



Intel® Select Solutions for Huawei FusionStorage*

Quickly deploy robust, scalable software-defined storage with an optimized, performance-verified solution.



We live in an age of unprecedented opportunities for discovery built on fast compute and massive amounts of available data. Modern businesses can tap into a wealth of information to generate insights and offer new services across a range of industries, from telecommunications and finance to utilities, streaming media, and other enterprise-scale organizations. But as the quantities of data grow, so do the challenges of storing and accessing it efficiently, with the ability to scale as needed.

Enterprise private and hybrid clouds offer a more versatile approach to storage compared to traditional storage models, but cloud options still rely on an underlying infrastructure that can support the flexible, high-performance needs of organizations looking for a cost-effective way to manage massive amounts of data.

Huawei FusionStorage* addresses that challenge by offering enterprise businesses fully distributed enterprise storage features with massive scale-out capabilities designed for cloud-based architectures. Similar to a virtual distributed storage-area network (SAN) storage system, FusionStorage employs distributed technologies to organize solid-state drives (SSDs) into large-scale storage-resource pools. The SSDs are deployed in readily available servers, powered by Intel® Xeon® Scalable processors. Huawei FusionStorage uses distributed hash-based data routing, distributed caching, global load balancing, and multiple data-protection technologies to provide high-performance block storage.

To help enterprise businesses quickly and efficiently deploy FusionStorage to modernize storage in their data centers, Intel and Huawei have codeveloped Intel® Select Solutions for Huawei FusionStorage. Intel Select Solutions for Huawei FusionStorage consist of hardware and software that are optimized for outstanding performance with predictable, linear growth. The solutions are tested and verified by Intel and Huawei, so enterprises can spend less time researching infrastructure and simply implement a leading software-defined storage (SDS) solution powered by the latest Intel® hardware.

Huawei FusionStorage

Huawei FusionStorage is scale-out storage, designed for enterprise cloud architecture, that scales performance and capacity on demand. FusionStorage consolidates all the storage resources of standard x86 servers, powered by Intel Xeon Scalable processors, into a fully distributed storage pool. This flexible solution supports a wide array of enterprise-class data-service features, such as snapshots, thin provisioning, remote replication, and multi-tenant support.

FusionStorage makes use of Small Computer System Interface (SCSI)- and Internet SCSI (iSCSI)-based block-storage APIs to virtualize the storage resources of local servers into SAN storage. The solution meets SAN storage requirements imposed by diverse database applications and virtualization deployments, such as cloud resource pooling, desktop cloud, and DevCloud.

Huawei FusionStorage offers:

- The ability to use general-purpose servers as storage nodes
- Massive scale-out storage for cloud providers
- On-demand provisioning of block, file, or object storage
- A rich set of enterprise-grade features
- An open architecture that integrates into OpenStack* and Apache Hadoop* ecosystems
- Automated data services, operations, and management

Intel Select Solutions for Huawei FusionStorage

Intel Select Solutions for Huawei FusionStorage can help you optimize price and performance for your FusionStorage deployment, while significantly reducing the time required to evaluate, test, and configure infrastructure. Components are selected to be workload-optimized and are verified to perform.

Specifically, Intel Select Solutions for Huawei FusionStorage combine Intel Xeon Scalable processors, Intel® SSD technology, and Intel® Ethernet Network Adapters to empower enterprises to quickly harness a reliable, comprehensive solution that delivers:

- **Advanced security features** with technologies designed to help keep data secure and help businesses protect their data without compromising speed¹
- **High uptime with advanced reliability, availability, and serviceability (RAS) features** that facilitate recovery, which can reduce the frequency and cost of server downtime while protecting the integrity of mission-critical workloads
- **Few service disruptions** to help lower total cost of ownership (TCO) by reducing disruptions during drive swaps and providing LED management for faster status identification
- **Easy scalability** to manage high loads by simply increasing the number of servers and SSDs

Hardware Selections

Intel and Huawei chose Intel Xeon Scalable processors for Intel Select Solutions for Huawei FusionStorage because these processors support the most demanding workloads. For the “Base” configuration, the Intel Xeon Gold 5120 processor provides an optimized balance of price and performance in a mainstream configuration. The Intel Xeon Gold 6138 processor powers the “Plus” configuration,

What Are Intel® Select Solutions?

