

## Intel Select Solutions for SmartX HCI



“As a leading HCI vendor, SmartX is keenly aware of the importance of new hardware technologies to the development of hyper-converged solutions and have always been in close cooperation with Intel in this area. By using Intel Optane Persistent memory to greatly optimize and upgrade the architecture of SMTX OS, we are able to realize a qualitative leap in performance, effectively meeting the demands of critical systems, expanding HCI into the core applications of various industries, and accelerating the intelligent transformation of data centers.”

– Xu Wenhao  
CEO, SmartX

Owing to its advantages in agility and cost-effectiveness, hyper-converged infrastructure (HCI) has become the preferred digital transformation choice for more and more enterprise users. HCI helps enterprises pool and manage compute and storage resources, thereby improving efficiency and return on investment (ROI). In a research report published in 2020, the IDC predicted that the demand for hyper-converged solutions will continue to grow at a healthy compound annual growth rate (CAGR) of roughly 14% over the next 5 years. The HCI market is projected to reach USD 2.56 billion in 2024<sup>1</sup>.

As one of China's leading HCI vendors, Beijing Zhiling Haina Technology Co., Ltd. (“SmartX”) launched SMTX OS, a hyper-converged solution based on proprietary SmartX distributed block storage technology to facilitate the construction of next-gen IT infrastructure. The solution is capable of meeting the stringent demands of core customer operations in I/O throughput, latency, and other metrics, and is widely used across the finance, healthcare, and manufacturing industries.

In addition to the core SMTX OS software, Intel Select Solutions for SmartX HCI are equipped with advanced hardware such as 2<sup>nd</sup> Gen Intel® Xeon® Scalable processors and Intel® Optane™ persistent memory. The highly reliable, easily scalable, and production-ready hyper-converged solution offers a variety of features, which are outlined below.

- Intel Optane persistent memory App Direct Mode provides cutting-edge and ultra-low latency server virtualization and storage performance through end-to-end optimization of compute virtualization, storage networks, and storage media.
- The workload-optimized HCI integrated solution of the SmartX standalone software platform, combined with conventional x86 servers, helps simplify IT architecture to facilitate the rapid deployment of modern data centers.
- Extensive innovations to modules such as distributed block storage and built-in virtual machine (VM) services. Proven performance and availability help users take full advantage of hardware performance, and for more efficient use of compute, storage, network, and other resources.

The solution helps users quickly construct pre-integrated and pre-optimized infrastructure capable of meeting their performance and cost requirements.

### SmartX Hyper-Converged Solutions Accelerate the Intelligent Transformation of Data Centers

SmartX hyper-converged solution is based on dual- or quad-core commercial servers. The solution is fully optimized, verified, ready for use straight out the box, and provides fine-grained visualized hardware management for an enhanced delivery and use experience. As the core component of SmartX hyper-converged solutions, SMTX OS provides basic IT services such as distributed block storage, compute virtualization, monitoring, and CloudOps. Through a distributed software-defined architecture and hyper-converged deployment model, SMTX OS enhances data center performance and reliability, improves system scalability, and simplifies CloudOps.

