

Huawei OceanStor Dorado V6 All-Flash Storage Systems

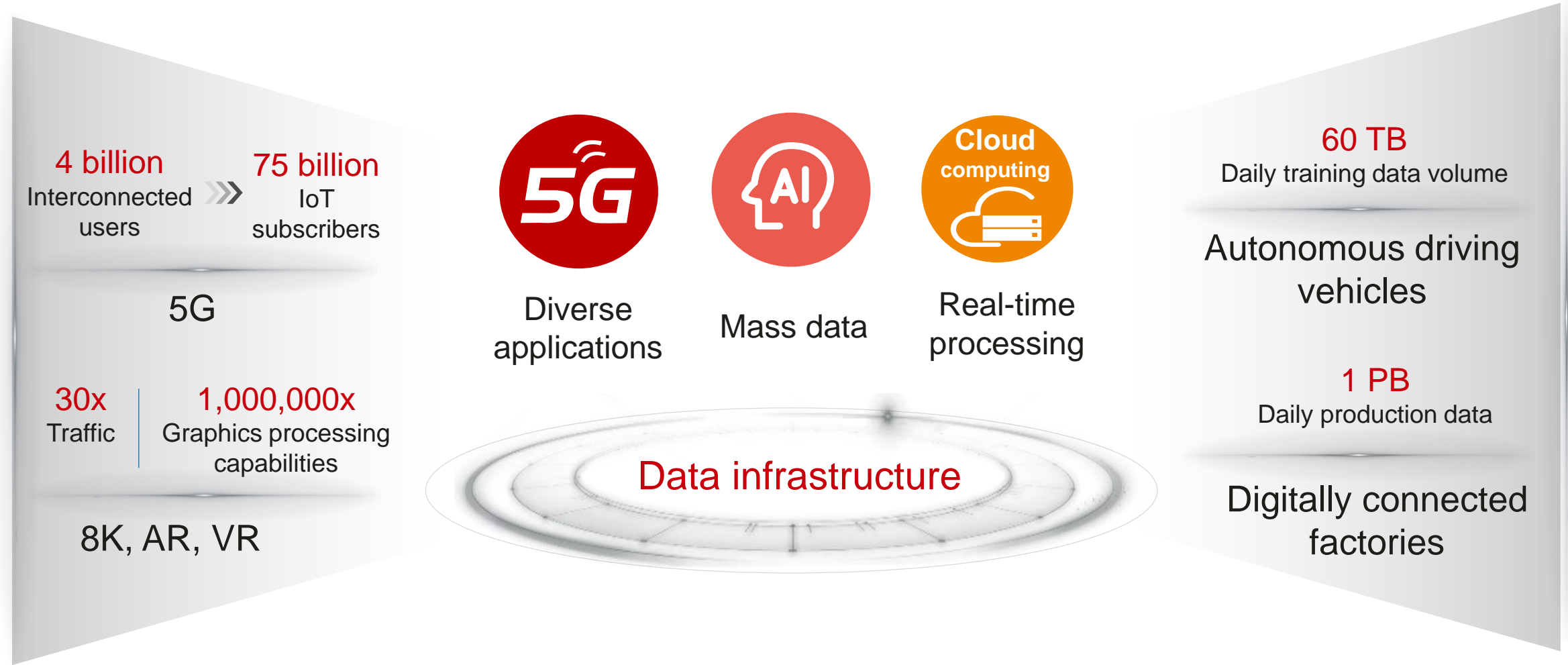
Overview Presentation



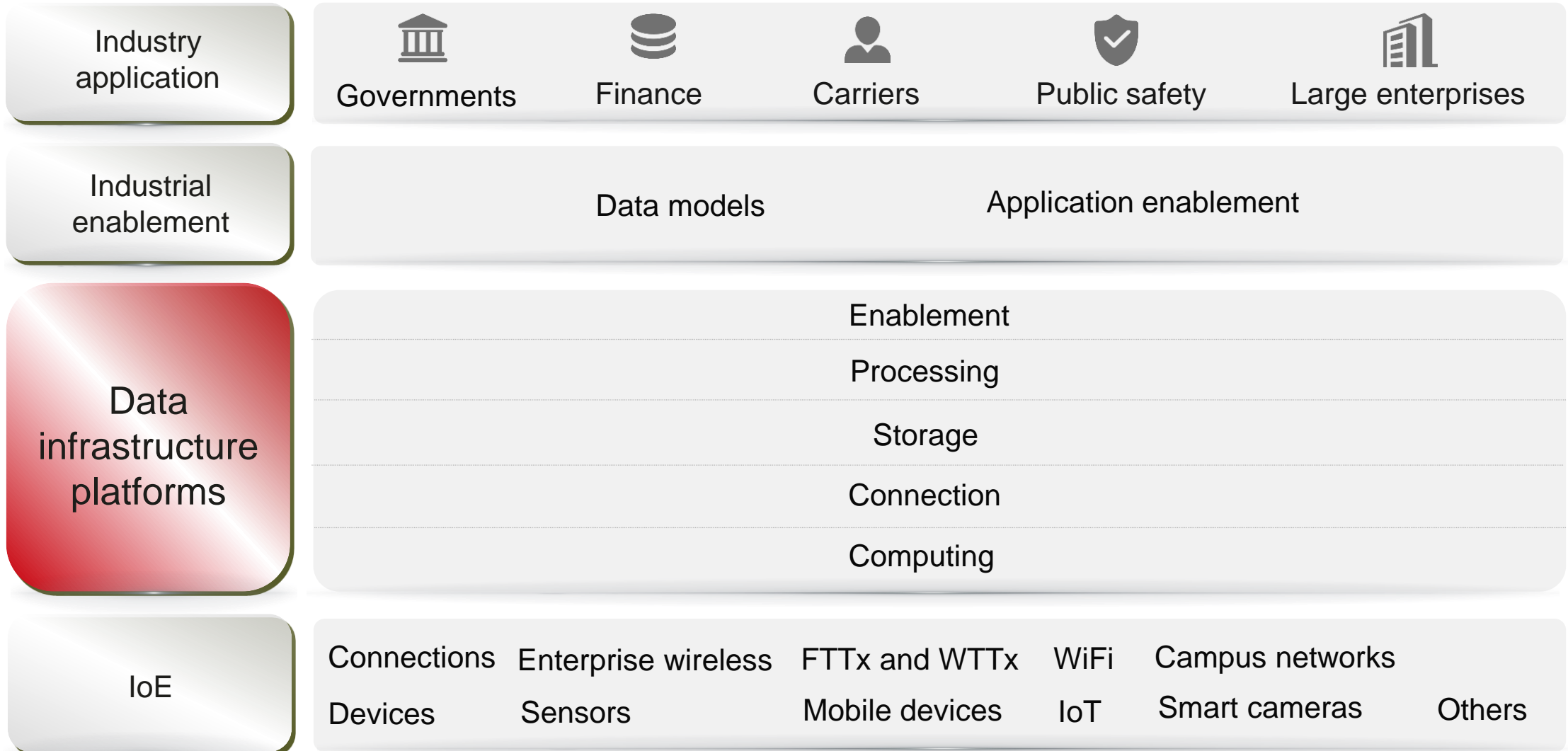
Security Level:



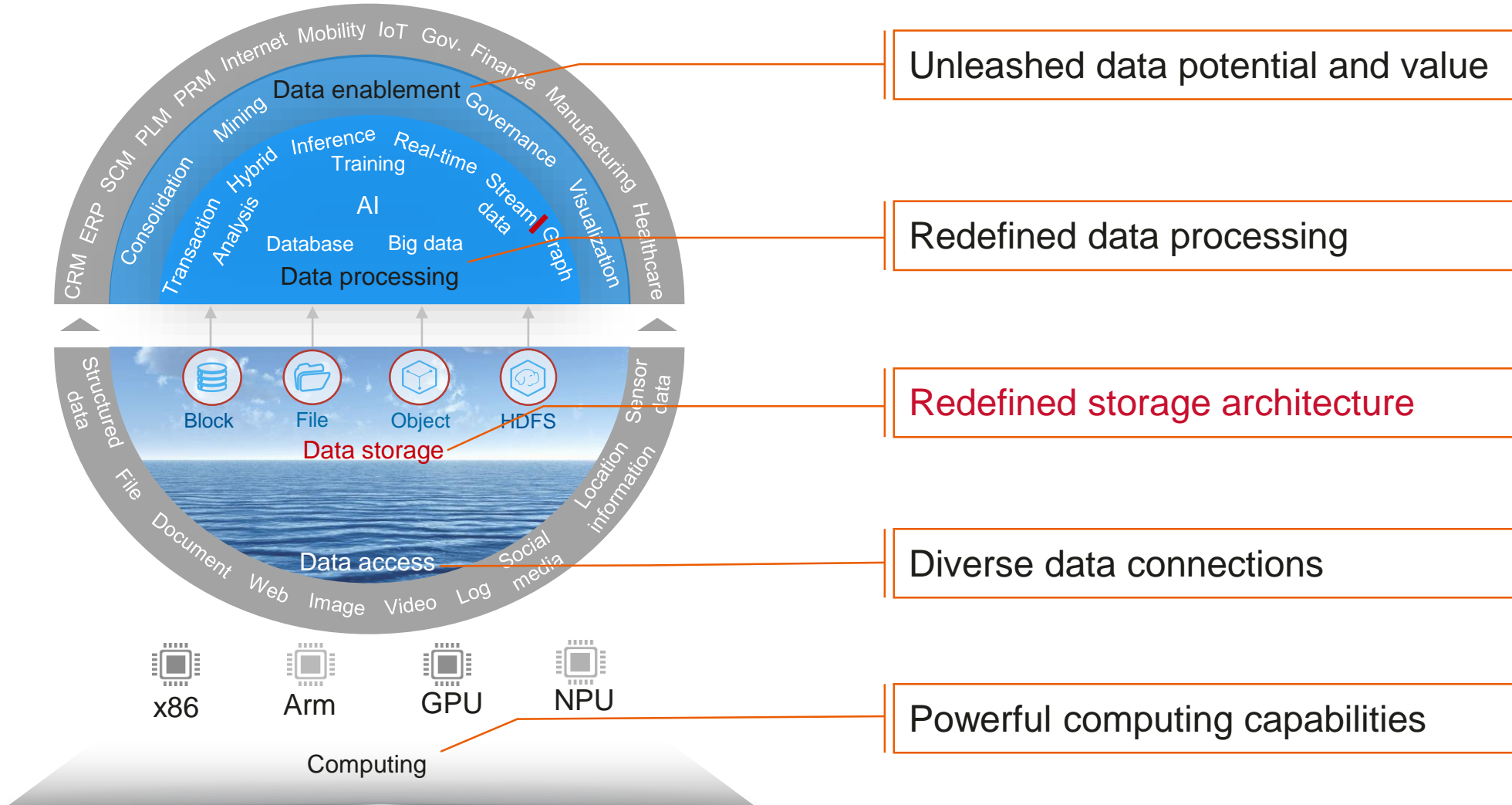
Intelligent IoE Era Drives Explosive Data Growth