Intel Select Solutions are verified hardware and software stacks that are optimized for specific software workloads across compute, storage, and network. The solutions are developed from deep Intel experience with industry solution providers, in addition to extensive collaboration with the world's leading data center and service providers.

To qualify as an Intel Select Solution, solution providers must:

1. Follow the software and hardware stack requirements outlined jointly by Intel and Huawei (see Appendix A)
2. Replicate or exceed Intel's reference benchmark-performance threshold
3. Publish a detailed implementation guide to facilitate customer deployment

Solution providers can develop their own optimizations to add further value to their solutions.

which is designed for high-density deployments or more demanding, latency-sensitive environments. Higher-number processors can also be used in either configuration.

Intel and Huawei selected Intel SSD DC S4500 Series and Intel SSD DC P4510 Series drives for both configurations because they are built on the NVMe Express* (NVMe*) specification 1.2 and are architected with 64-layer, triple-level cell (TLC), Intel® 3D NAND Technology. Both drive series deliver high performance and quality of service (QoS) that enables data centers to increase workload density, minimize service disruptions, and efficiently scale deployments.

Intel and Huawei also chose the Intel® Ethernet 700 Series with 10, 25, and 40 gigabit Ethernet (GbE) for Intel Select Solutions for Huawei FusionStorage. The series offers intelligence and performance for network packet processing. And flexible, scalable input/output (I/O) virtualization and intelligent offloads further improve performance and efficiency. The Intel Ethernet 700 Series delivers validated performance ready to meet high quality thresholds for data resiliency and service reliability for most media types and port speeds, and it is backed by extensive testing, validation, and worldwide product support.^{2,3,4,5}

Verified Performance through Benchmark Testing

All Intel Select Solutions are verified through benchmark testing to meet a specified capability level of workload-optimized performance. For Intel Select Solutions for Huawei FusionStorage, Intel and Huawei chose the Vdbench* benchmark to evaluate the performance of the solutions.

Vdbench is an open source benchmark tool widely adopted by the storage industry that measures storage array and data integrity of block storage for individual drives and logical unit numbers (LUNs). Intel and Huawei used Vdbench to generate

disk I/O workload characteristics for varying data volume, sizes, block lengths, and queue lengths to test capability across a range of typical storage array use cases, as shown in [Appendix A](#). This solution was specifically tuned and optimized for larger data sizes and balanced data read/write performance using 8k block, 6 volume, 128 queue length at 70% read and 30% write. (See oracle.com/technetwork/server-storage/vdbench-downloads-1901681.html for more information on Vdbench.)

Base and Plus Configurations

Intel Select Solutions for Huawei FusionStorage are available in two configurations: Base and Plus, as shown in [Appendix A](#). The Base configuration specifies the minimum required performance capability for Intel Select Solutions for Huawei FusionStorage. The Plus configuration provides one example of how system builders, system integrators, and solution and service providers can further optimize the solution to achieve higher performance and capabilities. For example, customers can achieve more than four times greater performance when using the Plus configuration, compared to using the Base configuration, as shown in [Appendix A](#).

Technology Selections for Intel Select Solutions for Huawei FusionStorage

In addition to the Intel hardware foundation used for Intel Select Solutions for Huawei FusionStorage, Intel technologies integrated into Intel Xeon Scalable processors deliver further performance, reliability, and security gains:

1. Intel® Volume Management Device (Intel® VMD):

Enables hot-swap replacement of NVMe SSDs from the PCI Express* (PCIe*) bus without shutting down the system, while standardized LED management helps provide much faster identification of SSD status.

2. Intel® Platform Trust Technology (Intel® PTT) or a discrete Trusted Platform Module (TPM) 2.0:

Protects the system start-up process by ensuring the boot hardware is tamper-free and provides secured storage for sensitive data.