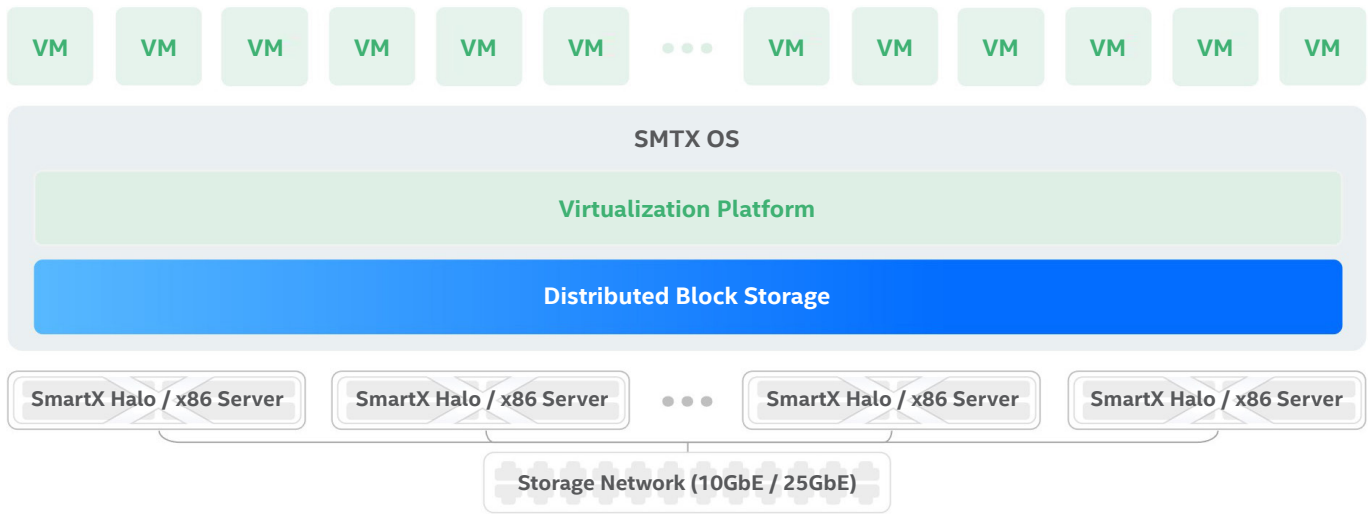


Figure 1: SMTX OS Hyper-Converged Solution Deployment Architecture

SMTX OS includes a web console and is made up of modules such as distributed block storage, built-in VM, and advanced data console services. SMTX OS offers a variety of advantages, which are outlined below.

- **Software-defined and hyper-converged deployment:** Easy to deploy, maintain, and scale. As SMTX OS is based on x86 architecture, it supports integration with most servers on the market.
- **Efficient and stable distributed block storage:** Proprietary SmartX distributed block storage technology features flexible copy data and provision strategies, automated tiering of hot and cold data, and smart data migration to provide stable and reliable high-performance storage virtualization for enterprise users.
- **Open virtualization services:** Features built-in VM services capable of hosting production-level applications. SMTX OS supports multiple virtualization platforms such as VMware and Citrix to safeguard users against the high costs of platform lock-in.
- **Multilevel security (MLS):** Synchronous and asynchronous backup and disaster recovery solutions, production-level high availability functions such as built-in backup and active-active, and reliability verified through long-term testing in large-scale production environments reduce the risk of business interruption and data loss.
- **Unified and simplified CloudOps:** Simplified CloudOps through unified resource management, end-to-end visibility, and intuitive visualization of system data from a single management platform.

