

OceanStor Dorado 5000/6000 All-Flash Storage Systems

Ever Fast Performance with Innovative Hardware

30% higher performance than the previous generation

E2E NVMe for 0.05 ms of ultra-low latency

FlashLink® intelligent algorithms

Efficient O&M with Intelligent Edge-Cloud Synergy

Converged SAN and NAS for improved resource utilization

3-layer intelligent management:

- 365-day capacity trends prediction
- 60-day performance bottleneck prediction
- 14-day disk fault prediction
- Immediate solutions for 93% of problems

FlashEver: No data migration over 10 years for 3-gen systems

Always-On Applications with 5-Layer Reliability

Component reliability: Wear leveling and anti-wear leveling

Architecture and product reliability: 0 data loss in the event of failures of controllers, disk enclosures, or three disks

Solution and cloud reliability: 0 business interruption with gateway-free A-A design, geo-redundant 3DC solution, and gateway-free cloud backup

Huawei OceanStor Dorado 5000/6000 are mid-range storage systems in the OceanStor Dorado all-flash series, and are designed to provide excellent data service experience for enterprises. Both products are equipped with innovative hardware platform, intelligent FlashLink® algorithms, and an end-to-end (E2E) NVMe architecture, ensuring the storage systems deliver a 30% higher performance than the previous generation, and achieve the latency down to just 0.05 ms. The intelligent algorithms are built into the storage system to make storage more intelligent during the application operations. Furthermore, the five-level reliability design ensures the continuity of core business.

Excelling in scenarios such as OLTP/OLAP databases, server virtualization, VDI, and resource consolidation, OceanStor Dorado 5000/6000 systems are smart choices for medium and large enterprises, and have already been widely adopted in the finance, government, healthcare, education, energy, and manufacturing fields. The storage systems are ready to maximize your return on investment (ROI) and benefit diverse industries.

Product Features

Ever Fast Performance with Innovative Hardware

Innovative hardware platform:

The hardware platform of Huawei storage enables E2E data acceleration, improving the system performance by 30% compared to the previous generation.

- ✓ The intelligent multi-protocol interface module hosts the protocol parsing previously performed by the general-purpose CPU, expediting the front-end access performance by 20%.
- ✓ The computing platform offers industry-leading performance with 25% higher computing power than the industry average.

- ✓ The AI accelerator module analyzes and understands I/O rules of multiple application models based on machine learning frameworks to implement intelligent prefetching of memory space. This improves the read cache hit ratio by 50%.
- ✓ The intelligent SSD hosts the core Flash Translation Layer (FTL) algorithm, accelerating data access in SSDs and shortening the write latency by half.
- ✓ The intelligent hardware has a built-in Huawei storage fault library that accelerates component fault location and diagnosis, and shortens the fault recovery time from 2 hours to just 10 minutes.

Intelligent algorithms:

Most flash vendors lack E2E innate capabilities to ensure full performance from their SSDs. OceanStor Dorado 5000/6000 run industry-leading FlashLink® intelligent algorithms based on self-developed controllers, disk enclosures, and operating systems.

- ✓ Many-core balancing algorithm: Taps into the full power of the hardware platform in a controller to deliver premium computing power.
- ✓ Service splitting algorithm: Offloads reconstruction services from the controller enclosure to the smart SSD enclosure, easing load pressure.
- ✓ Cache acceleration algorithm: Accelerates batch processing with the intelligent module to bring intelligence to storage systems during application operations.

The data layout between SSDs and controllers is coordinated synchronously.

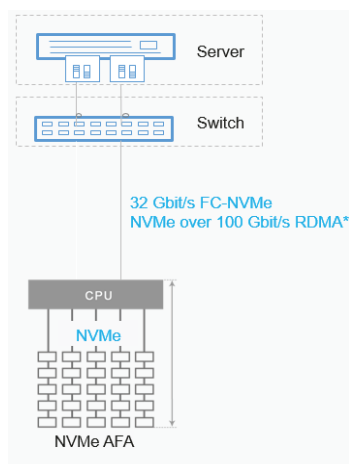
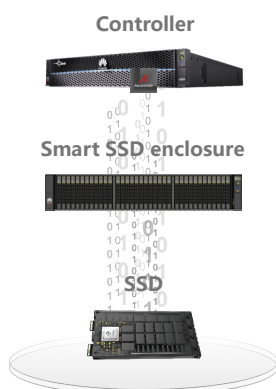
- ✓ Large-block sequential write algorithm: Aggregates multiple discrete data blocks into a unified big data block for disk flushing, reducing write amplification and ensuring stable performance.
- ✓ Independent metadata partitioning algorithm: Effectively controls the performance compromise caused by garbage collection for stable performance.
- ✓ I/O priority adjustment algorithm: Ensures that read and write I/Os are always prioritized, shortening the access latency.

FlashLink® intelligent algorithms give full play to all flash memory and help Huawei OceanStor Dorado achieve unparalleled performance for a smoother service experience.