3. Intel® Trusted Execution Technology (Intel® TXT):

Provides the foundation for highly scalable platform security in physical and virtual infrastructures. It helps harden servers at the lowest level against threats of hypervisor, BIOS, or other firmware attacks, malicious rootkit installations, and other types of attacks or misconfiguration for firmware and operating systems.

Intel® Xeon® Scalable Processors

Intel Xeon Scalable processors:

- Offer high scalability for enterprise data centers
- Deliver performance gains for virtualized infrastructure compared to previous-generation processors
- Achieve exceptional resource utilization and agility
- Enable improved data and workload integrity and regulatory compliance for data center solutions

Intel® Select Solutions for Huawei FusionStorage* feature Intel Xeon Gold processors.



4. Intel® Hyper-Threading Technology (Intel® HT Technology):

Ensures that systems use processor resources more efficiently and increases processor throughput to improve overall performance on threaded software.

5. Intel® Turbo Boost Technology:

Accelerates processor and graphics performance for peak loads.

6. Intel® Speed Shift technology:

Allows the processor to select its best operating frequency and voltage to deliver optimal performance and power efficiency.

A Verified, Optimized Solution for Software-Defined Storage

Intel Select Solutions for Huawei FusionStorage offer a fast path to modernizing data centers with SDS. Proven to scale, these pre-tuned and tested configurations are designed to let organizations deploy data center infrastructure that is proven to perform in less time and with less effort.

Visit intel.com/selectsolutions for more information on Intel Select Solutions.

Learn More

Intel Select Solutions: intel.com/selectsolutions

Intel Xeon Scalable processors: intel.com/xeonscalable

Intel SSD Data Center Family:

intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds.html

Intel Ethernet 700 Series: intel.com/ethernet

Intel Select Solutions are supported by Intel® Builders: <http://builders.intel.com>. Follow us on Twitter: [#IntelBuilders](https://twitter.com/IntelBuilders)

Huawei FusionStorage: <https://e.huawei.com/us/products/cloud-computing-dc/storage/cloud-storage/fusionstorage>

Appendix A: The Base and Plus Configurations for Intel Select Solutions for Huawei FusionStorage

To refer to a solution as an Intel Select Solution, a server vendor or data center solution provider must meet or exceed the defined minimum configuration ingredients and reference minimum benchmark-performance thresholds listed below.

