# Agenda

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</tbody>
</table>
Global market overview

The following data comes from the storage data baseline.

- The market share of mid-range and entry-level block storage grew slowly. In 2013, the market shares of mid-range and entry-level block storage and high-end block storage accounted for 32.8% and 26.32% respectively.
- The market share of unified storage grew year by year from 2008 to 2013 and the average market growth rate was up to 7%.
- The market share of NAS storage was unstable. In 2009, the market share of NAS storage encountered negative growth. However, the growth rate of the market share increased sharply to 32% in 2012.
Major storage products in 2014

- SmartThin
- UltraPath
- SmartQoS
- SmartPartition
- SmartMotion
- SmartTier
- HyperCopy
- HyperSnap
- HyperClone
- HyperReplication

T series unified storage

Main product

OceanStor 18000 series

Flagship product
## Product positioning — Target markets

<table>
<thead>
<tr>
<th>Category</th>
<th>Model</th>
<th>Characteristic</th>
<th>Use Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-end storage</td>
<td>OceanStor 18800/18500/18800F S6800T</td>
<td>Highest performance, Largest scale, Most powerful connection capability, Strongest capacity optimization capability, Highest efficiency, Memory optimization</td>
<td>Large-scale integration, L1 application program virtualization, Hybrid load balancing, Multiple application programs, High-performance applications</td>
</tr>
<tr>
<td>Mid-range storage</td>
<td>S5800T S5600T S5500T</td>
<td>Unified storage, Stable performance, Strong capacity expansion capability, Excellent capacity optimization capability, Efficient services, Flash memory optimization (SSD-based tiered storage)</td>
<td>Enterprise application programs (Oracle, email, and SAP), Storage integration, Server virtualization, Advanced storage tiering, Data protection, File sharing</td>
</tr>
<tr>
<td>Entry-level storage</td>
<td>S2600T S2200T</td>
<td>Good performance and capacity, Ease of use, Cost effectiveness</td>
<td>Basic integration, Microsoft application programs, Entry-level server virtualization, iSCSI SAN, Video surveillance</td>
</tr>
</tbody>
</table>
Target application scenarios — Data centers

Data center (production/DR center)

Application/Server
- NetBackup/BE server
- OA
- Billing
- Email
- SAP
- ERP

Network

Primary storage

Secondary storage

OceanStor 18000 series and T series

Data Center Storage

<table>
<thead>
<tr>
<th>Data Center Storage</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary storage</td>
<td>Centralized storage, DR</td>
</tr>
<tr>
<td>Secondary storage</td>
<td>Storage tiering, secondary storage</td>
</tr>
<tr>
<td>Secondary storage</td>
<td>Backup media, D2D</td>
</tr>
</tbody>
</table>

Major application scenarios
Specific application scenarios
## Target application scenarios — IT applications

<table>
<thead>
<tr>
<th>Application Scenario</th>
<th>Major Application Scenarios</th>
<th>Specific Application Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical IT applications (database, ERP, and email)/Data integration</td>
<td>Exchange, SQL, Oracle, SAP, SharePoint, and DB2</td>
<td></td>
</tr>
<tr>
<td>Server virtualization/Cloud computing</td>
<td>VMware, Hyper-v, and Citrix</td>
<td></td>
</tr>
<tr>
<td>VDI</td>
<td>VMware, Hyper-v, and Citrix</td>
<td></td>
</tr>
<tr>
<td>Video surveillance/VoD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File sharing/File server consolidation</td>
<td>Specific application scenarios</td>
<td></td>
</tr>
<tr>
<td>Disk backup</td>
<td>Specific application scenarios</td>
<td></td>
</tr>
<tr>
<td>Archive</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Big data (life science and oil exploration)</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

### Applicable to structured data storage scenarios

- Major application scenarios
- Specific application scenarios
## Target application scenarios — IT industries

<table>
<thead>
<tr>
<th>Sector</th>
<th>Major Customer</th>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>Public security, security, customs, taxation, social security, health care, and government affairs</td>
<td>Public security: macroscopic intelligence, police services integrated platform, population information library, safe city, network surveillance, and technical investigation Security: Communications Bureau, Measurement and Control Bureau, Jiangnan Institute, 84X Institute; 12 Golden Projects including Golden Tax, Golden Insurance, and Golden Auditing; regional health platform construction; data center DR construction of information committees</td>
</tr>
<tr>
<td>Finance</td>
<td>Big four banks, commercial banks, CITIC, insurance, securities</td>
<td>Check image and e-archive; DR construction of city commercial banks; Data center backup of small- and medium-sized banks outside China, centralized storage of non-financial systems</td>
</tr>
<tr>
<td>Large enterprises</td>
<td>Electronics manufacturing, tobacco, metallurgy</td>
<td>Storage construction of mail, ERP, and EDM systems; backup and DR system construction</td>
</tr>
<tr>
<td>Electric power</td>
<td>State Grid Corporation of China, China Southern Power Grid, Eskom, CFE, MEA, OEDAS</td>
<td>Centralized procurement of traditional dispatching system, smart metering and intelligent dispatching system D5000, SG-ERP short list of power corporations</td>
</tr>
<tr>
<td>Oil and gas</td>
<td>PetroChina, Sinopec, CNOOC, Saudi Aramco, PDVSA, PEMEX, Abu Oil</td>
<td>Pipeline video surveillance, shortlisted in centralized procurement</td>
</tr>
<tr>
<td>Media assets</td>
<td>National, provincial, and municipal TV stations, film and TV companies</td>
<td>NLE system, packaging system, and media asset library of TV stations; NLE and animation of film and TV companies</td>
</tr>
<tr>
<td>Transportation</td>
<td>Subway, light rail, Ministry of Railways, railway and road bureaus, provincial transportation departments, highway</td>
<td>Video surveillance storage for rail transit, data center storage for railway and road bureaus, high-availability virtualized consolidation for ticketing systems</td>
</tr>
<tr>
<td>Commerce</td>
<td>Government agencies, SMBs, hospitals, education</td>
<td>Centralized storage and DR for various business systems</td>
</tr>
</tbody>
</table>
Agenda