E2E NVMe architecture for full series:

All-flash storage has been widely adopted by enterprises to upgrade existing IT systems, but always-on service models continue to push IT system performance boundaries to a new level. Conventional SAS-based all-flash storage cannot break the bottleneck of 0.5 ms latency. NVMe all-flash storage, on the other hand, is a future-proof architecture that implements direct communication between the CPU and SSDs, shortening the transmission path. In addition, the quantity of concurrencies is increased by 65,536 times, and the protocol interaction is reduced from four times to two, which doubles the write request processing. Huawei is a pioneer in adopting end-to-end NVMe architecture across the entire series. OceanStor Dorado 5000/6000 use the industry-leading 32 Gb FC/100 Gb NVMe protocols at the front end, and 100 Gb RoCE protocol at the back end for E2E data acceleration. This enables latency as low as 0.05 ms and 10x faster transmission than SAS all-flash storage.

FlashLink®



Linear increase of performance and capacity:

Unpredictability of business growth requires storage to provide effortless linear increases in performance as more capacity is added to keep up with ever-changing business needs.

OceanStor Dorado 5000/6000 support scale-out of 16 controllers, and IOPS increases linearly as the quantity of controller enclosures increases, matching the performance needs of the future business development.

Efficient O&M with Intelligent Edge-Cloud Synergy

Extreme convergence:

Huawei OceanStor Dorado 5000/6000 provide both SAN and NAS services to meet diverse service needs, improve storage resource utilization, and reduce total cost of ownership (TCO).

On and off-cloud synergy:

Huawei OceanStor Dorado 3000 all-flash system combines general-purpose cloud intelligence with customized edge intelligence over a built-in intelligent hardware platform, providing incremental training and deep learning for a personalized customer experience. The eService intelligent O&M and management platform collects and analyzes over 190,000 device patterns on the live network in real time, extracts general rules, and enhances basic O&M.

Intelligence throughout service lifecycle:

Intelligent management covers resource planning, provisioning, system tuning, risk prediction, and fault location, and enables 60-day and 14-day predictions of performance bottleneck and disk faults respectively, and immediate solutions for 93% of problems detected.

FlashEver:

The intelligent flexible architecture implements component-based upgrades without the need for data migration within 10 years. Users can enjoy latest-generation software and hardware capabilities while also protecting their existing investments.

Always-On Applications with 5-Layer Reliability

Industries such as finance, manufacturing, and carriers are upgrading to intelligent service systems to meet the strategy of sustainable development. This will likely lead to diverse services and data types that require better IT architecture. Huawei OceanStor Dorado all-flash storage is an ideal choice for customers who need robust IT systems that consolidate multiple types of services for stable, always on services. It ensures end-to-end reliability at all levels, from component, architecture, product, solution, all the way to cloud, supporting data consolidation scenarios with 99.9999% availability.

Benchmark-Setting Reliability

SSDs:

Reliability has always been a top concern in the development of SSDs, and Huawei SSDs are a prime example of this. Leveraging global wear-leveling technology, Huawei SSDs can balance their loads for a longer lifespan of each SSD. In addition, Huawei's patented anti-wear leveling technology prevents simultaneous multi-SSD failures and improves the reliability of the entire system.



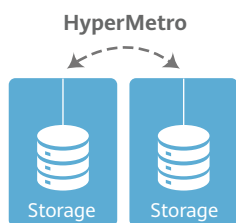
SSD

Architecture:

Huawei OceanStor Dorado 5000/6000 adopt the intelligent matrix architecture (multi-controller) within a fully symmetric active-active (A-A) design to eliminate single points of failure and achieve high system availability. Application servers can access LUNs through any controller, instead of just a single controller. Multiple controllers share workload pressure using the load balancing algorithm. If a controller fails, other controllers take over services smoothly without any service interruption.

Products:

Product design is a systematic process. Before a stable storage system is commercially released, it must ensure that it meets the demands from both software and hardware, and can faultlessly host key enterprise applications. The OceanStor Dorado 5000/6000 are equipped with hardware that adopts a fully redundant architecture and supports dual-port NVMe and hot swap, preventing single points of failure. The innovative 9.5 mm palm-sized SSDs and biplanar orthogonal backplane design provide 44% higher capacity density and 25% improved heat dissipation capability, and ensure stable operations of 2U 36-slot SSD enclosures. The smart SSD enclosure is the first ever to feature built-in intelligent hardware that offloads reconstruction from the controller to the smart SSD enclosure. Backed up by RAID-TP technology, the smart SSD enclosure can tolerate simultaneous failures of three SSDs and reconstruct 1 TB of data within 20 minutes. In addition, the storage systems offer comprehensive enterprise-grade features, such as 3-second periodic snapshots, that set a new standard for storage product reliability.