Construct Data Infrastructure to Maximize Data Value



Redefine Data Infrastructure to Boost Digital Economy



Transform Storage Infrastructure to Monetize Data



Larger-scale financial transactions

Peak-time transactions

 **300%**

150,000 transactions per second, doubling profits



Smoother 5G communications

Billing processing time

 **67%**

Settlement for heavy workloads within 4 hours at the beginning of each month



One-stop government services

Government service efficiency

 **50%**

Data does the legwork

Upgrade for Inclusive All-Flash Storage in Any Scenario

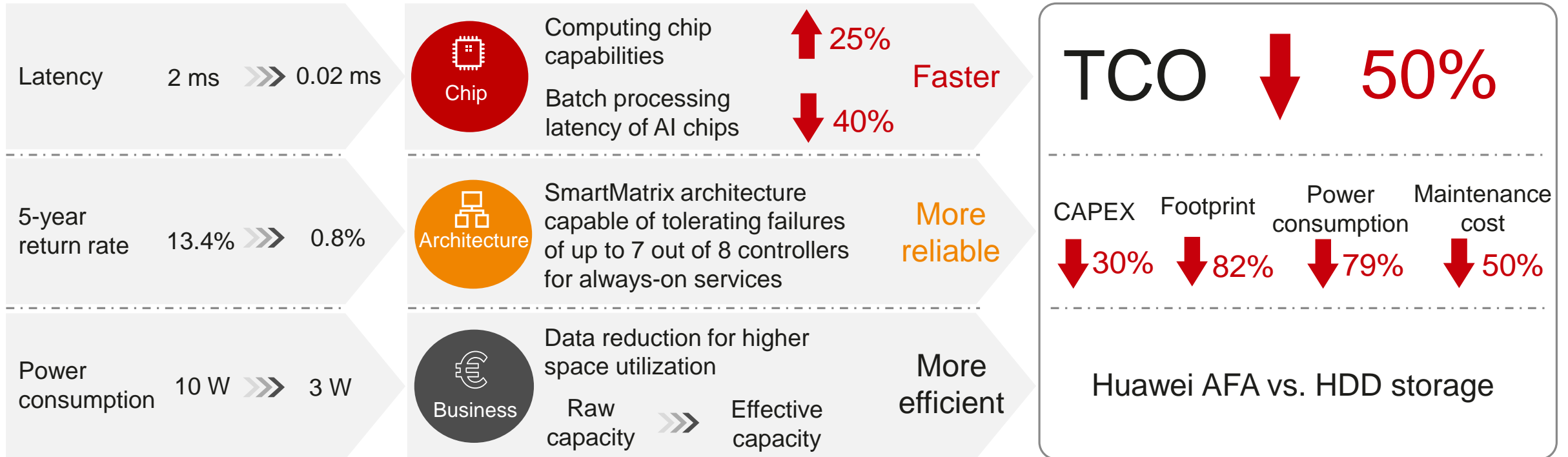


HDD

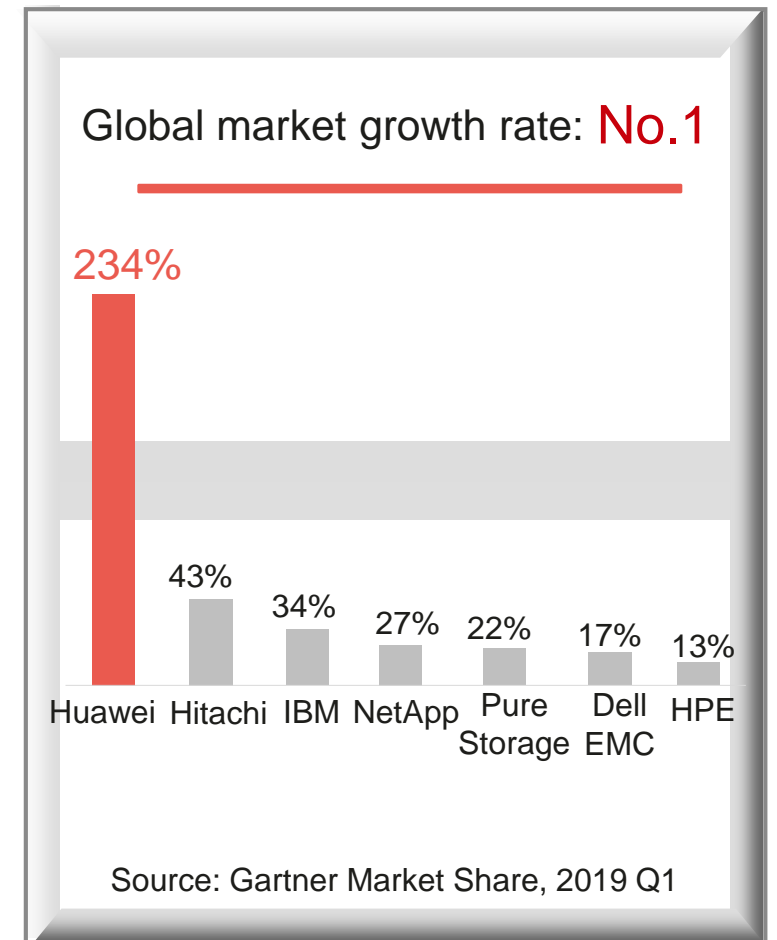
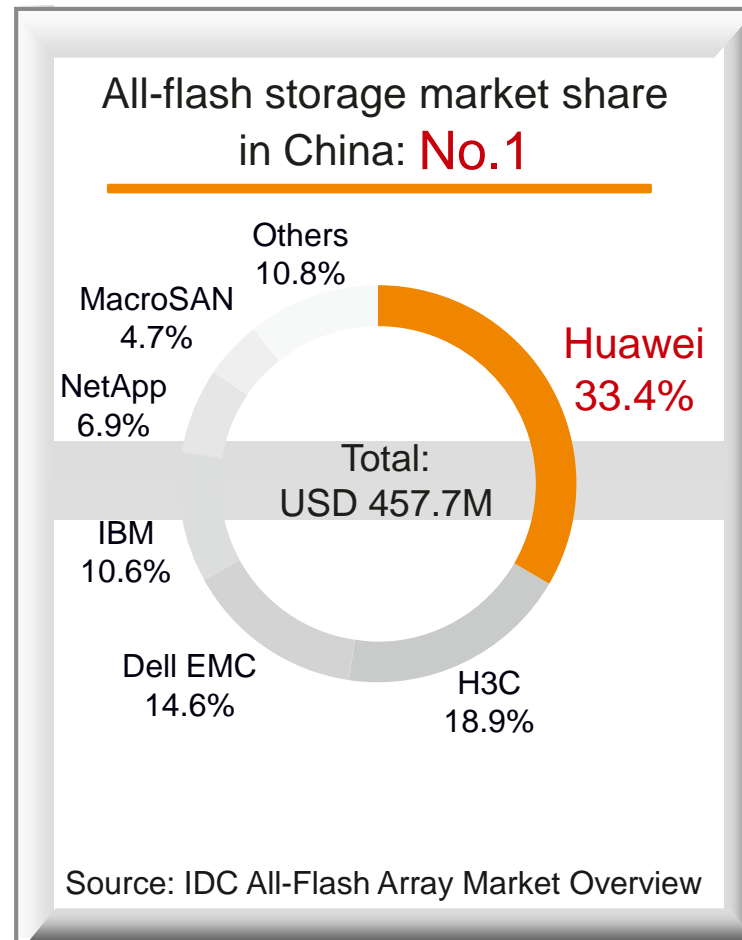
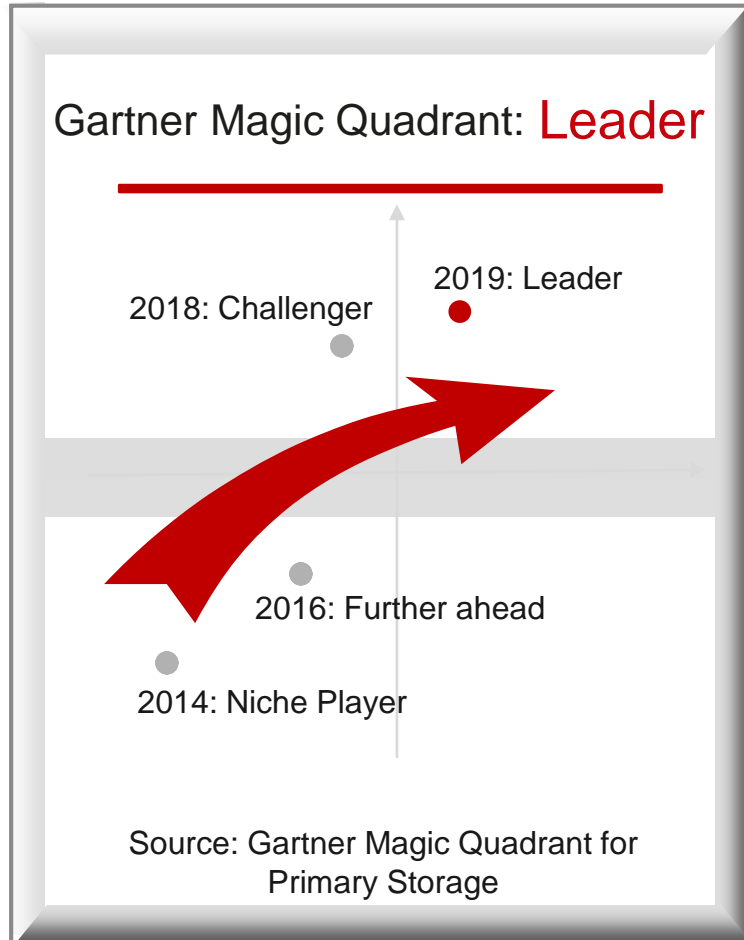


