MacroSAN MS7000G3
Storage System Datasheet

MacroSAN Technologies Co.,Ltd.

I. Product overview

MacroSAN MS7000G3 series storage is a new generation of high-end hybrid flash storage from MacroSAN Technologies. It adopts high-performance hardware architecture design and high-reliability design, with leading performance and specifications. It provides a safe, reliable, high-performance, intelligent and efficient storage platform for enterprise core businesses, fully meeting the growing performance and capacity requirements of scenarios such as large databases and server virtualization.

MS7000G3 Equipment Front View

II. Product characteristics

Extremely reliable

Fully Redundant Architecture: MS7000G3 adopts a modular, fully redundant architectural design. In the event of any component failure, it can achieve rapid fault isolation and online replacement of components to ensure business continuity.

Cache power-down protection: Adopts cache landing technology. When the storage is accidentally powered down, the cached data will be swiped down to the built-in SSD for permanent preservation through the built-in battery module, ensuring that the data in the cache will not be lost.

CRAID technology: The unique IDDC + CRAID technology can realize minute-level rapid reconfiguration of partially damaged hard disks. A single RAID group can tolerate physical failures of any three hard disks without data loss. Based on global load technology, IO is distributed to all hard disks, greatly improving IO concurrency capability to achieve rapid reconfiguration. The reconfiguration time for 1TB of data can be shortened to within 20 minutes, and it allows multiple disks in a RAID group to experience media failure at the same time without data loss. At the same time, combined with the storage system's hard disk slow power-up technology, it avoids the risk of tripping caused by current overload when a large number of hard disks are powered on at the same time, further ensuring high system reliability.

Controller self-healing technology: When all controllers of the storage engine are abnormal (such as crash or hardware/software failures), the system can quickly and automatically repair and restore normal operation, ensuring that cache data is not lost and greatly reducing business interruption time.

Cache Freeze Technology: When the data disk cannot write data due to flash-off or failure, the data in the cache can be frozen. After the data disk failure is repaired, the frozen cache data will be brushed to the data disk to ensure data is not lost.

Data consistency protection: Supports data consistency protection based on T10 PI, ensuring data integrity of the entire path from the host port to the hard disk during data reading and writing, preventing silent data errors, and safeguarding user data security.

MacroPath Multipath Software: When the server accesses LUNs through multiple paths, MacroPath can recognize the paths and manage them in an integrated way, detect the operation status of the paths in real time, warn when paths fail, and switch to normal paths in a timely manner to ensure high efficiency and reliability of services.

Complete Data Protection

MS7000G3 provides rich data protection features, including data snapshots, data replication, clone, symmetric dual-activity storage, etc. These features realize data management and protection from online to

nearline, and from local to remote, providing users with multi-level and cross-region data protection solutions.

Data Snapshot: MacroSAN's continuous data snapshot function can create up to 2048 incremental history-based point-in-time copies of a single data volume to provide continuous data protection. When data "soft" failures occur (such as data corruption caused by software programs, virus damage, accidental deletion, etc.), data can be quickly recovered by "rolling back" to the appropriate point-in-time mark. Supports cascading snapshots to further protect the security of snapshot data.Snapshot support for ROW and COW.

Encryption: Supports hardware-level encryption for data at rest via Self-Encrypting Drives (SED), and complies with GM/T 0002-2012 SM4, the cryptographic industry standard of the People's Republic of China, to meet the security requirements of government and enterprise customers.

Data replication: Supports both synchronous and asynchronous replication, which can be converted online according to business needs, taking into account business performance and data protection. It supports local replication within the device and remote replication across devices. The replication link supports 10/25/100GE Ethernet and 16/32G FC, providing flexible configuration options. Asynchronous replication supports customized data transmission intervals and can provide hopping, one-to-many, and many-to-one configurations. In case of unexpected disasters, services can be quickly restored based on data copies to ensure business continuity. Synchronous replication is based on IO-level synchronization, saving a fully synchronized real-time mirror for the main LUN data. When the main LUN data fails, the mirrored data can provide storage services with RPO=0.

Clone: The clone function can online provide a highly available and flexible data copy that is completely consistent with the production volume at a certain moment. After creating a clone, the clone volume can be immediately provided to front-end services without waiting for data synchronization to complete, which is suitable for application scenarios such as data analysis or testing of frequently generated data. It also supports forward and reverse synchronization, enabling the system to quickly synchronize data based on differences without re-cloning full data, realizing continuous data protection and flexible use.

Symmetric Dual-Activity Storage: Without introducing any third-party hardware or software, storage symmetric dual-activity is realized directly through two MS7000G3 storage devices, which are redundant with each other. When one storage fails, the other can take over the business in real time, achieving zero RPO and RTO. The dual-activity link between two MS7000G3 devices supports 10/25/100GE Ethernet and 16/32G FC. The dual-activity function can be combined with the replication function to realize a multi-site, cross-region ring 3DC disaster recovery solution, providing solution-level high reliability.