1. Product Overview And Positioning
2. Product Highlights
3. Product Comparison
4. Success Stories
5. Ordering Guide
6. How to Get Resources
OceanStor 18000 series enterprise storage

Secure and trustworthy
- **Full redundancy design**: Fully redundant multi-controller system architecture based on Smart Matrix, maximizing system stability and preventing data loss
- **Dedicated assurance**: SmartQoS and SmartPartition, delivering dedicated assurance for core services
- **Sound disaster recovery solutions**: Industry-leading RPO of 0 to 5 seconds, ensuring continuity of core services

Flexible and efficient
- **Flexible scalability**: Flexible expansion, improving volume performance and space without adding hardware resources to meet the needs of increasing services
- **Peerless performance and specifications**: 1 million IOPS/16 controllers/7 PB capacity/3 TB Cache, two times as average industrial specifications and applicable to any complex scenario
- **Easy to meet virtualization**: Full internal software architecture virtualization with wide support for open standards, boosting management efficiency
## OceanStor 18000 series specifications

<table>
<thead>
<tr>
<th>Product Name</th>
<th>18500</th>
<th>18800</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware Specifications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. number of disks</td>
<td>1584</td>
<td>3216</td>
</tr>
<tr>
<td>Max. number of controllers</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Max. cache capacity</td>
<td>768 GB</td>
<td>3072 GB</td>
</tr>
<tr>
<td><strong>Software Specifications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic software</td>
<td>A control system software package provides the following functions: Storage resource management, RAID, dynamic LUN expansion, dynamic RAID group expansion, online upgrade, performance statistics, alarm management, remote power-off, and <strong>online LUN migration</strong></td>
<td></td>
</tr>
<tr>
<td>Virtual snapshot (license-controlled)</td>
<td>HyperSnap</td>
<td></td>
</tr>
<tr>
<td>LUN copy (license-controlled)</td>
<td>HyperCopy</td>
<td></td>
</tr>
<tr>
<td>Remote replication (license-controlled)</td>
<td>HyperReplication (including 3DC)</td>
<td></td>
</tr>
<tr>
<td>LUN clone (license-controlled)</td>
<td>HyperClone</td>
<td></td>
</tr>
<tr>
<td>Thin provisioning (license-controlled)</td>
<td>SmartThin</td>
<td></td>
</tr>
<tr>
<td>Tiered storage (license-controlled)</td>
<td>SmartTier</td>
<td></td>
</tr>
<tr>
<td>Intelligent data motion (license-controlled)</td>
<td>SmartMotion</td>
<td></td>
</tr>
<tr>
<td>QoS (license-controlled)</td>
<td>SmartQoS</td>
<td></td>
</tr>
<tr>
<td>Cache partitioning (license-controlled)</td>
<td>SmartPartition</td>
<td></td>
</tr>
<tr>
<td>Heterogeneous consolidation (license-controlled)</td>
<td>SmartVirtualization</td>
<td></td>
</tr>
<tr>
<td>Data encryption (license-controlled)</td>
<td>SmartEncryption</td>
<td></td>
</tr>
</tbody>
</table>

The roadmap prevails for the delivery time of the features in red font.
OceanStor 18000 series system architecture dedicated to critical services

Multi-controller system architecture

- **Global resource sharing**
  - Resources of one controller can be used by other controllers and global cache is available.

- **Load balancing**
  - Controllers are in active-active mode and loads on controllers are balanced.

- **Scale-out**
  - A storage system can be expanded to a maximum of 8 engines or 16 controllers.

- **Full PCIe switching**
  - Loose coupling (Engines are relatively independent.)
  - Block-free interconnection of global resources
Smart Matrix of the OceanStor 18000 series

Mirror channel

PCIe 2.0 port (4 GB/s)

PCIe link

Enclosure 0

Enclosure 1

Enclosure 2

Enclosure 3

DSW 0

DSW 1

PCIe switch

Multi-controller architecture
OceanStor 18000 series load balancing within a controller

- The storage system automatically executes LUN load balancing on different controllers.
- LUN space balancing is implemented on all disks.
- The UltraPath can automatically select an optimum path (optimum owning controller).
Two-layer virtualization of the OceanStor 18000 series RAID 2.0+

Huawei two-layer virtualization RAID 2.0+: underlying medium virtualization + upper-layer resource virtualization, solving fast data reconstruction problems and intelligent resource allocation problems, superior to traditional RAID 2.0 of competitors.

- Fast data reconstruction: shortening data reconstruction time from 10 hours to 30 minutes, accelerating reconstruction by 20 times.
- Intelligent resource allocation: smart software–based resource allocation, improving efficiency.

Improving data reconstruction by 20 times and boosting intelligent resource allocation efficiency.
Traditional RAID groups vs. EAID 2.0+ virtual storage pool

**Traditional RAID group**

- **RAID 1, RAID 2, RAID 3**
  - Each RAID group occupies member disks exclusively, wasting the concurrent I/O processing capability of disks.
  - The RAID group is limited in the number of disks due to the parity check.