SSD

Huawei innovations make inclusive all-flash storage affordable



Lead the Market with Cutting-Edge OceanStor Dorado All-Flash Storage



OceanStor Dorado All-Flash Storage Gains Industry Renown

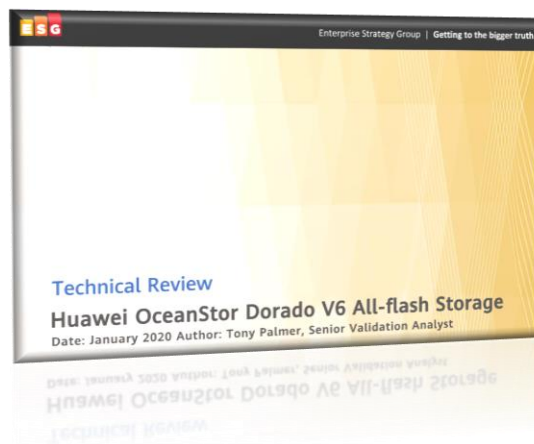
Interop Grand Prize



INTEROP Recognizing OceanStor Dorado as one of the most competitive products



Verification by the ESG Lab



ESG Proving that OceanStor Dorado can easily manage heavy-load applications for enterprises
Enterprise Strategy Group



Magnitude-9.0 earthquake resistance certification



TTL Proving that OceanStor Dorado can prevent damage caused by vibration during transportation, installation, and operation

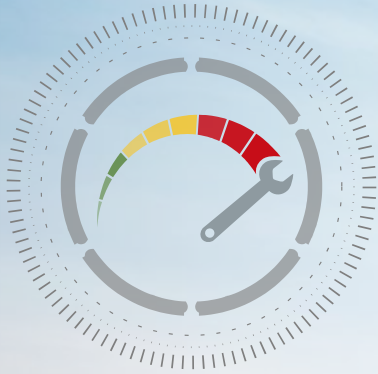


OceanStor Dorado All-Flash Storage Sets Benchmarks



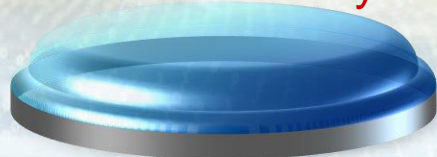
OceanStor Dorado All-Flash Storage Highlights

Ever Fast



Industry's highest performance and lowest latency

20 million IOPS
0.1 ms latency



Ever Solid



SmartMatrix fully-interconnected architecture for always-on applications

Tolerates failure of 7 out of 8 controllers

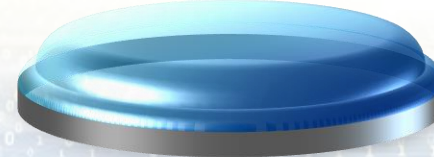


AI-Powered



Intelligent full-lifecycle management with AI chips and algorithms

AI-enabled O&M



Ever Fast

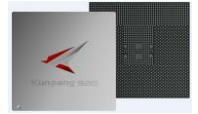
Chip-Powered Platforms for 20 Million IOPS



Industry's
highest
performance

Chip-powered

Seamless storage upgrades for industry-leading performance



Protocol-leading

E2E NVMe for a high-performance expressway

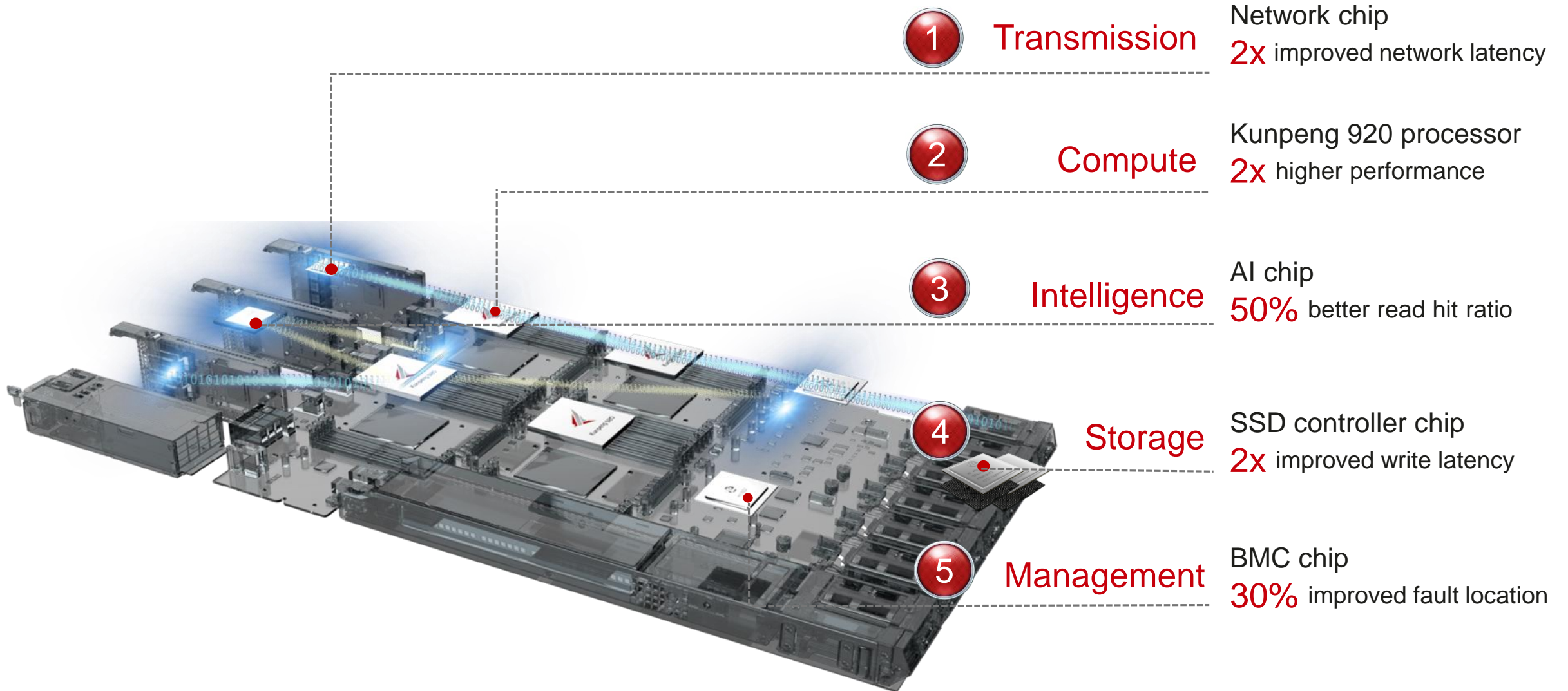


Algorithm-accelerated

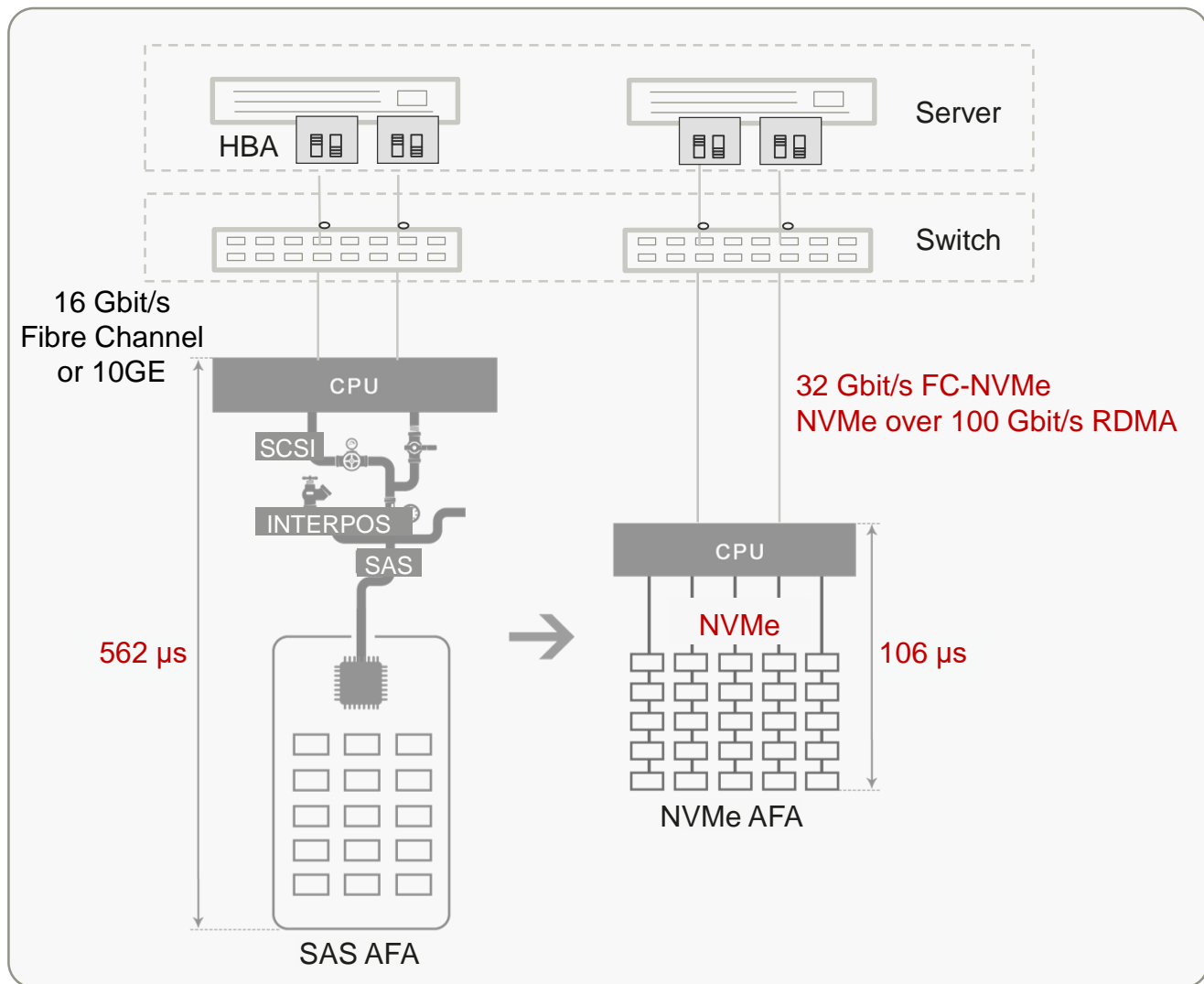
SSD-controller synergy with intelligent algorithms for maximized all-flash performance

FlashLink[®]

No.1 Performance with 5 Intelligent Chips



E2E NVMe for Full Series — Every Product Model Is Ever Fast



0.1 ms

Test model: 7:3 read/write, 130 μs read latency, 50 μs write latency
 Time = 130 x 0.7 + 50 x 0.3 = 106 μs

Shorter path >> Wider channel >> Fewer interactions

E2E >> Full series >> Every model ever fast

*Front-end NVMe over 100 Gbit/s RDMA will be available in the next version.
 *Deployment of FC NVMe or NVMe over ROCE due to the maturity of ecosystem.