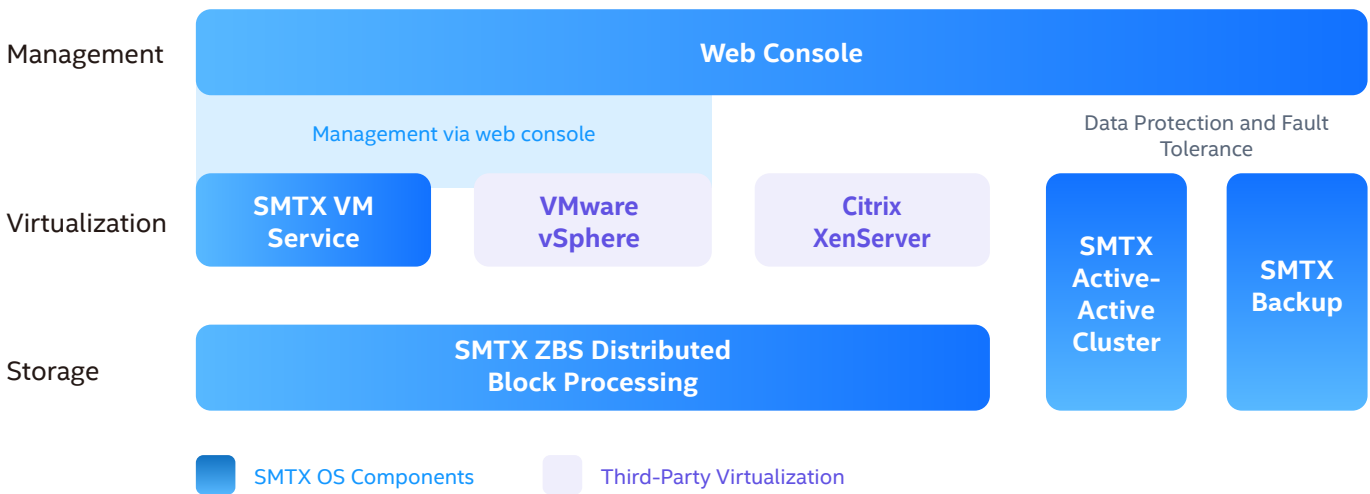


Figure 2: SMTX OS Software Module Configuration

## Intel Select Solutions for SmartX HCI

Intel Select Solutions for SmartX HCI speeds up deployment in data-intensive sectors.

- Configuration optimized for SmartX hyper-converged solutions.
- Faster evaluation, selection, and procurement of relevant hardware.
- Faster deployment of new infrastructure.
- Outstanding performance on a trusted Intel-based platform.

### Hardware Selections

- **2<sup>nd</sup> Gen Intel Xeon Scalable processors:** Designed for software-defined architecture, the 2<sup>nd</sup> Gen Intel Xeon Scalable processors provide cutting-edge performance, enhanced hardware virtualization, and innovative platform features across compute, network, and storage. The processor's 48 PCIe 3.0 sockets support I/O-intensive workloads and accelerate the rate at which enterprises generate insights from data.
- **Intel Optane persistent memory:** With cutting-edge throughput, near-memory latency, high service quality, and extreme durability, it includes Memory Mode and App Direct Mode. When App Direct Mode is selected, specific applications are able to directly access independent persistent memory resources. This increases persistent storage capacity and further reduces latency.
- **Intel SSDs:** Based on the NVMe protocol, Intel SSDs provide high IOPS, high bandwidth, and low latency. Optimization for read-intensive workloads reduces costs and improves both energy efficiency and data reliability.
- **Intel Ethernet Converged Network Adapters:** Excellent network performance, superb reliability, comprehensive compatibility with a wide range of devices, and support for a variety of advanced functions such as Virtual Machine Device Queues (VMDq) and Single Root I/O Virtualization (SR-IOV).

### Technical Selections

Other Intel technologies were also introduced to further improve the performance and reliability of the solution.

- **Intel QuickAssist Technology (Intel QAT):** Chipset-based hardware acceleration for growing compression and cryptographic workloads for greater efficiency while delivering enhanced data transport and protection across server, storage, and network infrastructure.

## What Are Intel Select Solutions?

Intel Select Solutions are a series of proven hardware and software stacks optimized for specific computing, storage, and networking workloads. The development of these solutions stems from Intel's deep cooperation with solution providers, along with its extensive collaboration with leading data centers and service providers.

To qualify as an Intel Select Solutions provider, enterprises must fulfill the conditions below.

1. Meet Intel's software and hardware stack requirements.
2. Meet Intel's benchmark performance thresholds.
3. Publish a detailed implementation guide to facilitate customer deployment.

Once they have met Intel's basic requirements, providers may develop their own optimizations to add further value to their solutions.

- **Intel Ultra Path Interconnect (Intel UPI):** Four Intel UPI (9200 series) and up to three Intel UPI (8200 series) channels increase the scalability of the platform to as many as two sockets (9200 series) and up to eight sockets (8200 series). Intel UPI offers the perfect balance between improved throughput and energy efficiency.
- **Intel Deep Learning Boost (Intel DL Boost) with Vector Neural Network Instructions (VNNI):** Delivers enhanced artificial intelligence (AI) inference performance. 2<sup>nd</sup> Gen Intel Xeon Scalable processors help to deliver AI readiness across the data center, to the edge and back.
- **Intel Infrastructure Management Technologies (Intel IMT):** A framework for resource management, Intel IMT combines multiple Intel capabilities that support platform-level detection, reporting, and configuration. This hardware-enhanced monitoring, management, and control of resources can help enable greater data center resource efficiency and utilization.
- **Intel Security Libraries for Data Center (Intel SecL - DC):** A set of software libraries and components, Intel SecL-DC enables Intel hardware-based security features. They can be used by customers and software developers to more easily develop solutions that help secure platforms and help protect data.

