



Solution Brief

Intel[®] Select Solution for NFVI v2 2nd Generation Intel[®] Xeon[®] Processor Scalable Family

Advantech SKY Servers Verified as Intel® Select Solutions for NFVI v2

Overview

When communication service providers (CommSPs) need a solution for Network Function Virtualization Infrastructure (NFVI), they must be able to quickly and efficiently deploy it, realizing reliable, secure and workload-optimized deterministic performance on a balanced platform. To achieve this, they need a framework that makes it easier for them to deploy NFVI in a timelier fashion, allowing them to leverage the benefits of software defined networking sooner. Intel® Select Solutions for NFVI provides this new framework, and helps CommSPs to meet the challenges of next generation networking and compute more efficiently.

Advantech white box servers verified as Intel® Select Solutions are readily accessible through Advantech Remote Evaluation Services and will help CommSPs to spend less time, effort and expense evaluating hardware and software options and more on designing and deploying new services. In the case of NFV, Intel® Select Solution for NFVI delivers a choice of optimized virtual network configurations verified for complex communications workloads on agile and reliable infrastructure.

The Advantech SKY-8201L and the SKY-8101D are the first of Advantech's platforms based on 2nd generation Intel® Xeon® Scalable processors to be verified as Intel® Select Solutions using the latest test scripts. Both platforms represent Advantech's most powerful and flexible dual socket systems, addressing scalability challenges head-on. They extend Advantech's white box server offering with a choice of Intel® Xeon® Platinum and Intel® Xeon® Gold CPUs from both 1st and 2nd generation Intel® Xeon® processor Scalable families.

This solution brief describes how Intel® Select Solutions for NFVI address the complexity that service providers face in choosing the right infrastructure for NFV. It discusses Advantech's SKY-8201L and SKY-8101D configurations in detail and compares them with the base and plus specifications required to meet the Intel® Select Solutions for NFVI v2 specifications.

Ready to ship as pre-configured platforms and also available for benchmarking in Advantech's Remote Evaluation Service labs, developers can now gain faster access to optimized and stable platform configurations to conduct testing and modeling of solutions that will help them define next-generation services.

Solution Highlights

- NFV-Ready 1 & 2 RU high performance dual-socket NUMA balanced servers
- Available now for wide scale deployment
- Fully certified with Red Hat Enterprise Linux and Red Hat OpenStack Platform
- Verified as Intel® Select Solutions for NFVI Cloud and Controller nodes
- Packed with the latest technologies in networking and acceleration interfaces, and NVME Storage
- Leveraging 2nd Gen Intel® Xeon® processor SKUs with increased NFVI packet processing performance

Advantech's SKY-8201L and SKY-8101D are verified Intel® Select Solutions for NFVI that benefit communications service providers by providing their developers with faster access to optimized and stable platform configurations to accelerate development of NFV solutions.

Ready to ship as preconfigured platforms and also available for benchmarking in Advantech's Remote Evaluation Service labs, communications service providers can utilize these platforms to conduct testing and modelling of solutions that will define nextgeneration services.





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Optimizing Network Infrastructure Efficiency

- 1. EXTENDED SCALABILITY FROM M to XL
- 2. HIGHEST PACKET THROUGHPUT ON Intel® ARCHITECTURE
- 3. PERFORMANCE ACCELERATION AS YOU NEED IT

When you have all three the SKY has no limit

Introduction

The Intel® Select Solutions for NFVI were defined based on the functional requirements of a wide range of NFVI use cases to arrive at a verified and workload-optimized configuration for VNFs and other NFVI applications. The Advantech platforms that are verified Intel® Select Solutions for NFVI are built around the following architectural and deterministic performance features of their Intel® Xeon® Gold processor-based servers:

- Balanced non-uniform memory access (NUMA) connectivity: I/O is evenly distributed across both CPU sockets. Workloads running on both sockets can benefit from direct access to network, storage (Non-Volatile Memory Express, or NVMe drives), and Intel® QuickAssist Technology (Intel® QAT) acceleration.
- High throughput network interface cards (NICs): Both the SKY-8101D and SKY-8201L offer four NUMA balanced PCIe x16 Gen3 slots. They can be configured with two dual 40GbE NICs based on Intel® Ethernet Controller XL710-BM2 per socket for 320Gbps aggregate throughput. For the purpose of Intel Selection Solutions for NFVI verification, the servers were each configured with one NIC per socket, with one active and one back-up port per NIC.
- **Storage:** 2 x 1TB Advantech SATA SSDs are configured as boot drives while 4 x 2TB Intel® SSD Data

Center P4510 Series drives (2 max per NUMA node on SKY-8201L) deliver a blend of high performance, storage density, and reliability for Plus configurations (2 x 2TB for Base). High sequential throughput, high random IOPS, and low/reliable latency characteristics of Intel® SSD Data Center Family for NVMe* help accelerate applications across a wide range of NFVI workloads.