Uncompromising Performance with Innovative FlashLink[®] Algorithms

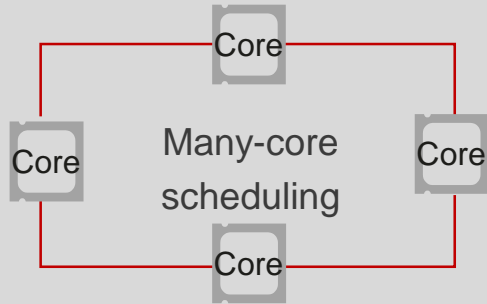
Controller with 5 chips



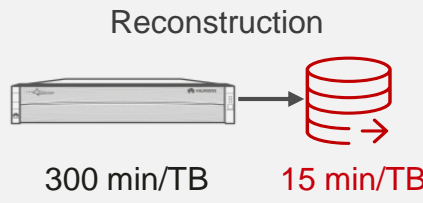
Smart SSD enclosure



SSD

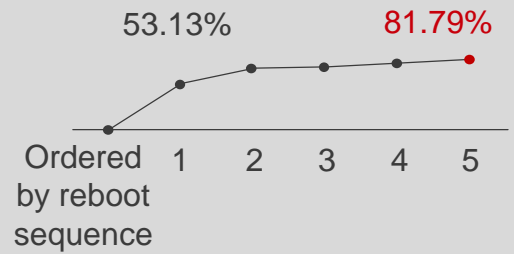


Many-core scheduling
Kunpeng + Many-core algorithm
2x computing power

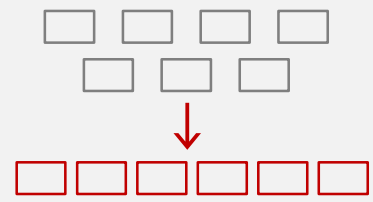


Reconstruction
300 min/TB → **15 min/TB**

Kunpeng + Service grouping
20x reconstruction speed



AI chip + Cache algorithm
50% cache hit ratio



Full-stripe writes
Less write amplification



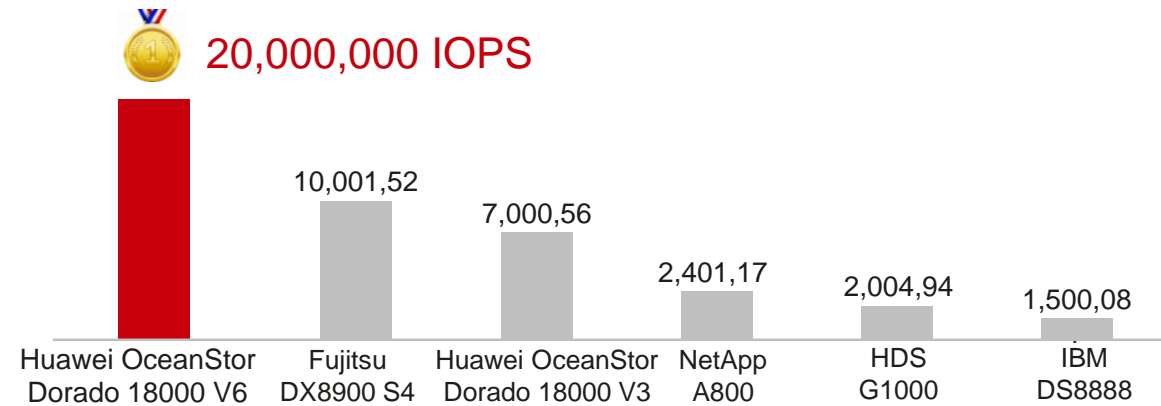
Multi-streaming data separation
Less garbage collection



Global I/O priority adjustment
Lower latency

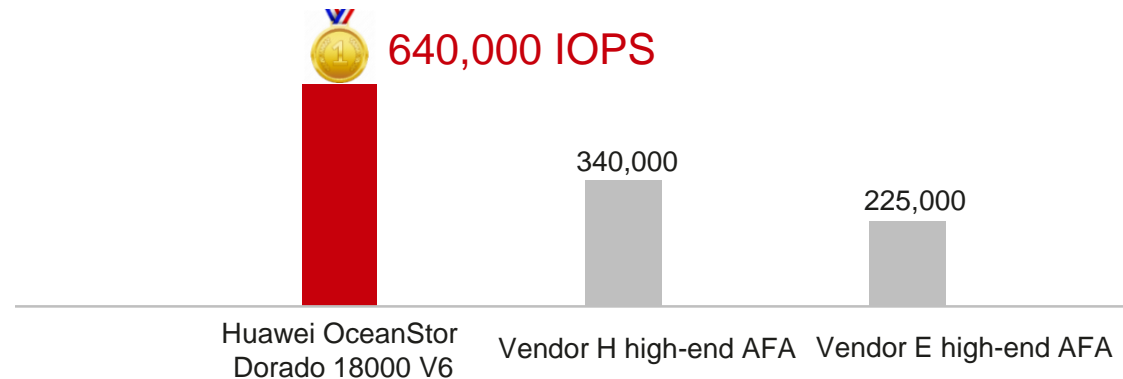
2x Better Than the Next-Best Player

No.1 performance in SPC-1 benchmark



Test conditions: 32-controller, SPC-1; test report released in 2020.

2x higher than competitors in databases



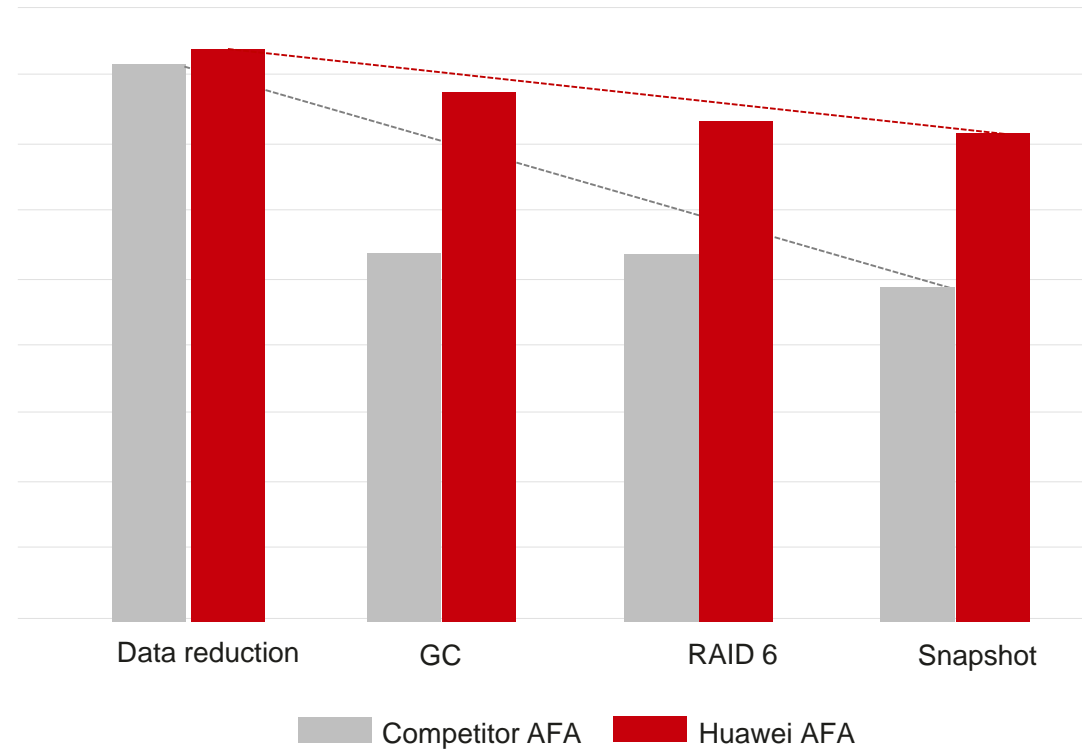
Test conditions: dual-controller, 7:3 read/write, 80% space occupied, data reduction enabled, 1 ms latency

Uncompromising Performance

In Different Scenarios

Huawei vs. Competition
Performance with value-added features enabled

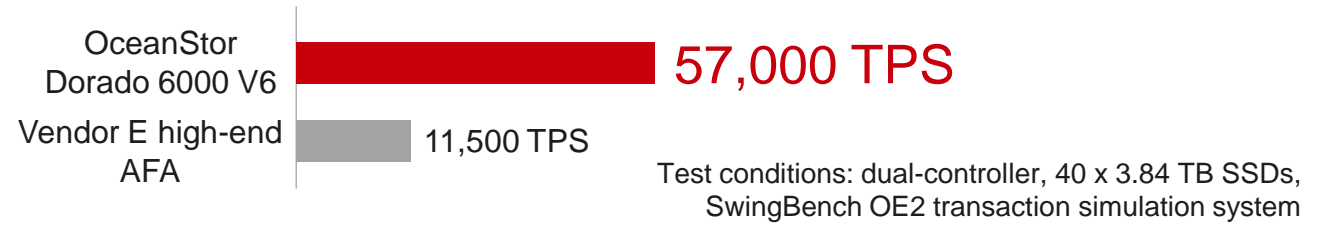
Competitor AFA: 40% decrease; Huawei AFA: < 10% decrease



Test devices: dual-controller, 1 TB cache, 16 Gbit/s FC frontend, NVMe backend, 25 x 3.84 TB SSDs
Test conditions: hybrid workload, 8 KB I/Os, 7:3 read/write, 1 ms average latency, 8 LUNs

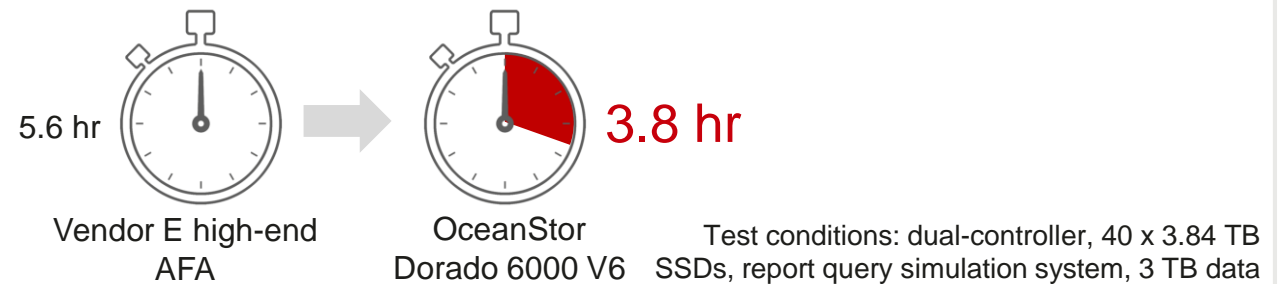
5x Better User Experience

Online transactions: **5x more TPS***

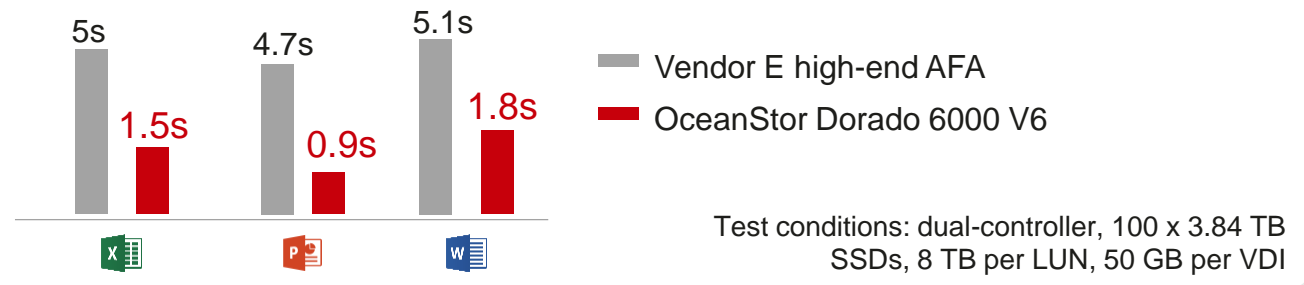


*TPS: transactions per second

Report queries: **33% shorter batch processing**



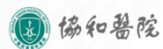
VDIs: **80% faster application response**