- **Pool 1, Pool 2**
  - Each pool shares DD member disks, making full use of the concurrent I/O processing capability of disks.
  - A pool has a fixed number of parity bits, leading to an unlimited number of concurrent I/Os on disks.

**EAID 2.0+ storage pool**

- **Thick LUN, Thin LUN, Snapshot resource pool, Hot spare disk**
  - Each function space is independently allocated and cannot be flexibly used, resulting in capacity silos.
  - All function space shares the capacity of pools. The pool allocates space to each function space after receiving an application request.
RAID 2.0+ accelerating data reconstruction by 20 times

Underlying virtualization

- Internal Disk
- External Disk
- Chunk
- CKG
- RAID

Upper-layer virtualization

- Extent
- Volume/File
- SmartCache
- SmartTier
- SmartMotion
- SmartThin
- SmartVirtualization

Faster RAID reconstruction ensuring a more reliable system

- RAID ensures basic data reliability. However, RAID reconstruction is the weakest link in a storage system. If a disk fails when the reconstruction is not complete, data is lost. Therefore, faster RAID reconstruction ensures a more reliable system.

RAID 2.0+ accelerating data reconstruction by 20 times

- MB-level data reconstruction: The basic units of RAID 2.0+ are 64 MB data blocks. The basic units of traditional RAID groups are TB-level disks. A smaller granularity benefits data reconstruction.
- All disks rather than member in RAID groups participating in reconstruction: RAID 2.0+ enables all disks to participate in reconstruction.
- According to Huawei’s actual test, RAID 2.0+ shortens reconstruction time from 10 hours to 30 minutes, accelerating data reconstruction by 20 times.
RAID 2.0+ reserves some hot spare space and distributes the hot spare space to all disks.

When a disk fails and must be reconstructed, all disks in the storage pool participate in the reconstruction. Compared with N-to-1 reconstruction mode of traditional RAID groups, RAID 2.0+ reconstructs data in N-to-N mode, accelerating data reconstruction by N times.

Data recovery time: 30 minutes per TB
### OceanStor 18000 series RAID 2.0+: smart software–based intelligent resource allocation

#### Underlying virtualization

<table>
<thead>
<tr>
<th>Internal Disk</th>
<th>Chunk</th>
<th>CKG</th>
<th>RAID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External Disk</th>
<th>SmartVirtualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCo/ISC/FCOE...</td>
<td></td>
</tr>
<tr>
<td>NFS/CIFS....</td>
<td></td>
</tr>
<tr>
<td>S3.....</td>
<td></td>
</tr>
</tbody>
</table>

#### Upper-layer virtualization

- **Extent**
- **Volume/File**
- **SmartCache**
- **SmartTier**
- **SmartMotion**
- **SmartThin**

#### Smart software improving system efficiency

- The upper-layer virtualization and smart series software enables intelligent resource allocation of a storage system, improving efficiency by three times.

#### Smart series software

- **SmartTier**: It enables refined data access, statistics, copy and migration, accelerates access to data specified by users, and simplifies data processing process, improving performance by three times.
- **SmartMotion**: It relocates data to suit service characteristics without the need to migrate LUNs or stop the storage system and increases overall disk utilization by two times.
- **SmartThin**: It allocates storage resources on demand and improves storage efficiency by three times.
OceanStor 18000 series efficient smart software suite

- **SmartVirtualization**: Data flowing deeply
- **SmartThin**: Smart thin provisioning
- **SmartQoS**: Smart quality of service
- **SmartPartition**: Cache partitioning
- **SmartMotion**: Data flowing horizontally
- **SmartTier**: Data flowing vertically

*The SmartVirtualization is being developed.*
OceanStor 18000 series SmartTier: a balance among cost, performance, and capacity

- Intelligent data flow among storage tiers
- Optimal utilization of storage performance resources
- Service continuity during resource adjustment
- On-demand storage media allocation to store the right data onto the right location at the right time, reducing hotspot data access latency by 80%
OceanStor 18000 series SmartMotion: reducing average disk load and improving disk utilization

- Hotspot data unbalances access to disks, resulting in volume performance bottlenecks.
- The SmartMotion enables volume data to be more evenly distributed on disks and more disks to process volume I/Os.
- Balanced data distribution and eliminated disk hot spots maintain disks at optimum conditions and improve data utilization by 50%.

Eliminating hot spots on disks and improving resource utilization by 80%
OceanStor 18000 series SmartQoS: giving priority to critical services

- **Service quality control:**
  - Helps critical services reach their expected performance by providing them with necessary storage resources in a timely manner.

- **SLA-based management of storage resources**
  - Monitors application performance and achieves performance targets.

- **Policy-based performance optimization**
  - Sets performance targets for critical applications.
  - Sets performance upper limits for low-priority applications, preventing resource contention.
  - Sets QoS policies and implements them at different intervals.

SmartQoS serves the most important applications with the optimum storage resources.
OceanStor 18000 series SmartPartition: Dedicated assurance for core services

- Manages cache resources based on policies.
  - Sets cache partitioning targets for critical services.
  - Dynamically adjusts cache resources for services to meet the targets.
- Dynamically shares cache partitions, providing flexible cache availability.
- Isolates caches for different services, preventing malicious cache contention.
- Ensures adequate cache resources for critical services to meet their performance targets.