Superior Performance

High-performance hardware platform: MS7000G3 adopts a disk-control separation architecture design. The storage controller is based on 5th Gen Intel Xeon Scalable Processors with built-in hardware acceleration. The internal communication of the engine uses a high-speed 100GE RDMA channel, providing excellent IO processing capability. It supports NVMe over Fabrics, with front-end supporting high-speed 16/32Gb NVMe over FC and 25/100Gb NVMe over RoCE protocols, and back-end supporting expansion of NVMe SSD through 25/100GE RDMA interfaces. It builds a high-performance end-to-end NVMe architecture to break through performance bottlenecks and provide extreme IOPS and ultra-low latency.

Efficient Horizontal Expansion: MS7000G3 adopts MacroSAN's horizontal SAN expansion architecture, supporting online horizontal expansion via 10/25/100GE Ethernet and 16/32G FC network protocols. It can be expanded up to 48 storage controllers, 192TB of Tier-1 cache (DDR5), 1,344 host interfaces, and 48,000 disks, building a large-scale parallel storage system to meet growing data processing needs.

Intelligent Cache Scheduling: MS7000G3 adopts asymmetric cache scheduling technology in cache policy, dynamically adjusting the size of read and write caches according to actual conditions to meet the real-time changing performance requirements of LUNs.

Dynamic Load Balancing: Supports dynamic load balancing between controllers, adjusting workloads between controllers without interruption, eliminating performance bottlenecks, and achieving strict service level objectives.

Quality of Service Control (QoS): With the increasing performance and scalability of storage, more business systems are accommodated in a single storage system. Users need to specify different service priorities for different business types. The QoS function of MS7000G3 integrates and pools storage resources such as CPU, memory, and ports, ensuring that higher-priority service requests can obtain higher IOPS/bandwidth and lower response latency.

Intelligent Storage Platform for Flash

The high performance of flash hard drives has been widely recognized by the industry. With the ODSP storage operating system, MS Series storage integrates this leading hard drive technology into its high-performance architecture to provide an ultimate flash convergence solution.

Intelligent media identification for ultimate performance: The ODSP storage operating system can intelligently identify back-end storage media. For flash hard disks, it automatically executes flash optimization algorithms, reduces the frequency of hard disk operations, shortens the IO path, and provides ultimate performance.

Global Wear Balance Enhances Flash Memory Lifespan: Based on CRAID 3.0, integrated with flash memory characteristics, CRAID 3.0 flash memory optimization technology is formed. It can slice each flash hard disk into several small pieces to form a global resource pool, and then intelligently distribute IO to all small pieces evenly through discrete algorithms, thus achieving global wear balance and significantly enhancing the lifespan of flash memory.

Intelligent Data Management

MS7000G3 virtualizes resource space to form a Cell resource pool. Based on the dynamic allocation and free flow of Cells, MacroSAN has constructed a set of intelligent management methods, namely ICMT (Intelligent Cell Management Technology).

Auto-tiering/HotCache: With ICMT technology, there is no binding between LUNs, RAID, and hard disks. Through Cell-based data copying and migration, data can flow freely between different hard disk media according to data access frequency, realizing automatic tiering and HotCache Level 2 hotspot caching.

Automatic Thin Provisioning: Based on ICMT's automatic thin provisioning technology, the system automatically identifies front-end service IOs and coordinates the dynamic allocation of storage resources, significantly reducing the difficulty of capacity planning for system administrators.

Adaptive Deduplication: Based on the ODSP storage software platform, it realizes global data block-level, online and post-line adaptive non-destructive deduplication, reducing data volume and improving storage space utilization. The system automatically switches between online and post-line deduplication modes according to business load, reducing the impact of deduplication on business performance. Secondary comparison is performed before deleting duplicate data to avoid data loss. It supports flexible online enabling and disabling of the deduplication function by data volume, and can be used simultaneously with the online compression function to improve the data reduction ratio.

Online compression: Through the built-in data compression function module of the storage system, data is compressed online at the first time of writing. Lossless data compression is adopted to avoid data loss caused by compression. At the same time, through powerful hardware resources and optimized compression algorithms, the impact of data compression on front-end business systems is minimized to ensure smooth business access. It supports configuration of hardware acceleration cards to improve compression ratio and reduce the occupation of storage controller resources. It supports flexible online enabling and disabling of the compression function by data volume, and can be used simultaneously with the adaptive deduplication function to improve the data reduction ratio.

Efficient Operational Deployment

SAN/NAS Integration: In the same hardware device, it provides both SAN and NAS data storage services without configuring additional NAS gateway devices, reducing equipment investment, shortening data access paths, and effectively reducing the complexity of deployment and operation and maintenance. NAS supports file system snapshot, replication, dual-activity and other functions, and can build a SAN/NAS integrated dual-activity high-reliability solution.

Support for Cloud and Container Loads: MS7000G3 provides the ability to interface with the OpenStack cloud platform and K8S container orchestration platform, providing high-performance and

high-reliability storage resources for cloud and container environments, simplifying management, and improving business deployment efficiency.