- Intel® QuickAssist Technology (Intel® QAT) acceleration: Is built into the Intel® C628 series chipset to improve performance and efficiency by offloading computeintensive encryption and compression operations from server CPUs, including:
 - Bulk cryptography: symmetric encryption + authentication, and cipher operations
 - Public key cryptography: asymmetric encryption, digital signatures, and key exchange
 - Compression: lossless data compression for data in flight and at rest.

Configurations

Three minimum Intel® Select Solutions for NFVI configurations are defined:

1. The cloud node of Intel® Select Solution for NFVI v2 plus configuration is based on Intel® Xeon® Gold 6252 CPU @ 2.1 GHz, or higher number SKU. This hardware configuration showcases a combination of the latest Intel® processor technology coupled with Intel® platform technologies such as Intel QAT. These technologies are integrated on the motherboard to deliver best-inclass NFVI performance with highest virtual network function density using DPDK.

- 2. The cloud node for Intel® Select Solution for NFVI v2 base configuration is based on the Intel® Xeon® Gold 6230 processor @ 2.1 GHz, or Intel® Xeon® Gold 6230N processor @ 2.3 GHz 20C/40T, or higher number SKU. It is based on a value-performance optimized hardware configuration. This reduces the requirements specified for Intel® Select Solutions for NFVI v2 plus configurations while retaining use of the latest Intel® platform technology. It delivers notable NFVI performance for VNFs, basic networking, and cryptography and compression technology.
- 3. The controller node is used to host Openstack control and signaling functions making additional local storage and hardware acceleration optional.

Both Advantech platforms passed plus and controller configuration tests and were validated with dual Intel® Xeon® Gold 6252 processors (24 cores each, 2.1GHz).





Figure 1: Advantech SKY-8101D front and rear views

Advantech SKY-8101D

The SKY-8101D high-end server meets the criteria for the Intel® Select Solution for NFVI v2 plus and base configurations, and has been designed for maximum performance, scalability and functionality in a 1U rack mount footprint. The configurations verified to meet Intel's reference benchmarkperformance threshold were equipped with dual Intel® Xeon® Gold 6252 processors (24 cores each, 2.1GHz) for both the plus and controller configurations. The server is also available with a broader choice of processors from the Intel® Xeon® processor Scalable family.

The SKY-8101D is a high-end server optimized for computing power, accelerated workloads and high speed, high density I/O with optimum energy efficiency.

Two Intel® Xeon® Scalable processors provide the latest architectural enhancements, including rebalanced cache hierarchy, and Intel® Ultra Path Interconnect (Intel® UPI) for increased bandwidth and transfer rates between sockets at up to 10.4GT/s.

In addition, the new Intel® Advanced Vector Extensions 512 (Intel® AVX512) Vector Neural Network Instruction (VNNI) extension increases the throughput of tight inner convolutional loop operations, reduces the memory bandwidth required to perform deep learning operations and will improve the performance of image matching algorithms on Advantech white box servers.

Each socket supports 6 memory channels and up to 12 DDR4 RDIMMs at 2666 MHz for up to 1536GB of ECC memory using the latest technology. Advanced RAS modes such as mirroring and sparing increase platform reliability.

The SKY-8101D's thermal system design enables support for processors with up to 165W TDP. This allows the appliance to scale from 8 core CPUs to the highest performance 28 core processors available today.

With an abundance of PCI Express lanes, the SKY-8101D can support up to four full height 3/4 length (10.5") PCIe x16 adapters for modular, configurable networking I/O and acceleration. PCIe Gen3 technology on all slots provides sufficient bandwidth to support multiple 40GbE and quad 10GbE NICs as well as the latest adapters offering 100GbE connectivity. With integrated security and compression acceleration based on Intel® QuickAssist Technology and two 10GbE ports with SR-IOV and RDMA support, the system offers bestin-class integration in a 1RU form factor.

Advanced Lights Out Management based on Advantech code base BMC and IPMI suite improves system manageability and reliability, providing platform thermal management, H/W monitoring and supervision. Remote firmware upgrade capability and hardware-based BIOS redundancy make the SKY-8101D an ideal platform for mission-critical and highly available networks.