<table>
<thead>
<tr>
<th>Cache partition</th>
<th>Cache partition 2</th>
<th>Cache partition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Physical cache
OceanStor 18000 SmartThin: on-demand purchase

Optimum resource utilization
Highest thin LUN performance
Seamless space allocation and reclamation

- Real-time allocation of physical space, improving storage utilization
  - Allocates storage space based on the number of write I/Os delivered by hosts.
- Extended lifespan of storage capacity, reducing purchase costs
- Automated processes, reducing capacity management complexity by 95%
  - When the available space of a thin LUN is below the threshold, the system automatically adds physical space to the thin LUN.
  - Capacity planning is not needed, which simplifies storage resource allocation and reduces the overhead.

Improving space utilization, simplifying capacity management, and facilitating refined IT investment
OceanStor 18000 series: second-level RPO

Synchronous replication

1. Synchronous I/O write to the primary and secondary storage, ensuring zero I/O loss
2. Secondary storage
3. Primary storage

Asynchronous replication

1. Snapshot every 5 seconds based on time stamps
2. Snapshot-based remote data replication
3. Primary storage
4. Secondary storage

Efficient data replication for easy disaster recovery

- Synchronous replication (RPO = 0): The I/O processing completes only after I/Os are written onto both the primary and secondary storage systems for disaster recovery. After a successful synchronous replication, no data will be lost in an event of a disaster.
- Asynchronous replication (RPO = 5 seconds): Memory time stamps are used to generate snapshots for data on the primary and secondary storage systems every 5 seconds. At the same time, remote replication is performed for the snapshot data. The asynchronous replication ensures minimum data loss each 5 seconds.
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## Comparison Table

<table>
<thead>
<tr>
<th>Huawei</th>
<th>EMC</th>
<th>IBM</th>
<th>HDS</th>
<th>HP</th>
<th>Fujitsu</th>
</tr>
</thead>
<tbody>
<tr>
<td>18800</td>
<td>VMAX 40K</td>
<td>VMAX 20K</td>
<td>DS8870 1T</td>
<td>3PAR 10800</td>
<td>DX8700 S2</td>
</tr>
<tr>
<td>3 TB</td>
<td>2 TB</td>
<td>1 TB</td>
<td>DS8800 384GB</td>
<td>768 GB</td>
<td>1152 GB</td>
</tr>
<tr>
<td>18500</td>
<td>VMAX 10K</td>
<td>XIV G3</td>
<td>VSP 1 TB</td>
<td>3PAR 10400</td>
<td></td>
</tr>
<tr>
<td>768 GB</td>
<td>512 GB</td>
<td>720 GB</td>
<td></td>
<td>192 GB</td>
<td></td>
</tr>
</tbody>
</table>
General competition strategy

The OceanStor 18000 is a new product with a few application cases and the brand competitiveness is weak. However, the product is in line with development trends of storage technologies.

The pricing of the OceanStor 18000 is based on HDS pricing and close to HP pricing with price advantages in hardware specifications, performance, and scalability.

The basic capabilities of the OceanStor 18000 are similar to those of other vendors. However, the OceanStor 18000 has comprehensive functions with advantages in storage virtualization and data relocation. Details need to be improved.

The specifications, performance, and scalability of the OceanStor 18000 are excellent. (Number of controllers/switch bandwidth/cache/disks/host ports/disk bandwidth)

Focusing on open system environments

Using excellent technologies to beat IBM and HP and cost-effectiveness to beat EMC and HDS

Strengthening high-end image and brand, exploiting advantages, and avoiding disadvantages in China

Force competitors to elevate product levels and prices and use the OceanStor 18000 series to beat mid-range and high-end products of competitors.
## Enterprise storage array comparison

### Comparison between the OceanStor 18000 and EMC VMAX & HDS VSP

<table>
<thead>
<tr>
<th></th>
<th>HUAWEI OceanStor 18000</th>
<th>EMC VMAX</th>
<th>HDS VSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching type of system architecture</td>
<td>16 controllers PCIe lossless switching</td>
<td>16 controllers RapidIO lossy switching</td>
<td>8 controllers PCIe lossless switching</td>
</tr>
<tr>
<td>Dispersed deployment</td>
<td>Supported by all bays</td>
<td>Supported by 2 bays</td>
<td>Not supported</td>
</tr>
<tr>
<td>Data recovery speed (per TB)</td>
<td>30 minutes</td>
<td>720 minutes</td>
<td>720 minutes</td>
</tr>
<tr>
<td>Synchronous RPO</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Asynchronous RPO</td>
<td>5 seconds</td>
<td>60 seconds</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Random IOPS performance</td>
<td>1 million</td>
<td>-</td>
<td>260,000</td>
</tr>
<tr>
<td>Automatic tiering migration granularity</td>
<td>0.5 MB</td>
<td>7.6 MB</td>
<td>42 MB</td>
</tr>
<tr>
<td>Cache partitioning speed</td>
<td>A maximum of 64 partitions, taking effect immediately</td>
<td>A maximum of 8 partitions, taking effect immediately</td>
<td>5 minutes/GB, no interruptions</td>
</tr>
<tr>
<td>Data motion</td>
<td>Supported</td>
<td>Supported</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

- **Lossless switching of 16 controllers, shorter latency than EMC VMAX and stronger concurrent processing than HDS VSP**
- **90% faster data recovery than EMC VMAX and HDS VSP**
- **80% better RPO than EMC VMAX and HDS VSP in asynchronous replication**
- **200% better performance than HDS VSP**
- **90% and 95% better automatic migration than EMC VMAX and HDS VSP respectively, better hotspot performance, improving SSD utilization**
- **Cache partitioning ensuring performance of critical services, 7 times better than EMC VMAX** (The function takes effect immediately. Cache partitioning of HDS VSP takes several hours.)