Cloud Disk: Helps enterprise users quickly deploy and build private cloud/private network disk/online document management systems. MacroSAN Cloud Disk can support up to 10,000+ users and online preview of more than 100 formats of documents such as ai, psd, eps, CAD, 3D, pictures, audio, video, and multimedia. It helps enterprises realize centralized storage and management of documents, convenient sharing, mobile office, collaborative office, group rights management, etc., providing teams with a highly transparent and secure collaborative environment.

Open Platform, Interconnection

Heterogeneous virtualization: The built-in virtualized data management engine can integrate storage array devices of different brands and architectures (such as IP SAN and FC SAN) into MacroSAN's unified storage resource pool for unified management, effectively reducing management difficulty and maintenance costs, and improving resource utilization. In addition, the heterogeneous virtualization function can be paired with replication, snapshot, dual-activity and other software to achieve local or cross-site data protection, supporting virtualization of mainstream storage vendors' products and effectively protecting users' existing investments.

Non-disruptive Data Migration (NDM): MacroSAN's NDM technology can realize online data migration within a single device and across devices, with no front-end perception and no business interruption during migration. All series of MacroSAN hybrid arrays and all-flash arrays support NDM technology. Hybrid arrays can realize non-disruptive data migration with all-flash arrays through NDM technology. In addition, for third-party storage arrays, MacroSAN can also realize data migration to third-party storage arrays through NDM technology and heterogeneous virtualization function to achieve resource integration.

Comprehensive support for IPv6: Supports IPv4 and IPv6 dual protocol stacks. IP SAN storage networks can be constructed between hosts and storage via IPv4/v6 protocols, out-of-band management networks between management terminals and storage via IPv4/v6 protocols, and data replication networks

between storage devices via IPv4/v6 protocols, meeting the deployment, application and management needs of different application scenarios.

Full-series interconnection: Based on the ODSP unified software platform, MS7000G3 is compatible with all MS series products. Without third-party hardware and software, it can realize unified management through MacroSAN UBSM unified block storage management platform, simplify operation and maintenance, and realize flexible data migration and protection solutions.

III. Product specifications

Product Model	MS7040G3
Maximum controllers	48
Maximum Cache	192TB DDR5
Maximum front-End host port	1344
Front-end channel port types	16/32Gb/s FC、10/25/100Gb/s iSCSI、16/32Gb NVMe over FC、25/100Gb NVMe over RoCE
Protocols Support	FC, iSCSI, NVMe over FC, NVMe over RoCE, CIFS, NFS, HTTP, FTP, S3, etc.
Expanded Hard Disk Enclosure Types	2U DSU: 25 disk slot, support 2.5" NVMe SSD 4U DSU: 24 disk slot, support 2.5"/3.5" disk 2U DSU: 25 disk slot, support 2.5" disk
Drive types	SCM, NVMe, SSD, SAS, NL-SAS,SED(Self-Encrypting Drive), SATA, etc. （Support mixed insertion of different types of hard disks）
Maximum drives	48000
Maximum flash drives	16000
Maximum LUNs	65536
Disk detection and diagnosis	Support periodic disk detection
	Support intelligent dynamic adjustment of disk detection speed
RAID level and hot standby types	RAID/CRAID（CRAID3.0）0、1、3、4、5、6、10、50、60、X0 etc.
	Support dedicated hot standby, global hot standby, and idle hard disk hot standby
CRAID characteristics	The CRAID group allows multiple hard disks to have media errors, tolerates

	physical failures of any three disks, and supports normal reconstruction, local reconstruction, and fast reconstruction
Operating system supported	AIX, HP-UX, Solaris, Windows, Linux, Galaxy Kirin, China Standard Software, UnionTech OS, Ningsi, Bohua, China Science and Technology Foundry, etc.
Virtualization system supported	VMware、Citrix、Hyper-V、OpenStack、KVM、XEN、ZStack、Yunhong、H3C CAS, etc.
Multipath supported	Compatible with multi-path software that supports ALUA/SLUA features, enabling dynamic load balancing and link failover
Basic management software	MacroSAN management suite, including basic storage management, CRAID, system monitoring, log and alarm, etc.
Management model	Support graphical (Chinese), CLI, provide WebService access interface, SMI-S and Cinder management interface
Value-added features	Thin provisioning, Intelligent tiering, Non-disruptive data migration(NDM), Performance monitoring, Snapshot, Replication, Cloning, Symmetric dual-active, NAS dual-active, Heterogeneous virtualization, QoS, Multi-tenants, Deduplication, Compression,Encryption(SM4), Ring 3DC, Cloud Disk, etc.
Power input	100V～127V AC/200V～240V AC；60Hz/50Hz 240V HVDC
Temperature	Working temperature:5°C to 35°C
	Storage temperature: -20℃~+60℃
Humidity	Working humidity: 10%~90% R.H. (non-condensing)
	Storage humidity: 10%~90% R.H. (non-condensing)