Verified performance through benchmark testing

Intel Select Solutions offers the “Base” and “Plus” configurations (see Appendix 1) to better suit the different performance requirements of SmartX hyper-converged solution users. Sysbench and FIO were used for testing.

- Sysbench is a modular, cross-platform, and multi-threaded benchmark tool primarily used to evaluate OS parameters important for running a database under intensive load.

- FIO is an open-source tool primarily used to stress test the I/O performance of disks, processors, network adapters, and other hardware components.

The “Plus” configuration utilizes the App Direct Mode of Intel Optane persistent memory to provide a larger memory pool and a high-speed cache to reduce solution latency. Test data shows that the IOPS of the “Plus” configuration is superior in both sequential and random read/write requests<sup>3</sup>.



Figure 3: Comparison of “Base” and “Plus” Performance

SmartX	FIO/Storage 4K Rand Read (IOPS)	FIO/Storage 4K Rand Write (IOPS)	FIO/Storage 1M Seq Read (IOPS)	FIO/Storage 1M Seq Write (IOPS)
Base	32300	24800	830	520
Plus	331000	162000	5200	1700

Table 1. Intel Select Solutions for SmartX HCI – FIO Test Data

SmartX	Sysbench/OLTP R/W TPS	Sysbench/OLTP R/W TPS Ave. Lats (s)
Base	820	20
Plus	1780	9

Table 2. Intel Select Solutions for SmartX HCI – Sysbench Test Data

**Note:** Testing was carried out on 1 VM running on 3 bare metal nodes (3P1V); FIO Configuration: 1 I/O depth | numjobs = 16 | 10Gbps storage network (base).

Helping Enterprises Build Modern Data Centers with HCI

Intel Select Solutions for SmartX HCI take full advantage of cutting-edge Intel hardware and SmartX hyper-converged solutions to provide users with high infrastructure performance and flexibility in key application scenarios. By providing distributed block storage,

built-in compute virtualization, rich deployment models, and other basic IT services, this solution accelerates the deployment of modern data centers with production-ready HCI at a highly competitive TCO.

## Appendix: “Base” and “Plus” Configurations of Intel Select Solutions for SmartX HCI

3 nodes	Base	Plus
Processors	2 x Intel® Xeon® Silver 4210 processor or higher	2 x Intel® Xeon® Gold 6240 processor or higher
Memory	192 GB or more DDR4-2933	192 GB DDR4-2933 8 x 128 GB Intel® Optane™ persistent memory
Boot Drive	2 x 480 GB Intel® S4510 SATA SSD	2 x 480 GB Intel® S4510 SATA SSD
Storage Drive	10 x 2 TB 7200RPM SATA HDD	4 x 1.6 TB Intel® SSD DC P4610
Storage Cache	2 x 1.6 TB Intel® SSD DC P4610	NA
Data Network	1 x 10GbE dual-port Intel® Ethernet CNA X710-DA2 SFP+	3 <sup>rd</sup> party vendor Ethernet
Management Network	1 x 1GbE dual-port Intel® NIC	1 x 1GbE dual-port Intel® NIC



<sup>1</sup> <https://www.idc.com/getdoc.jsp?containerid=prCHC46226720>

<sup>2</sup> Config 1 – Base: 3-node: 2 x Intel® Xeon® Silver 4210 processor, Total Memory 192 GB (2933 MHz), 2 x 480 GB Intel® SSD S4510, 10 x 2 TB 7200 RPM SATA HDD, 2 x 1.6 TB Intel® SSD DC P4610, 1 x 10GbE dual-port Intel® Ethernet CNA X710-DA2 SFP+, 1 x 1GbE dual-port Intel® NIC; Plus: 3-node: 2 x Intel® Xeon® Gold 6240 processor, Total Memory 192 GB (2933 MHz), 8 x 128 GB Intel® Optane™ persistent memory, 2 x 480 GB Intel® SSD S4510, 4 x 1.6 TB Intel® SSD DC P4610, 1 x 1GbE dual-port Intel® NIC.

<sup>3</sup> Testing was carried out on 1 VM running on 3 bare metal nodes (3P1V); FIO Configuration: 1 I/O depth | numjobs = 16 | 10Gbps storage network (base).

Performance varies by use, configuration and other factors. Learn more at [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex)

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See configuration table for details. No product or component can be absolutely secure.

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