### Comparison between the OceanStor 18000 and IBM DS8000 & HP P10000

- **IBM**: limited scalability of IBM dual-controller architecture, no heterogeneous virtualization, cache partitioning, and motion functions, reuse unavailable, uncertain performance of critical services, and global disk load balance unavailable
- **HP**: reuse unavailable and uncertain performance of critical services

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EMC: from tight coupling to loose coupling

DMX-4
- System architecture: Direct Matrix
- Max. number of controllers: 8
- Max. number of host ports: 64
- Max. cache size: 512 GB
- Max. number of disk slots: 2400

VMAX & VMAXe
- System architecture: Virtual Matrix
- Max. number of controllers: 16
- Max. number of host ports: 128
- Max. cache size: 1 TB
- Max. number of disk slots: 2400

VMAX40K
- System architecture: Virtual Matrix
- Max. number of controllers: 16
- Max. number of host ports: 128
- Max. cache size: 2 TB
- Max. number of disk slots: 3200

2004  →  2009  →  2012  →  2013  →  2014
Architecture evolution  Hardware specification improvement  High-end and midrange integration and hardware specification improvement

- DMX-4 was based on the tight coupling direct-connection matrix architecture. In 2009, VMAX was released and used the loose coupling virtual matrix architecture.
- VMAX and VMAXe were renamed as VMAX10K and VMAX20K respectively. VMAX40K hardware was upgraded only. VMAX hardware platform was separated from VNX hardware platform. VMAX10K was based on VNX7500. VMAX20K was stacked with 4 U CX-960.
- In 2013, VNX2 was released. EMC combined VMAX and VNX. However, the classification of high-end storage and mid-range storage became vague.
- At the end of 2014 Q2, EMC will launch its new-generation VMAX. Its hardware platform will use 4 U independent engine of VMX8000. The number of front-end ports of a single engine will be up to 88.

EMC will deliver the next-generation VMAX in 2014, and the hardware is based on 4 U independent controller of VNX8000.
Architecture comparison: EMC VMAX vs. HUAWEI 18000 series

**VMAX**

The virtual matrix switching architecture use RapidIO bus for interconnection. The total bandwidth is up to 160 GB/s. The storage system can be expanded to 16 controllers online.

**OceanStor 18000**

The smart matrix switching architecture use PCIe 2.0 bus for interconnection. The total bandwidth is up to 192 GB/s. The storage system can be expanded to 16 controllers online.
HTB EMC VMAX (1)

**Hardware**
- **Poor processing capability**: VMAX10K uses 2 U controller enclosures.
- **High expansion risk**: All engines of VMAX20K/40K are placed in one bay. Capacity expansion affects running of the existing engine.
- **More performance consumption**: Data switching of the RapidIO switching architecture affects performance and the latency is prolonged.

**Disaster recovery**
- **Inadequate local protection**: Each volume of VMAX has 128 snapshots only. The OceanStor 18000 has up to 1024 snapshots.
- **High RPO**: RPO is 60 seconds during asynchronous remote replication. The RPO of the OceanStor 18000 is 5 seconds only.
- **Weak connectivity**: The VMAX cannot be interconnected with VNX for disaster recovery. The OceanStor 18000 can be interconnected with the T series for disaster recovery.

**Efficiency**
- **Inaccurate hotspot management**: Tiered storage statistics and migration are implemented in unit of 7.6 MB. 8 KB I/O hotspot distribution of databases cannot be managed accurately. The OceanStor 18000 executes tiered storage statistics and migration in unit of 8 KB.
- **Rough space allocation**: Space is allocated in unit of 768 KB. The OceanStor 18000 allocates space in unit of 8 KB.
- **Slow reconstruction**: RAID reconstruction of VMAX takes 10 hours (per TB). The OceanStor 18000 requires 30 minutes (per TB) to complete RAID reconstruction.
HTB EMC VMAX (2)

**HTB**

- Use high hardware specifications (maximum cache, number of host ports, number of CPU cores, and maximum number of disks) of the OceanStor 18000 to beat VMAX10K to force EMC to promote its VMAX20K or a product with higher specifications.
- Use host ports and cache that are actually configured to force EMC to use higher configuration.
- Use high hardware specifications (maximum cache, number of host ports, number of CPU cores, and maximum number of disks) of the OceanStor 18000 to beat VMAX40K.
- Use more software such as the local data protection software and cache partitioning software to beat EMC VMAX.
- Use large-capacity SSDs to beat EMC VMAX.
- Get customers to configure synchronous and asynchronous remote replication at the same time in disaster recovery scenarios.

**How to defend**

- Few Success Stories (HUAWEI OceanStor 18000 series storage products have been widely applied in many industries and sections, including public security, taxation, energy, and narrowly defined governments. Use the Success Stories of other OceanStor enterprise storage products and tier-1 accounts in addition to those of the OceanStor 18000.)
HDS: sticking to the tight coupling architecture

**USP-V & USP-VM**
- System architecture: Hi-Star
- 2007

**VSP**
- System architecture: Hi-Star E
- Max. number of controllers: 8
- 1 TB cache
- 2048 disks
- 2010

**HUS-VM**
- System architecture: Hi-Star E
- Max. number of controllers: 2
- 256 GB cache
- 1152 disks
- 2012

**HDS sticks to using the tight coupling architecture.** The tight coupling architecture of VSP is Hi-Star E that is the fifth generation star-based switching architecture. HDS uses traditional three-layer architecture. In this architecture, the front-end controller is connected to hosts, the back-end controller is connected to disk bays, and cache is at the middle layer. In the new VSP architecture, HDS uses virtual storage directors (VSD) that controls the direction of all I/Os. However, VSD is not involved in data switching and has no impact on data performance.