Ever Solid

3,000+ DCs

10-year stable operation on the live network



Ever Solid Applications with 5 Reliability Layers

99.9999%
system-level reliability

99.99999%
solution-level reliability



Cloud backup

- Gateway-free cloud backup
- 30x higher backup frequency
- 20x faster backup speed



Solution

- Gateway-free active-active solution (1 ms latency)
- FlashEver without data migration



System

- Comprehensive enterprise-class features
- Tolerance for simultaneous failures of 3 disks
- Reconstruction of 1 TB data in 15 minutes



Architecture

- Tolerance for failures of 7 out of 8 controllers with SmartMatrix fully-interconnected architecture
- E2E active-active design

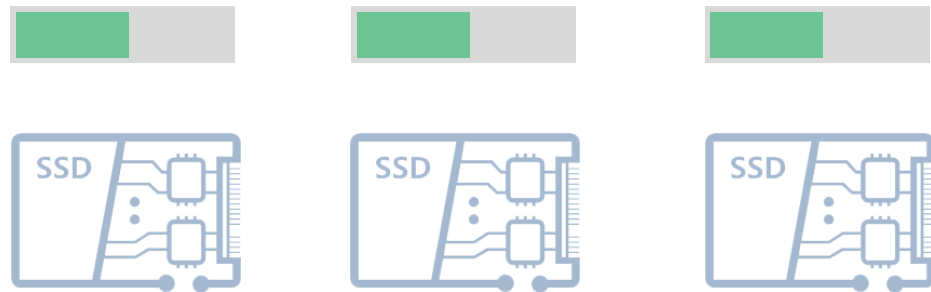


SSD

- Global wear leveling
- Huawei-patented global anti-wear leveling

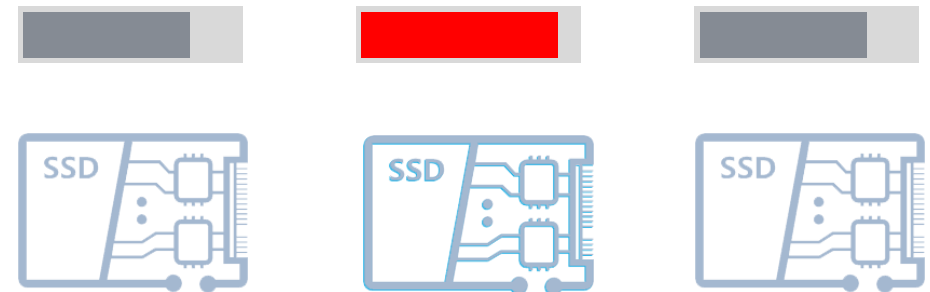
Disk Reliability — Global Wear and Anti-Wear Leveling

Early SSD life: global wear leveling



RAID 2.0+ improves SSD reliability by evenly distributing data to SSDs with fingerprints for wear leveling.

Late SSD life: Huawei-patented global anti-wear leveling

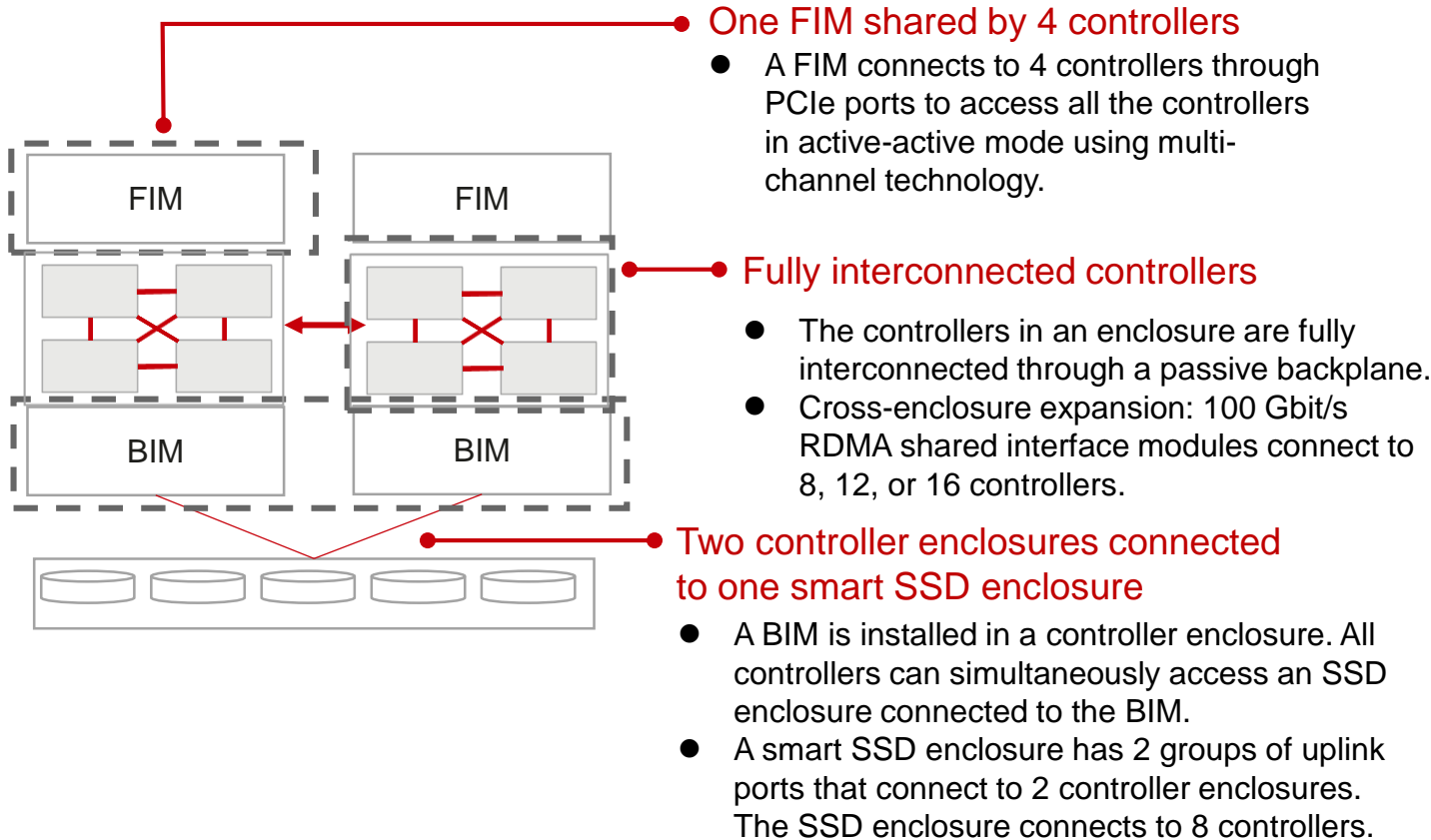


The workload of one SSD increases to prevent service downtime from simultaneous failures of multiple SSDs.

Prolong SSD service life and improve reliability

Architecture Reliability — SmartMatrix, Industry's Most Reliable Full Mesh Architecture

Full mesh architecture



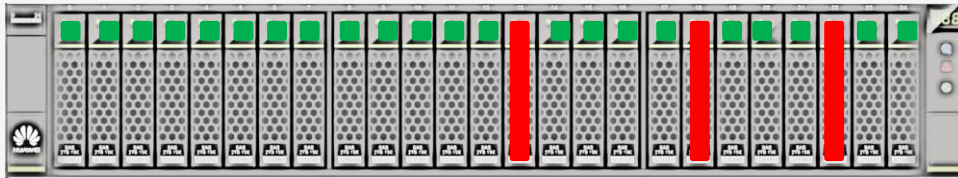
Industry-first: service continuity for failure of 7 controllers

| Tolerance | OceanStor Dorado V6 | Vendor E | Vendor H |
|--------------------------------|---|---|---|
| | <ul style="list-style-type: none"> ● Fully interconnected frontend and backend | <ul style="list-style-type: none"> ● Frontend: not interconnected ● Backend: 2 controllers interconnected | <ul style="list-style-type: none"> ● Frontend: fully interconnected ● Backend: 4 controllers interconnected |
| 1-controller failure | ✓ | ✓ | ✓ |
| 2-controller failure | ✓ | ✗ | ✓ |
| 7-controller failure | ✓ | ✗ | ✗ |
| 1-controller-enclosure failure | ✓ | ✗ | ✗ |

RAID-TP Provides Customized Protection for SSDs

Large-capacity SSDs lead to double the capacity (up to 32 TB) and 5x to 10x the failure rate