INGREDIENT	INTEL® SELECT SOLUTIONS FOR HUAWEI FUSIONSTORAGE BASE CONFIGURATION	INTEL SELECT SOLUTIONS FOR HUAWEI FUSIONSTORAGE PLUS CONFIGURATION
MINIMUM OF FOUR APPLICATION NODES		
PROCESSOR	2 x Intel® Xeon® Gold 5120 processor (2.20 GHz, 14 cores, 28 threads) or a higher number Intel Xeon Scalable processor	2 x Intel Xeon Gold 6138 processor (2.0 GHz, 20 cores, 40 threads) or a higher number Intel Xeon Scalable processor
MEMORY	256 GB or higher (8 x 32 GB DDR4-2666)	384 GB or higher (12 x 32 GB DDR4-2666)
BOOT DRIVE**	1 x 240 GB or larger Intel® SSD DC S4500 Series (M.2 or 2.5-inch) or higher	2 x 240 GB or larger Intel SSD DC S4500 Series (M.2 or 2.5-inch) or higher RAID1
STORAGE HOST BUS ADAPTER (HBA) CONTROLLER PER NODE**	N/A	Intel® RAID Controller RS3UC080J
DATA TIER	8 x 1.9 TB or larger Intel SSD DC S4500 Series or higher	8 x 2 TB or larger Intel SSD DC P4510 Series (NVM Express* [NVMe*]) or higher
DATA NETWORK**	1 x 10 Gb Intel® Ethernet Converged Network Adapter X710-DA2 (dual port) or better	1 x 10 Gb Intel Ethernet Converged Network Adapter X710-DA2 (dual port) or better
MANAGEMENT NETWORK PER NODE	Integrated 1 GbE	Integrated 1 GbE
NETWORK SWITCHES		
TOP OF THE RACK (ToR) SWITCH**	2 x 25 GbE or 10 GbE SFP+ switch with redundancy	2 x 25 GbE or 10 GbE SFP+ switch with redundancy
MANAGEMENT SWITCH	1 x 1 GbE switch	1 x 1 GbE switch
SOFTWARE		
HUAWEI EULEROS*	2.3 or newer	2.3 or newer
FUSIONSTORAGE BLOCK	V100R006C20 or newer	V100R006C20 or newer
VDBENCH*	5.04 or newer	5.04 or newer
APPLIES TO ALL NODES		
TRUSTED PLATFORM MODULE (TPM)**	TPM 2.0 discrete or firmware TPM (Intel® Platform Trust Technology [Intel® PTT])	TPM 2.0 discrete or firmware TPM (Intel PTT)
FIRMWARE AND SOFTWARE OPTIMIZATIONS	Intel® Volume Management Device (Intel® VMD) enabled** Intel® Trusted Execution Technology (Intel® TXT) enabled** Intel® Hyper-Threading Technology (Intel® HT Technology) enabled Intel® Turbo Boost Technology enabled Intel® Speed Shift technology, Hardware P-states (HWP) native C-states disabled** Power-management settings set to performance** LLC prefetch enabled** Uncore frequency scaling enabled**	Intel VMD enabled** Intel TXT enabled** Intel HT Technology enabled Intel Turbo Boost Technology enabled Intel Speed Shift technology, HWP native C-states disabled** Power-management settings set to performance** LLC prefetch enabled** Uncore frequency scaling enabled**

MINIMUM PERFORMANCE STANDARDS

Verified to meet or exceed the following minimum performance capabilities (8K block, 128 queue length, 6 volume x 4 node x 20 GB—70% read, 30% write):

IOPS	152,000	643,000
LATENCY (ms)	20.00	4.8

BUSINESS VALUE OF CHOOSING A PLUS CONFIGURATION OVER A BASE CONFIGURATION

With the Plus configuration of Intel Select Solutions for Huawei FusionStorage, businesses can achieve four times higher performance over the base configuration.

**Recommended, not required



¹ No computer system can be absolutely secure.

² The Intel® Ethernet 700 Series includes extensively tested network adapters, accessories (optics and cables), hardware, and software, in addition to broad operating system support. A full list of the product portfolio's solutions is available at [intel.com/ethernet](https://www.intel.com/ethernet). Hardware and software is thoroughly validated across Intel® Xeon® Scalable processors and the networking ecosystem. The products are optimized for Intel® architecture and a broad operating system ecosystem: Windows*, Linux* kernel, FreeBSD*, Red Hat* Enterprise Linux (RHEL*), SUSE*, Ubuntu*, Oracle Solaris*, and VMware ESXi*.

³ The Intel® Ethernet 700 Series is backed with global support infrastructure for customers pre- and post-sales.

⁴ Supported connections and media types for the Intel® Ethernet 700 Series are: direct-attach copper and fiber SR/LR (QSFP+, SFP+, SFP28, XLPP/CR4, 25G-CA/25G-SR/25G-LR), twisted-pair copper (1000BASE-T/10GBASE-T), backplane (XLAUI/XAUI/SFI/KR/KR4/KX/SGMII). Note that Intel is the only vendor offering the QSFP+ media type.

⁵ The Intel® Ethernet 700 Series supported speeds include 10 GbE, 25 GbE, 40 GbE, and 100 GbE.

Performance results are based on testing as of September 2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure.

Cost reduction scenarios described are intended as examples of how a given Intel- based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at [intel.com](https://www.intel.com).

Intel disclaims all express and implied warranties, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement, as well as any warranty arising from course of performance, course of dealing, or usage in trade.

Intel, the Intel logo, and Xeon are trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.

© 2018 Intel Corporation.