- As the basic enterprise storage system, HUS-VM was launched last year and uses the Hi-Star E architecture. The number of controllers is restricted to 2. HUS-VM inherits many advanced features from VSP. These features include heterogeneous virtualization and cache partitioning. The advanced features of enterprise storage are gradually applied to mid-range and high-end storage systems.
Architecture comparison: HDS VSP vs. HUAWEI 18000 series

**VSP**
- Cross bar switching architecture: resource sharing, a maximum of 8 controllers, 1024 GB cache, and 2048 disks
- A converter is required to support iSCSI or Gig-E.

**OceanStor 18000**
- Smart matrix architecture: based on PCIe 2.0 network, ensuring high performance
- Distributed scale-out: better scalability, a maximum of 16 controllers, 3072 GB cache, and 3216 disks
- Support for multiple types of interfaces such as iSCSI, Fibre Channel, and FCoE
HTB HDS VSP (1)

Disaster recovery
- **Weak connectivity**: The HDS VSP cannot be interconnected with AMS for disaster recovery. The OceanStor 18000 can be interconnected with the T series for disaster recovery.
- **Inadequate local protection**: Each volume of VMAX has 64 snapshots only. The OceanStor 18000 has up to 1024 snapshots.
- **High RPO**: RPO is 30 seconds during asynchronous remote replication. The RPO of the OceanStor 18000 is 5 seconds.

Efficiency
- **Inaccurate hotspot management**: Tiered storage statistics and migration are implemented in unit of 7.6 MB. 8 KB I/O hotspot distribution of databases cannot be managed accurately. The OceanStor 18000 executes tiered storage statistics and migration in unit of 8 KB.
- **Complicated management**: HDS VSP is difficult to manage. For example, it has no port groups. A single host mapping process involves over 150 clicks while the OceanStor 18000 requires merely 10 clicks.
- **Slow reconstruction**: RAID reconstruction of VMAX takes 10 hours (per TB). The OceanStor 18000 requires 30 minutes (per TB) to complete RAID reconstruction.

Material
- **Japan-invested company**: HDS is registered in America and completely belongs to Hitachi.
- **Information security risks**: In 2012, disks in a bank were damaged. The lost disk with confidential data appeared in Japan. The original manufacturer of VSP has limited service capabilities in China. Remote support may threat information security.
HTB HDS VSP (2)

**HTB**
- Use high specifications (6-core CPU, maximum cache and maximum numbers of disks and snapshots) of the OceanStor 18000 to beat VSP.
- Use larger cache.
- Configure the thin provisioning feature.
- Use SSDs to replace 15,000 rpm 2.5-inch SAS disks.
- Get customers to configure synchronous and asynchronous remote replication at the same time in disaster recovery scenarios.

**How to defend**
- Use the active-active solution. (Currently, use the VIS + 2 x OceanStor 18000 solution.)
- Number of ports (Configure more controllers and use high-density disk interface cards.)
- Data loss indemnity agreement is restricted by many factors.
HP: from OEM to tight coupling

StoreServ 10000:
- Max. number of controllers: 8
- Max. cache size: 768 GB
- Max. number of disks: 1920
- Max. number of host ports: 192

- Before purchasing 3PAR, HP is the OEM of high-end HDS devices such as XP24000 and USP.
- Nodes of StoreServ 10000 are interconnected by full-mesh backplane.
- Two application-specific integrated circuits (ASICs) are the core of the nodes. Control is separated from data migration. ASICs contain data memory and the CPU contains control memory. All non-data SCSI commands are processed in CPU memory and control memory. All data migration tasks are processed in ASICs.
- ASICs are interconnected with PCIe switches. Each switch has three slots and there are 9 slots in total.

Full backplane interconnection architecture
Architecture comparison: HP P10000 vs. HUAWEI 18000 series

**P10000**

- Supports a maximum of 8 controllers.
- Controllers are connected by full-mesh backplane. Scalability is poor and backplanes have single points of failure.

**OceanStor 18000**

- Controllers are connected by PCIe switching plane.
- Load sharing is available. All components are redundant. There is no single point of failure.
HTB StoreServ 10000 (1)

- **Poor engineering capabilities:** The StoreServ 10000 does not support full container load (FCL) delivery. Bays are transported without factory-installed disks. The customer needs to install disks on-site, which is time-consuming and does not show the quick deployment advantage of high-end storage systems.

- **Inadaptable to complex environments:** The StoreServ 10000 does not support cache partitioning and therefore cannot classify services by priority. In multi-service environments, it cannot guarantee the performance of mission-critical services.

- **Unstable performance:** The StoreServe 10000 has a poor processing capability. In the event of heavy service pressure, the performance fluctuates significantly.
HTB StoreServ 10000 (2)

**HTB**

- Force out the StoreServ 10000 using the following specifications: max. number of controllers, bus bandwidth, max. cache capacity, FCoE connection, SAS disks, heterogeneous storage virtualization, FCL delivery, and 6-core CPUs.
- Force out the StoreServ 10000 using the features of cache partitioning, QoS, and FCL delivery.
- Bid up the HP’s quotation using the cache configurations.