**Gateway-free active-active solution:**

Flash storage is designed for enterprise applications that require zero data loss or zero application interruption. OceanStor Dorado 5000/6000 use a gateway-free A-A solution to prevent node failures, simplify deployment, and improve system reliability. In addition, the A-A solution implements A-A mirroring for load balancing and cross-site takeover without service interruption, ensuring that core applications are not affected by system breakdown. The solution can also be smoothly upgraded to the geo-redundant 3DC solution for high-level data protection.

Gateway-free cloud DR*:

Traditional backup solutions are slow, expensive, and the backup data cannot be directly used. Huawei OceanStor Dorado 5000/6000 systems provide a converged data management solution. It improves the backup frequency 30-fold using industry-leading I/O-level backup technology, and allows backup copies to be directly used for development and testing. The disaster recovery (DR) and backup are integrated in the storage array, slashing TCO of DR construction by 50%. Working with HUAWEI CLOUD and Huawei jointly-operated clouds, the solution achieves gateway-free DR and DR in minutes on the cloud.

Technical Specifications

Model	OceanStor Dorado 5000 V6		OceanStor Dorado 6000 V6	
Hardware Specifications				
Maximum Number of Controllers	16*			
Maximum Cache (Dual Controllers, Expanding with the Number of Controllers)	256 GB-4 TB	1 TB-8 TB		
Supported Storage Protocols	FC, iSCSI, NFS, CIFS			
Front-End Port Types	8/16/32 Gbit/s FC/FC-NVMe*, 10/25/40/100 GbE, 25/100 Gb NVMe over RoCE*			
Back-End Port Types	SAS 3.0/100 Gb RDMA			
Maximum Number of Hot-Swappable I/O Modules per Controller Enclosure	12			
Maximum Number of Front-End Ports per Controller Enclosure	48			
Maximum Number of SSDs	1,600	2,400		
SSDs	1.92 TB/3.84 TB/7.68 TB/15.36 TB* palm-sized NVMe SSDs 960 GB/1.92 TB/3.84 TB/7.68 TB/15.36 TB SAS SSDs			
SCM Supported	800 GB* SCM			
Software Specifications				
Supported RAID Levels	RAID 5, RAID 6, RAID 10*, and RAID-TP (tolerates simultaneous failures of 3 SSDs)			
Number of LUNs	16,384	32,768		
Value-Added Features	SmartDedupe, SmartVirtualization, SmartCompression, SmartMigration, SmartThin, SmartQoS, HyperSnap, HyperReplication, HyperClone, HyperMetro, HyperCDP, CloudBackup *, SmartTier*, SmartCache*, SmartQuota*, SmartMulti-Tenant*			
Storage Management Software	DeviceManager	UltraPath	eService	
Physical Specifications				
Power Supply	SAS SSD enclosure: 100V-240 V AC±10%, 192V-288V DC Controller enclosure/Smart SAS disk enclosure/Smart NVMe SSD enclosure: 200V-240V AC±10%, 100-240V AC±10%,192V-288V DC, 260V-400V DC		SAS SSD enclosure: 100V-240V AC±10%, 192V-288V DC Controller enclosure/Smart SAS SSD enclosure/Smart NVMe SSD enclosure: 200V-240V AC±10%, 192V-288V DC, 260V-400V DC	
Dimensions (H x W x D)	SAS controller enclosure: 86.1 mm × 447 mm × 820 mm NVMe controller enclosure: 86.1 mm × 447 mm × 920 mm SAS SSD enclosure: 86.1 mm × 447 mm × 410 mm Smart SAS SSD enclosure: 86.1 mm x 447 mm x 520 mm NVMe SSD enclosure: 86.1 mm x 447 mm x 620 mm		SAS controller enclosure: 86.1 mm × 447 mm × 820 mm NVMe controller enclosure: 86.1 mm × 447 mm × 920 mm SAS SSD enclosure: 86.1 mm × 447 mm × 410 mm Smart SAS SSD enclosure: 86.1 mm × 447 mm ×520 mm NVMe SSD enclosure: 86.1 mm x 447 mm x 620 mm	
Weight	SAS controller enclosure: ≤ 45 kg NVMe controller enclosure: ≤ 50 kg SAS SSD enclosure: ≤ 20 kg Smart SAS SSD enclosure: ≤ 30 kg Smart NVMe SSD enclosure: ≤ 35 kg		SAS controller enclosure: ≤ 45 kg NVMe controller enclosure: ≤ 50 kg SAS SSD enclosure: ≤ 20 kg Smart SAS SSD enclosure: ≤ 30 kg Smart NVMe SSD enclosure: ≤ 35 kg	
Operating Temperature	-60 m to +1800 m altitude: 5°C to 35°C (bay) or 40°C (enclosure) 1800 m to 3000 m altitude: The max. temperature threshold decreases by 1°C for every altitude increase of 220 m			
Operating Humidity	10% RH to 90% RH			

*For further details on specification with an asterisk for a specific project, please contact Huawei sales.

To learn more about Huawei storage, please contact the local office or visit Huawei Enterprise website <http://e.huawei.com>.



Huawei Enterprise APP





Huawei IT



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