Simultaneous 3-disk failure without service interruption



Reconstruction of 1 TB data

SSD failure toleration

Traditional RAID: up to 2 SSDs

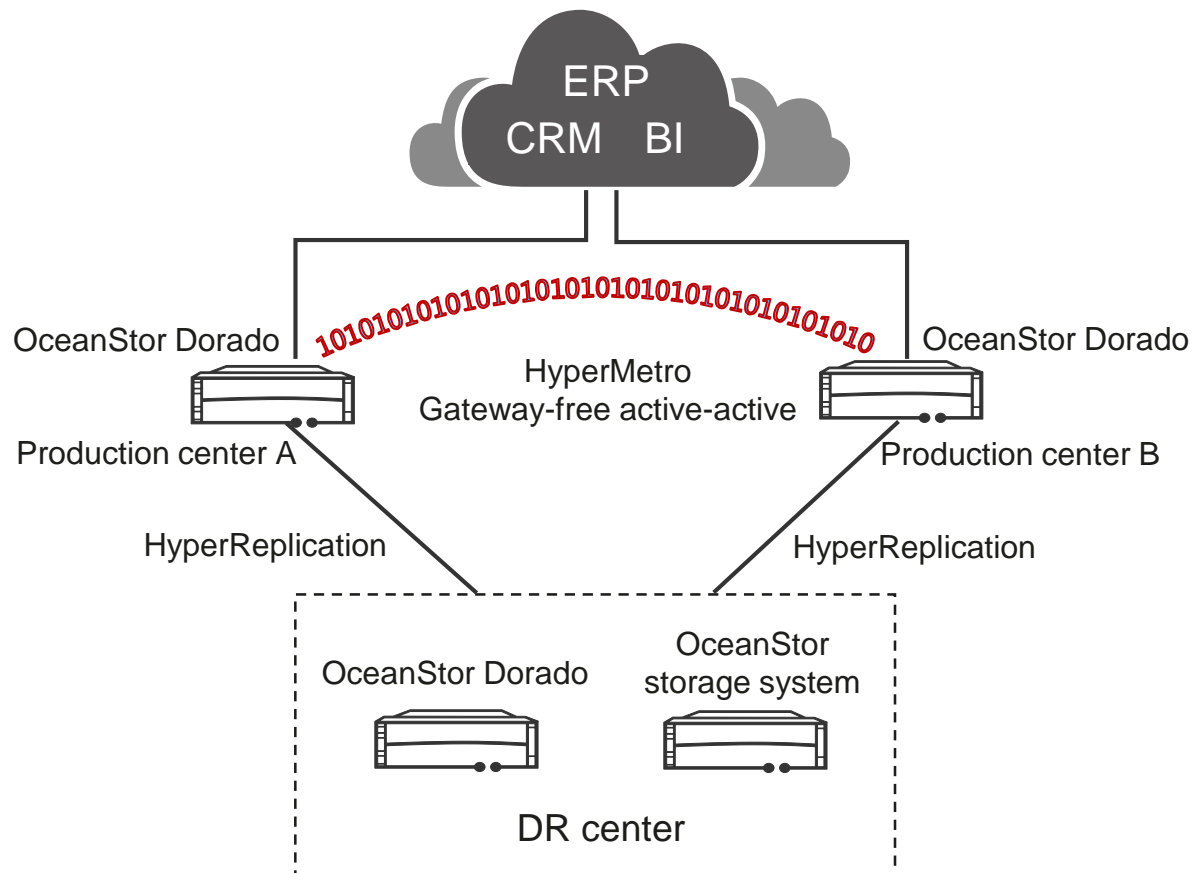
Huawei RAID-TP: simultaneous **3-SSD** failure

Data reconstruction

Traditional RAID: 5 hours

RAID-TP: 1 TB of data within **15 minutes**

Solution Reliability — Gateway-Free Active-Active Data Centers Solution



Lightning-fast and rock-solid

- **Gateway-free**
Fewer nodes and simplified management
- **Active-Active**
load balancing between sites, RPO = 0, RTO ≈ 0

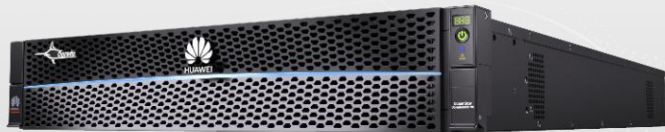
Easy-to-scale

- **Scalability to 3DC** improves reliability.
- **Serial, parallel, and star networking** meets the most demanding requirements for enterprise reliability.
- **Interconnection with traditional storage** builds cost-effective disaster recovery systems.

FlashEver — Zero Data Migration for Always-On Services

New upgrade model

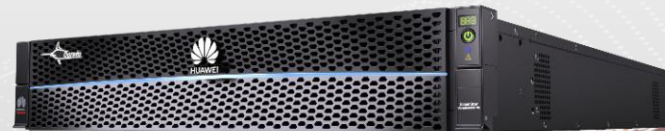
Individual replacement of controllers or SSD enclosures **instead of** replacing the entire system



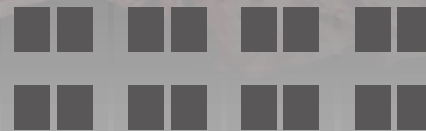
OceanStor Dorado Vx



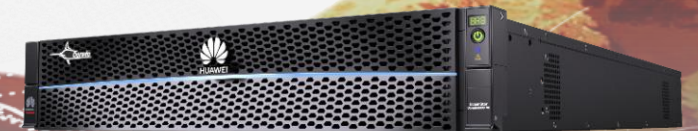
Zero data migration and **zero** service disruption