**How to defend**

- ASIC acceleration (Answer: SSDs of the OceanStor 18000 use ASIC chips to accelerate hotspot I/Os. The open OceanStor 18000 hardware conforms to the development trend of the storage industry. Software is the core of data storage.)
- High-density disk enclosure (Answer: One disk enclosure containing four disks is unfavorable to fault isolation. This technology is usually offered by mid-range storage systems. HUAWEI UDS, a cost-effective massive storage system, employs this technology.)
- Multi-tenant (Answer: The multi-tenant function tackles the management isolation issue, but also complicates device management. Customers are advised not to use this function.)
Agenda

1. Product Overview And Positioning
2. Product Highlights
3. Product Comparison
4. Success Stories
5. Ordering Guide
6. How to Get Resources
Huawei sold 151 sets of the OceanStor 18000 series and ranked No. 1 in product shipments in Chinese market.

- Operated reliably for consecutive 300 days.
- Penetrated into high-end customers, such as Sinopec, China Everbright Bank, Agricultural Bank of China, and State Administration of Taxation of China.
- Had a foothold in the industries including government and carrier and build the brand in the regions such as Beijing and Hunan, which had obviously promoted the sales.
- Paved the way for breakthrough into the industries including public security and tax on a large scale.
Safeguarding the Golden Auditing Project of National Audit Office

Customer requirements

- The Golden Auditing Project (GAP) implements central disaster recovery backup for service data of China National Audit Office’s 18 resident offices.
- Resident offices require unified disaster recovery.

Solution

- The unique 32:1 sharing disaster recovery solution of Huawei provides China National Audit Office’s headquarters and its 18 resident offices with flexible and ease-of-use sharing disaster recovery services.

Benefits

- Historical service data is centrally stored or smoothly relocated to new devices.
- The remote disaster recovery architecture (three centers at two sites) is compatible with storage devices from any manufacturer.
## Facilitating tax reforms of Hunan Local Tax Bureau

### Customer requirements
- 30 complex service systems coexist and require remote protection.
- The storage must meet service growth requirements in the next five years.

### Solution
- Use the *intra-city disaster recovery* solution to ensure security of the customer's service data.
- Use Huawei enterprise storage systems that can be expanded to 7 PB to meet long-term planning requirements of the customer.
- Use the No. 1 enterprise storage systems to easily carry 30 service systems of the customer.

### Benefits
- The customer can construct open storage systems with excellent performance, robust reliability, and flexible scalability.
- The underlying virtualization architecture improves data recovery performance by 20 times.
- Remote disaster recovery protection is available to tax data.
Ensuring high availability of Jiangsu resident identity inquiring system

**Customer requirements**
- A system of Jiangsu Public Security Department carries data of second generation ID card and fingerprint collection system.
- A system requires storage systems with excellent performance, robust reliability, and flexible scalability.

**Solution**
- Apply high-performance Huawei storage systems to the main service system of the customer.
- Apply the T series to the disaster recovery system and design a cost-effective disaster recovery solution.
- Use diversified backup policies to protect the customer’s data.

**Benefits**
- An efficient and trustworthy core data storage and disaster recovery platform is available.
- The response of a single service is improved by **200 times** and the response capability is improved by **50 times**.
- Online expansion is available to the customer. The customer can easily deal with service challenges. The TCO is reduced.
1. Product Overview And Positioning
2. Product Highlights
3. Product Comparison
4. Success Stories
5. Ordering Guide
6. How to Get Resources
## OceanStor 18000 series configuration quotation overview

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>System bay 0</td>
</tr>
<tr>
<td></td>
<td>System bay 1</td>
</tr>
<tr>
<td></td>
<td>Expansion disk bay</td>
</tr>
<tr>
<td></td>
<td>Expansion storage bay</td>
</tr>
<tr>
<td></td>
<td>Disk unit</td>
</tr>
<tr>
<td></td>
<td>Disk enclosure</td>
</tr>
<tr>
<td></td>
<td>Front-end interface module</td>
</tr>
<tr>
<td></td>
<td>Rear-end SAS interface module</td>
</tr>
<tr>
<td></td>
<td>Installation components (optical fibers, modem)</td>
</tr>
<tr>
<td>Software</td>
<td>System management software</td>
</tr>
<tr>
<td></td>
<td>Device management software</td>
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<tr>
<td></td>
<td>Local replication software</td>
</tr>
<tr>
<td></td>
<td>Remote replication software</td>
</tr>
<tr>
<td></td>
<td>Value-added software (SmartThin, SmartMotion,</td>
</tr>
<tr>
<td></td>
<td>SmartTier, SmartQoS, and SmartVirtualization)</td>
</tr>
<tr>
<td>Services</td>
<td>Installation service</td>
</tr>
<tr>
<td></td>
<td>Upgrade and maintenance services</td>
</tr>
</tbody>
</table>
OceanStor 18000 configuration quotation procedure

- **Hardware configuration**
  - Select engines and bays.
  - Select interface modules.
  - Select disks.
  - Select auxiliary materials.

- **Software configuration**
  - Configuration mode 1 (software quotation by item)
    - Select host software.
    - Select system software.
    - Select device management software.
    - Select local protection software.
    - Select remote protection software.
    - Select SmartVirtualization.
    - Select SmartQoS.
    - Select SmartCache.
    - Select SmartTier.
    - Select SmartThin.
    - Select SmartMotion.
  - Configuration mode 2 (software quotation by package)

- **Service configuration**
  - Install services.
  - Upgrade and maintain services.