Redundant power supplies, the ability to withstand single fan failures, redundant firmware images with failsafe upgrades and hot swappable FRUs make the SKY-8101D the platform of choice for applications requiring zero downtime.

The SKY-8101D is CE, FCC, UL, CB, CCC, and RoHS compliant.

Tables 1 and 2 show the exact hardware configurations of the SKY-8101D verified as an Intel® Select Solution for NFVI v2 and compares them to the latest reference specifications.

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Figure 2: Advantech SKY-8201L front and rear views

Advantech SKY-8201L

The SKY-8201L high-end server meets the criteria for the Intel® Select Solution for NFVI plus and base configurations, and has been designed for maximum performance, scalability and functionality in a 2U 27.5" depth rack mount footprint. The configurations verified to meet Intel's reference benchmark-performance threshold were equipped with dual Intel® Xeon® Gold 6252 processors (24 cores each, 2.1GHz) for both the plus and controller configurations. The platform is also available with a broader choice of processors from the Intel® Xeon® processor Scalable family.

The system is a cost effective, robust platform optimized for superior reliability in applications such as communications, edge and industrial high performance computing. It is specifically designed for high density PCIe card payloads where maximum I/O connectivity is needed or the integration of industry leading offload and acceleration technology is essential. The power and cooling options along with the streamlined mechanical design make it ideal for demanding applications requiring acceleration technologies such as GPU, DSP and FPGA cards.

Two Intel® Xeon® Scalable processors provide the latest architectural enhancements, including rebalanced cache hierarchy, and Intel® Ultra Path Interconnect (Intel® UPI) for increased bandwidth and transfer rates between sockets at up to 10.4GT/s.

Each socket supports 6 memory channels and up to 8 DDR4 RDIMMs at 2666 MHz for up to 1024GB of ECC memory using the latest technology. Advanced RAS modes such as mirroring and sparing increase platform reliability.

Specifically designed for applications requiring higher capacity, front loading, hotswappable storage with RAID support, the SKY-8201L accommodates up to twelve 3.5" or twenty four 2.5" removable drive bays at the front of the system, eight/twenty of which support SATA/SAS connectivity and a further four optional 2.5" NVMe drives, each connected to a PCIe Gen3 x4 OCuLink bus from Intel. With support for Intel® Virtual RAID on CPU (Intel® VROC) hybrid NVMe and SATA RAID, the server is ideal for video caching and edge transcoding, data acquisition, storage and processing as well as accelerated edge processing and

analytics. The SKY-8201L meets a variety of acquisition, preprocessing and forwarding performance needs and can operate in environments with limited space, higher ambient temperature and lower low noise level constraints.

The SKY-8201L is designed to withstand extended environmental conditions in terms of shock, vibration and operating temperature. Redundant power supplies, the ability to withstand single fan failures, redundant firmware images with failsafe upgrades and hot swappable FRUs all make the SKY-8201L the platform of choice for applications requiring zero downtime.

Interoperability testing is performed with a wide selection of Advantech and third-party PCIe card vendors in order to accelerate integration and shorten time to deployment. The SKY-8201L is CE, FCC, UL, CB, CCC, and RoHS compliant.

Tables 1 and 2 show the exact hardware configurations of the SKY-8201L verified as an Intel® Select Solution for NFVI v2 and compares them to the latest reference specifications.

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	Requirement	Required/ Recommended	Qty/ node	Advantech SKY-8101D /SKY-8201L-Plus		
СРU	Intel® Xeon® Gold 6252 CPU @ 2.1 GHz or higher number SKU	Required	2	2x Intel® Xeon® Gold 6252 CPU @ 2.1GHz 24C/48T		
Memory	Option 1: DRAM only configuration: 384GB (12 x 32 GB DDR4 2666 MHz) Option 2: DRAM only configuration: 384GB (24 x 16 GB DDR4 2666 MHz) Option 3: 192GB DRAM + 1.0 or 1.5 Intel [®] Optane [™] DC Persistent Memory	Required	12 24 12	384 GB DRAM (12 x 32 GB 2666 MHz 288- pin DDR4 RDIMM)		
NIC	Option 1: 2 x 25GbE Dual Port Intel [®] Ethernet Controller XXV710 Option 2: 2 x 40GbE Dual Port 40GbE Intel [®] Ethernet Controller XL710	Required	2 2	2x Advantech PCIE-2320 with XL710 @40GbE dual QSFP+		
Intel® QAT	Intel® C620 Series Chipset Family Integrated on Base Board Intel® C627/C628 chipset integrated w/NUMA connectivity to each CPU or minimum 16 PCIe* lane connectivity to one CPU	Required	1	Intel [®] C628 Chipset with Intel [®] QAT enabled		
Storage	2 x 480GB Intel [®] SATA Solid State Drive or equivalent boot drive	Required	2	2x Advantech SATA SSD @1.0TB		
	4 x 2.0TB Intel [®] SSD Data Center P4510 Series for NVMe or equivalent drive (Recommended NUMA Aligned)	Required	4	4x Intel [®] SSD DC P4510 Series @2.0 TB		
LAN on Motherboard (LOM)	10Gbps or 25Gbps port for Pre-boot Execution Environment (PXE) and Operation, Administration and Management (OAM)	Required	2	2x 10Gbps with Intel® X722 (Integrated into PCH)		
	1/10Gbps port for Management NIC	Required	1	2x 1Gbps with Intel [®] i210-AT		