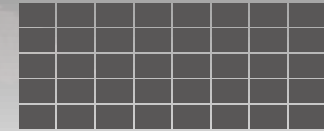
OceanStor Dorado Vx+1

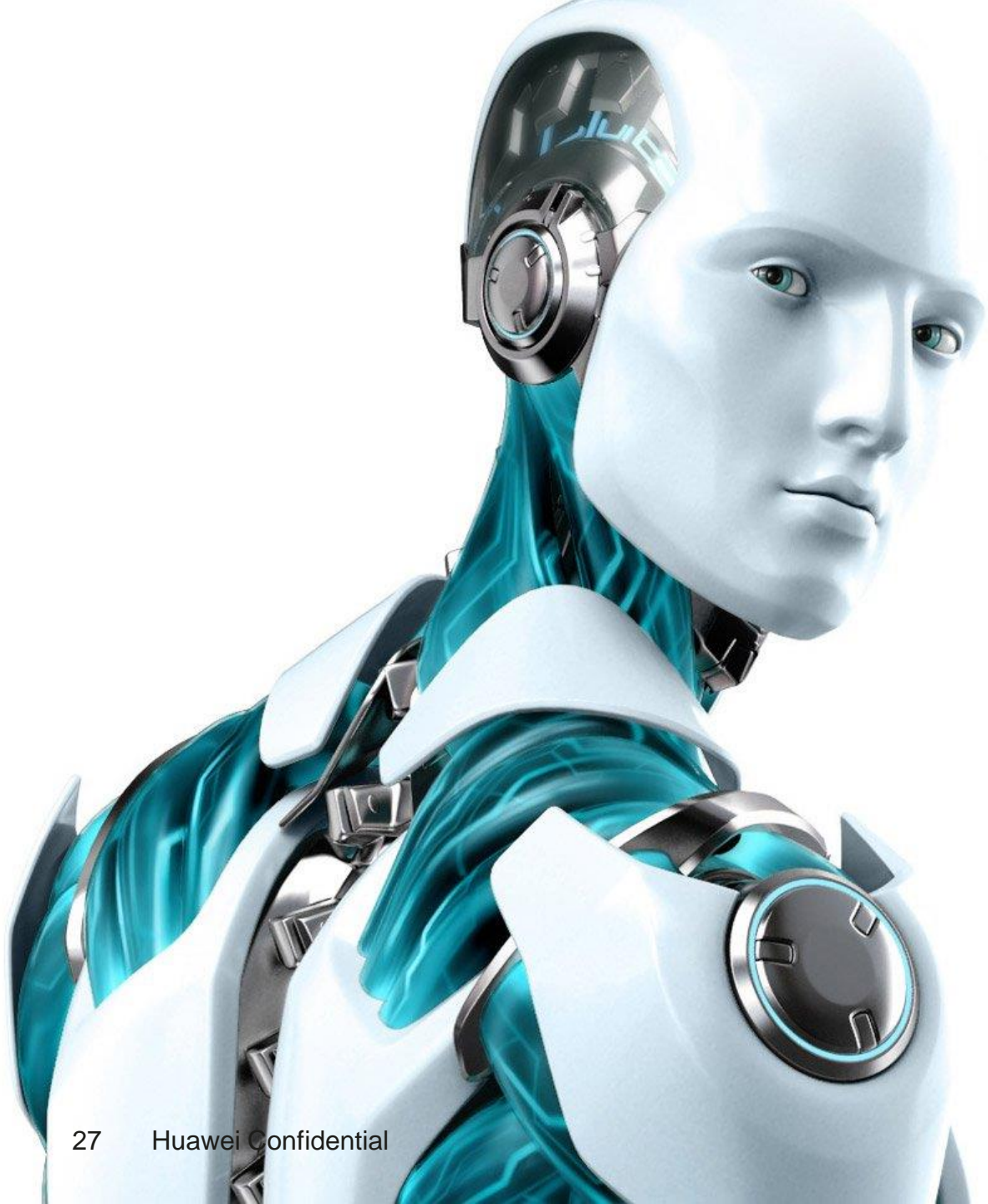


Free access to next-gen hardware for a **20%** performance increase



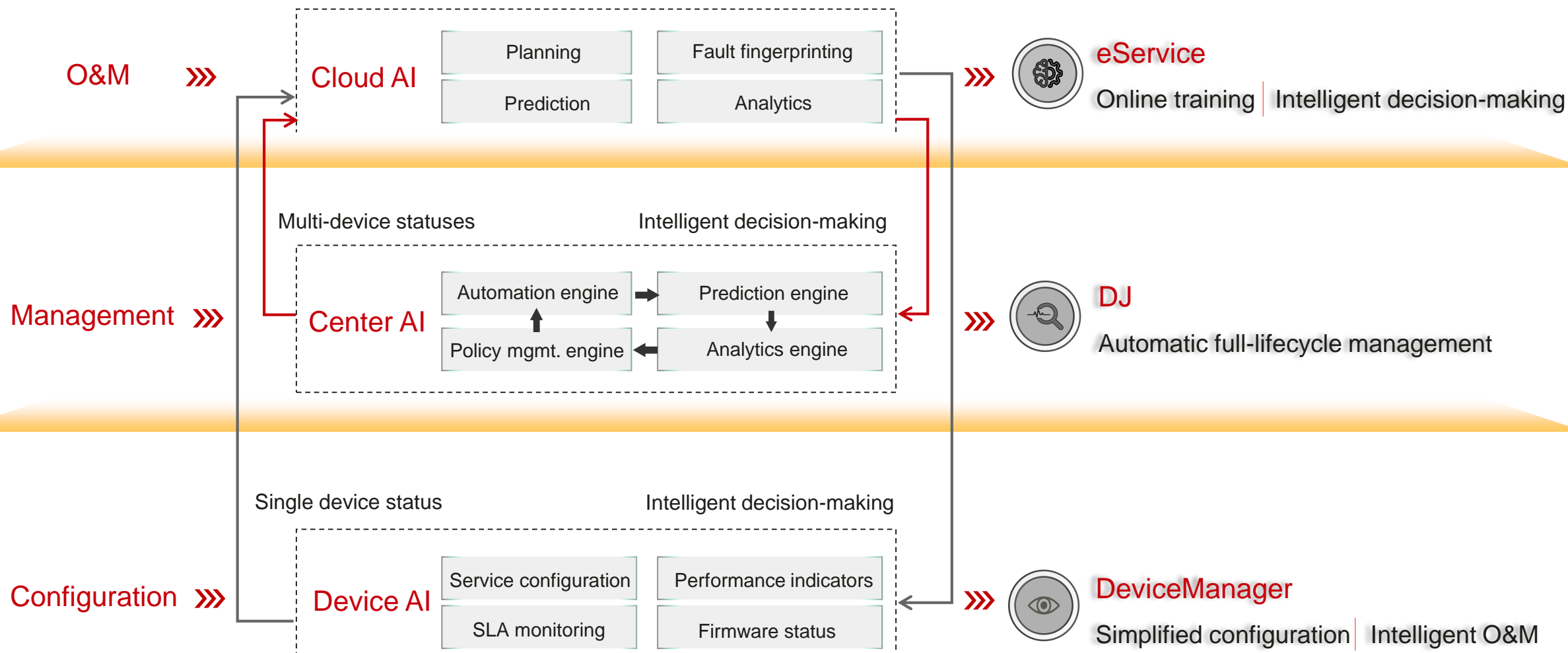
OceanStor Dorado Vx+2






AI-Powered

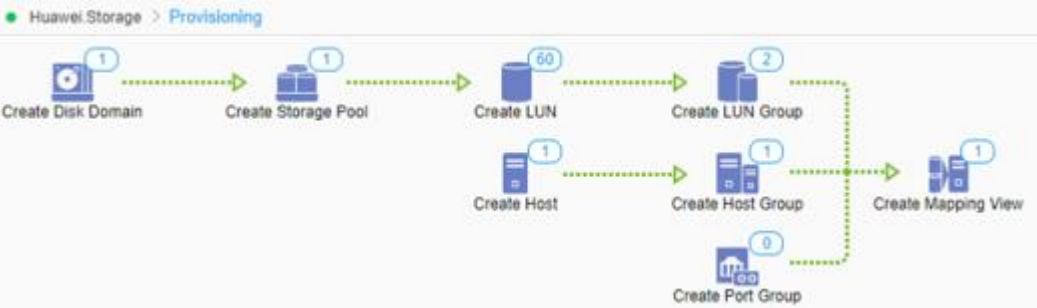
3-Layer, Intelligent Data Management for Confident Investment



Streamlined, AI-Powered Device Management for Bigger Profits

1 7 steps  One-click service provisioning for faster O&M and lower OPEX

2 Intelligent capacity prediction (365 days) and on-demand capacity expansion for more precise IT investment



Now 

Create LUN Group Advanced

* Name:

New LUN Existing LUN

* Storage Pool:

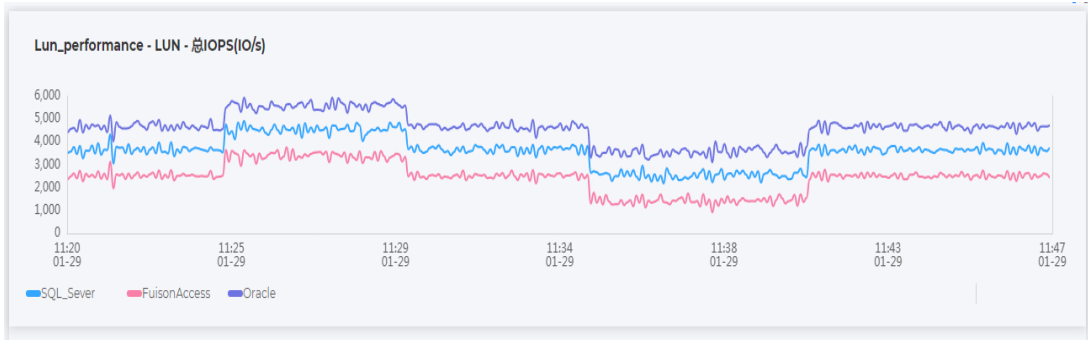
* Application Type:

LUNs:

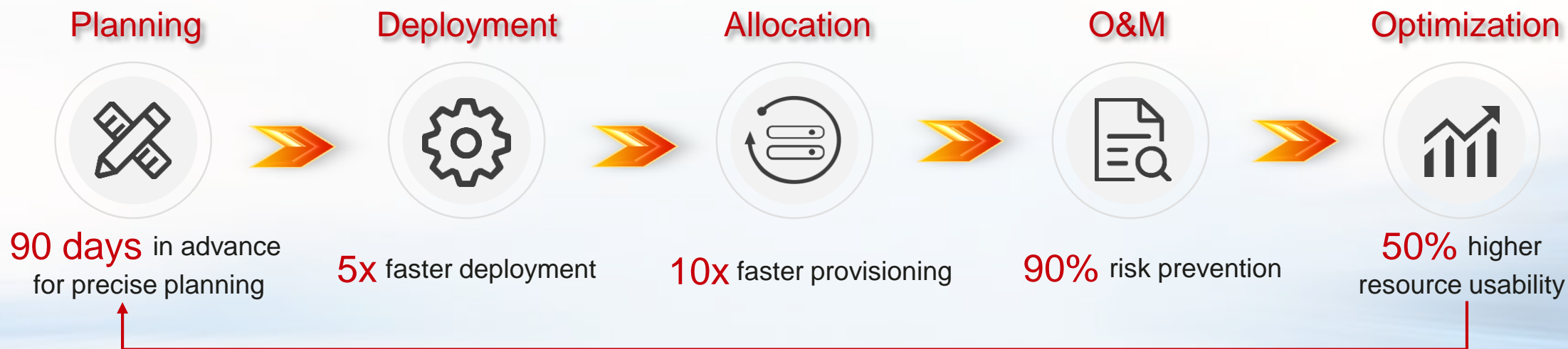
| Name Prefix | Capacity per LUN | Quantity |
|-------------------------------------|-------------------------------------|---------------------------------|
| <input type="text" value="LUN001"/> | <input type="text" value="500"/> GB | <input type="text" value="10"/> |

Map To:

3 Collection of real-time performance data for intelligent decision-making on the cloud

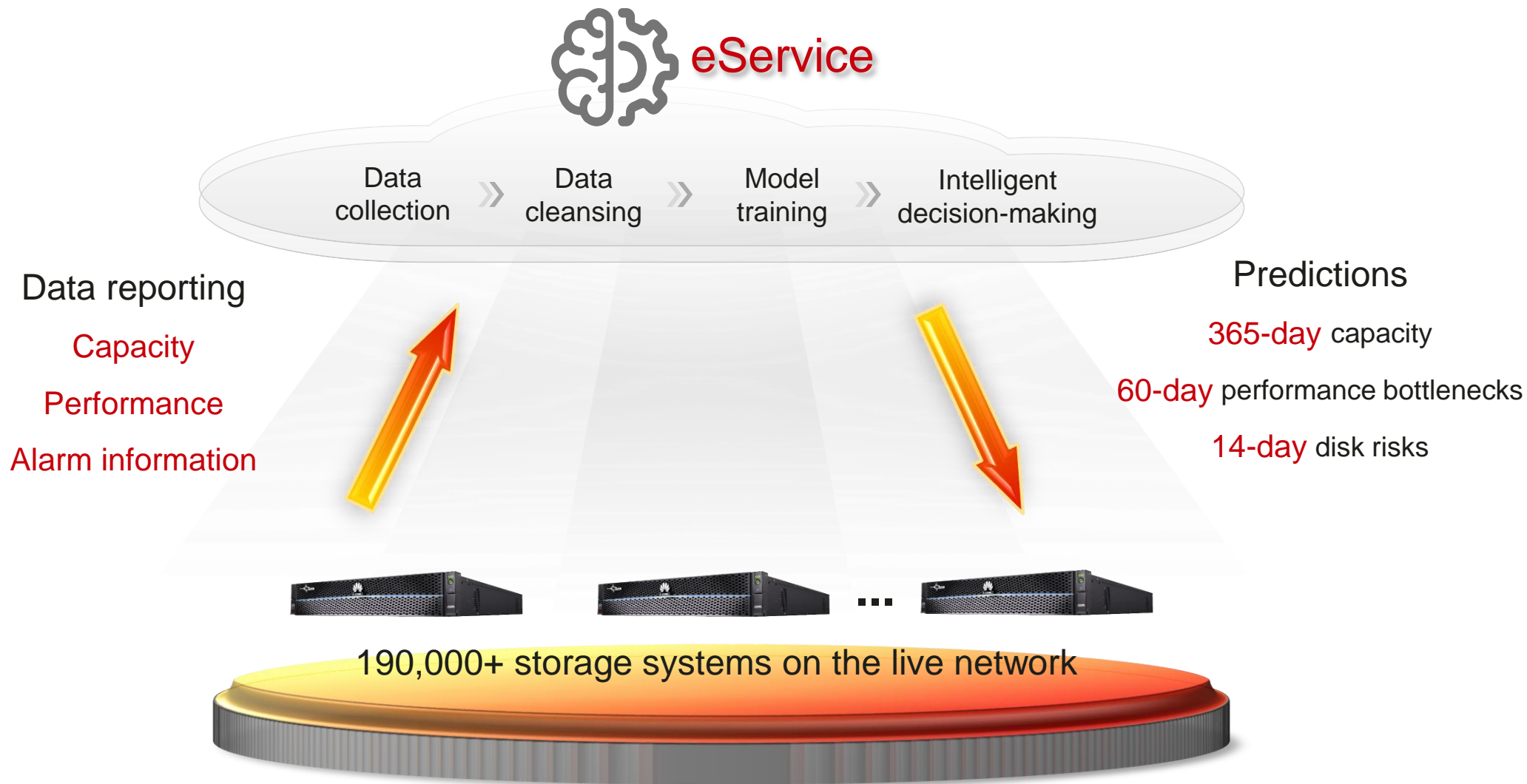


Automated AI Management for the Entire Lifecycle Raises Efficiency



AI management automatically allocates resources throughout the entire lifecycle

Edge-Cloud AI Synergy for Mass Data and Intelligent Resource Utilization



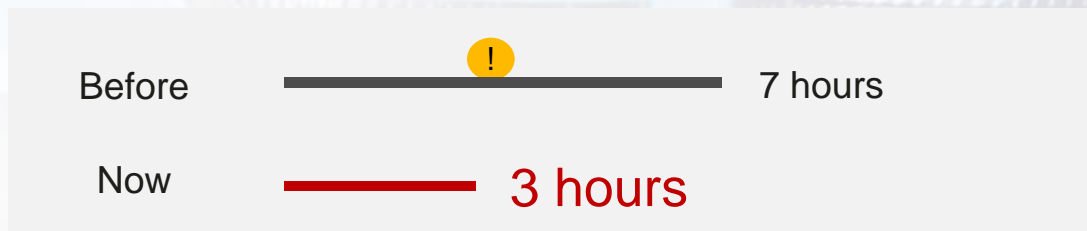
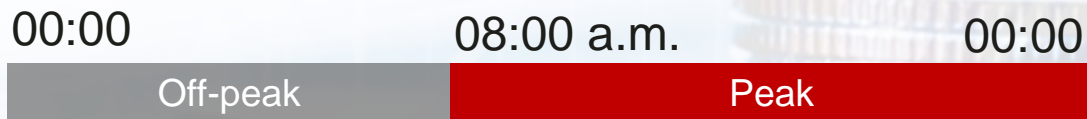
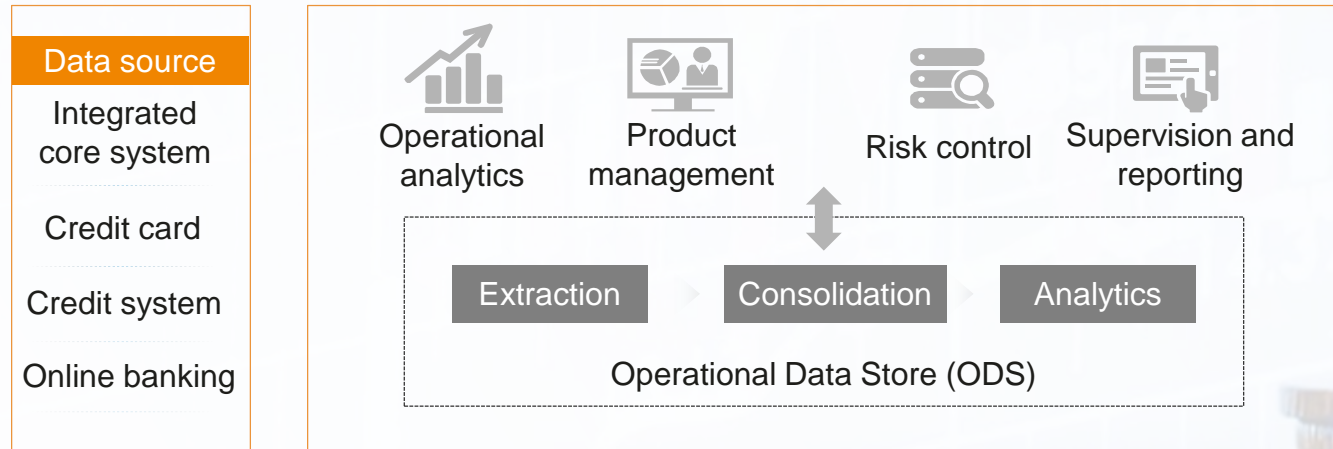
Success Stories




CITIC Bank

— 2x Faster ODS for Big Data Analytics and Decision-Making

China CITIC Bank: one of the first commercial banks in China, ranking No.27 in Tier 1 capital on the Top 1000 World Banks 2018 list



 2x faster ODS system

Off-peak data consolidation lowers costs and shortens the process from 7 to 3 hours for 0 impact on big data analytics and decision-making.

Hi3G

— Reliable Core Billing Systems Manage Exponential Service Growth

Hi3G: a leading telecom solutions provider based in Sweden and awarded Best Mobile Network Supplier five years in a row

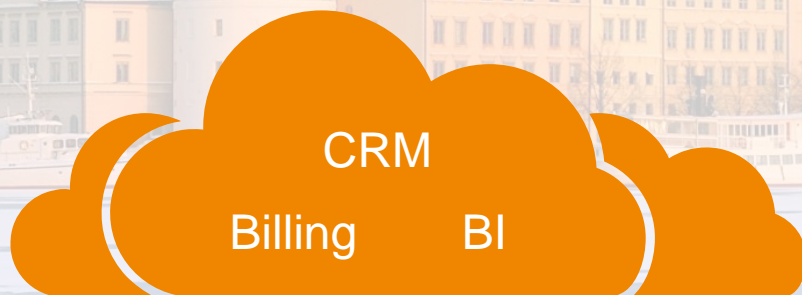
Pain points:

- 30% decrease in the system performance after snapshots enablement
- Unreliable service quality late in device lifecycle

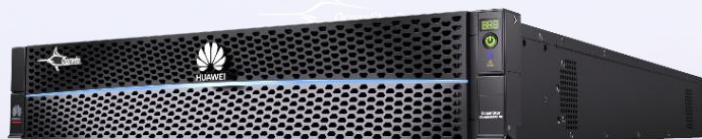


Hi3G

Solution: replacing legacy storage



violin
MEMORY



Uncompromising performance

Snapshots do not impact performance, allowing for multiple snapshots a week

24/7 services

Gateway-free active-active design for always-on services

Effortless migration

Online migration for non-disruptive services

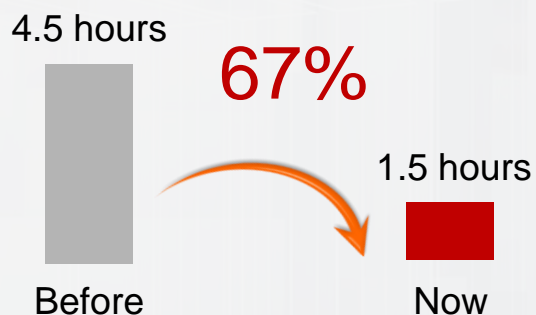
BYD

— Smart Manufacturing Accelerates Data Extraction by 67%

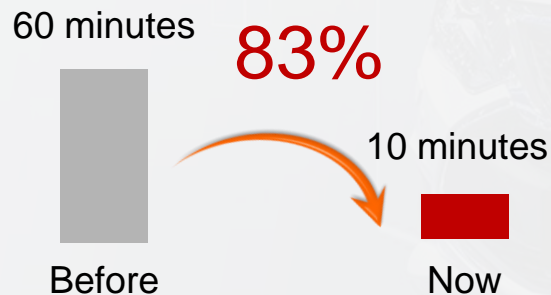
BYD: China's largest private carmaker and new-energy vehicle leader



BW data extraction:
4.5 hours → **1.5 hours**



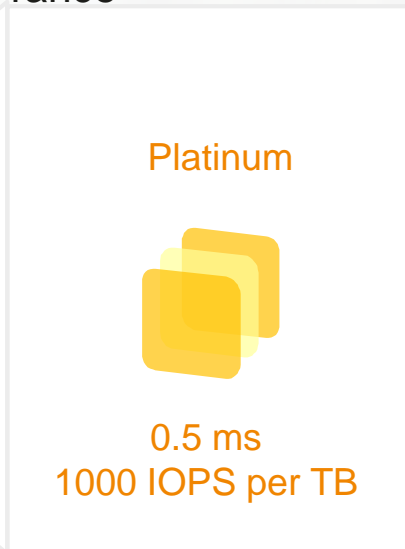
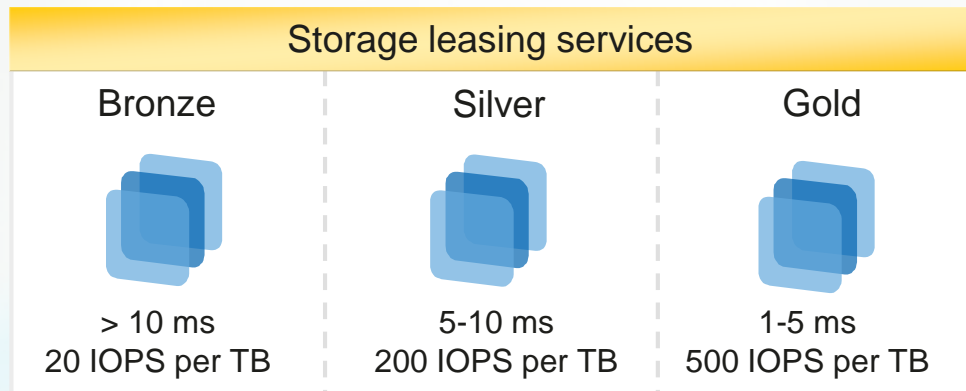
Transfer of 1000 spare parts:
1 hour → **10 minutes**



ACESI

— Expands Business with Platinum Storage Leasing Services

ACESI: the largest provider of cloud leasing in Eastern France



Platinum storage leasing

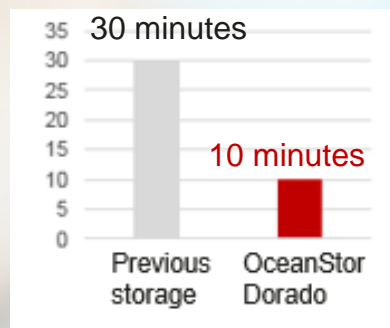
0.5 ms latency meets user service requirements and yields more business opportunities.

Powerful competitive edges

Lower O&M costs grant greater competitive edge in leasing.

High availability of core database resource pools

The gateway-free active-active solution meets the most stringent enterprise-class reliability requirements with six-nines availability for mission-critical services.



100 VM Deployment
3x faster service rollout
30 minutes → 10 minutes



"Huawei helped us provide leasing for high-performance storage space and eliminated our worries over resource shortages. We can provide more competitive services with Dorado deduplication and compression. We are planning to move all our data to Huawei OceanStor Dorado."

— Marco Geraci,
CTO of ACESI

Widiba

— Expands Customer Horizons with Digital Banking

Widiba: an online banking branch of Banca Monte dei Paschi di Siena S.p.A. (MPS), one of the oldest banks in the world

\$ Online financial services



Customer service chatbots

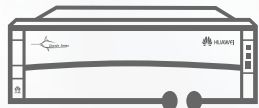


Online registration and transactions

Payment and settlement | Transaction history | Channel access

Camera identification and authentication | Voice biometrics

HyperMetro
Gateway-free active-active



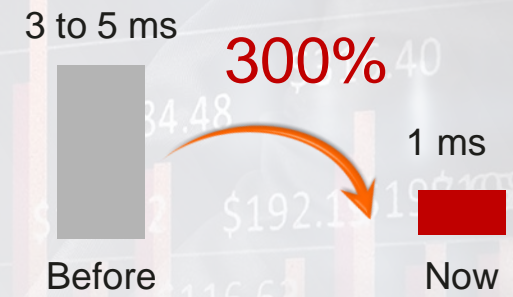
Florence



Siena

Service access anytime, anywhere
Gateway-free active-active solution for always-on services

Full-service hosting with 3x faster performance
Faster average response of storage systems to a transaction or query request



Thank You

Bring digital to every person, home, and organization for a fully connected, intelligent world.

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