- Two configuration modes: software quotation by item and by package
## OceanStor 18000 series software quotation by item — Selecting system software

<table>
<thead>
<tr>
<th>Configuration Quotation Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XVE system software package basic license</td>
<td>One set of the OceanStor 18000 supports up to 4 engines. Only one basic license is needed regardless of the number of engines.</td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (0 to 14 TB), SSD &amp; SAS</td>
<td>The license quotation is based on the capacity gradient.</td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (15 to 25 TB), SSD &amp; SAS</td>
<td>The capacity of SATA disks and other disks are separately charged.</td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (26 to 40 TB), SSD &amp; SAS</td>
<td>For example, there are 20 TB SATA disks, 45 TB SAS disks, and 3 TB SSDs. The total capacity of SAS disks and SSDs is 48 TB, the quotation of which is listed in this table. The other 20 TB SATA disks are charged separately.</td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (41 to 60 TB), SSD &amp; SAS</td>
<td></td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (61 to 100 TB), SSD &amp; SAS</td>
<td></td>
</tr>
<tr>
<td>XVE system software package, capacity license...</td>
<td></td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (0 to 14 TB), NL-SAS</td>
<td></td>
</tr>
<tr>
<td>XVE system software package, capacity license, 1 TB (15 to 25 TB), NL-SAS</td>
<td></td>
</tr>
<tr>
<td>XVE system software package, capacity license...</td>
<td></td>
</tr>
</tbody>
</table>
OceanStor 18000 series software quotation  
— Selecting other software

- The device management software is mandatory and its quotation configuration is the same as that of system software.
- Local data protection software is optional and its quotation configuration is the same as that of system software.
- Local data protection software is optional and its quotation configuration is the same as that of system software.
- SmartThin, SmartTier, SmartCache, SmartQoS, SmartVirtualization, and SmartMotion are optional and their quotation configuration is the same as that of system software.
# OceanStor 18000 series software quotation by package

<table>
<thead>
<tr>
<th>Mode</th>
<th>Configuration Quotation Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging mode 1</td>
<td>Basic software package license (for XVE software, Management Console, HyperCopy, HyperSnap, HyperClone, and SmartThin)</td>
<td>The basic software package contains system software, device management software, and local protection software. These three pieces of software do not require licenses if the basic software package license is already installed. This configuration, for example, applies to the scenario where the customers require only location protection software, 48 TB SATA disks, 30 TB SAS disks, and 1 TB SSDs.</td>
</tr>
<tr>
<td></td>
<td>Basic software package, capacity license, 1 TB, NL-SAS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic software package, capacity license, 1 TB, SSD &amp; SAS</td>
<td></td>
</tr>
<tr>
<td>Packaging mode 2</td>
<td>Advanced software package license (for XVE software, Management Console, HyperCopy, HyperSnap, HyperClone, SmartThin, SmartCache, SmartTier, and SmartMotion)</td>
<td>Either the basic software package or the advanced software package is configured. The two packages’ quotation configurations are the same.</td>
</tr>
<tr>
<td></td>
<td>Advanced software package, capacity license, 1 TB, NL-SAS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced software package, capacity license, 1 TB, SSD &amp; SAS</td>
<td></td>
</tr>
</tbody>
</table>

- For simplified configuration and reduced costs, some basic software functions are integrated into the basic software package and advanced features are integrated into the advanced software package.
- The basic software package contains system software, device management software, local protection software, and the SmartThin.
- The advanced software package contains system software, device management software, local protection software, the SmartThin, SmartCache, SmartTier, and SmartMotion.
SCT online configuration tool

SCT: a swift, smart, and simple online configuration quotation tool
SCT: simplifying configuration quotation

- **Product**
  - Quickly learning about Huawei products
  - The SCT comprehensively shows the latest and hot Huawei products, updates data in real time, and enables quick product selection, helping you learn about Huawei products.

- **Configuration**
  - Intelligent product configuration
  - Intelligent product configuration, automatic configuration verification, and configuration sharing simplify product configuration, ensure configuration accuracy, and help you complete configuration easily.

- **Quotation**
  - Easily creating a quotation order
  - Easy quotation order creation, specific discount settings, automatic price verification, and convenient quotation order management help you create and manage quotation orders.
How to obtain the permission to use the SCT

Account/Permission application

For a dealer

- If you do not have a Huawei account, register an account at Huawei’s official website.
- If you already have a Huawei account, send your account to the channel manager to apply for the SCT permission.

For a Huawei product manager

- If you already have the eCFG permission, use your W3 account for login.
- If you do not have the eCFG permission, use the permission application e-Flow to apply for data package permission of the corresponding product line.

SCT login

Use your Huawei account to log in to the following website:

http://app.huawei.com/unistar/sct

NOTE:

- You can log in to the SCT as user Guest to view and configure products. Enter the verification code to directly log in to the SCT.
- The recommended resolution is 1280 x 1024. Supported browsers include Internet Explorer 8.0, Firefox 11.0+, Safari 5.12+, and Chrome 19.0+.
SCT functions

1. **Product**
   Enables you to select a product for configuration.

2. **Configuration**
   Enables you to create a configuration item, view the configuration list, add or delete a product, and modify product configuration.

3. **Quotation**
   Enables you to create a quotation item, view the quotation list, and add, delete, or modify product configuration.
## Agenda

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How to obtain Huawei document resources

Method 1: enterprise website

http://enterprise.huawei.com/cn/

Method 2: email

enterprise_channel@huawei.com

Method 3: Document User Guide

1. What is HUAWEI Pre-sales Channel Documentation?
2. How to Get?
3. Where to Feedback?
How to obtain pre-sales support

@enterprise_channel@huawei.com

Support center

24/7 pre-sales email and hotline support
Comprehensive product and solution support

http://enterprise.huawei.com/en/about/contact

Partner

Partner

Huawei expert team