Table 1: Checklist for Intel[®] Select Solution for NFVI v2 Cloud Node Plus HW Configuration VS SKY-8101D & SKY-8201L

Table 2: Checklist for Intel[®] Select Solution for NFVI Controller Node HW Configuration VS SKY-8101D & SKY-8201L

	Requirement	Required/ Recommended	Qty/ node	Advantech SKY-8101D/SKY-8101D-Control
CPU	Intel® Xeon® Gold 5218 CPU @ 2.1 GHz or Intel® Xeon® 5218N CPU, 2.3 GHz, 16C/32T, 105W or higher number SKU	Required	2	2x Intel® Xeon® Gold 6252 CPU @ 2.1GHz 24C/48T
Memory	Option 1: DRAM only configuration: 192GB (12 x 16 GB DDR4 2666 MHz) Option 2: 192GB DRAM + 512GB Intel® Optane™ DC Persistent Memory	Required	12 12	384 GB (12 x 32 GB 2666 MHz 288-pin DDR4 RDIMM)
NIC	Option 1: 2 x 25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+ or Option 2: 2 x 10GbE Dual Port Intel® Ethernet Controller X710 or Option 3: 2 x Intel® Ethernet Server Adapter X520-DA2 SFP+	Required	2 2 2	2x Advantech PCIE-1220PS with X710 @10GbE dual SFP+
Intel® QAT	Intel [®] QuickAssist Adapter 8970 (PCle [*]) AIC or equivalent third party Intel [®] C620 series chipset with Intel [®] QAT Enabled (PCle) AIC with minimum 8 or 16 Lanes of PCle connectivity or multiple Intel [®] QAT AIC Adapters installed in the platform	Recommended	1	Intel [®] C628 Chipset with Intel [®] QAT enabled
Storage	2 x 480GB Intel [®] SATA Solid State Drive or equivalent boot drive	Required	2	2x Advantech SATA SSD @1.0TB
	2 x 2.0TB Intel® SSD Data Center P4510 Series for NVMe or equivalent (Recommended NUMA Aligned)	Recommended	2	4x Intel® SSD DC P4510 Series @2.0 TB
LAN on Motherboard (LOM)	10Gbps or 25Gbps port for PXE/OAM	Required	2	2x 10Gbps with Intel® X722 (Integrated into PCH)
	1/10Gbps port for Management NIC	Required	1	2x 1Gbps with Intel [®] i210-AT

Enhanced Features

Both of Advantech's SKY servers come with an enhanced feature set to improve availability, serviceability and usability:

- Remote Intelligent Platform
 Monitoring & Control
 - Integrated IPMI Based Management Controller
 - Development, Customization, Validation and Life Cycle Management
 - Standard and Advanced IPMI Features
- Redundant BIOS
 - Physical Redundant Flashes for Current/Backup BIOS
 - Watchdog Mechanism to Detect Failing / Corrupted BIOS
 - Rollback Mechanism for System Recovery if BIOS Upgrade Fails
 - Dedicated Update Utility (ABU)
- Remote BMC/BIOS Upgrade
 - x86 BIOS Upgradable By BMC and ABU (Advantech BIOS Utility)
 - Industry Standard HPM.1 Protocol

The safeguard and continuity of business critical services is also ensured by eliminating single points of failure with LAN bypass. Advantech's advanced LAN Bypass feature guarantees uptime by preserving network connectivity and maintaining communications in case of power outage or appliance malfunction. When Bypass Mode is active, multiple interface pairs can be bridged on power failure and will resume normal functionality when power is restored.

Remote Evaluation Service

Advantech's unique Remote Evaluation Service (RES) offers developers easy and secure access to an entire range of platforms upon which they can rapidly evaluate Advantech value-add and test new services. In concert with other Intel® Network Builders ecosystem members, Advantech enables developers with early access to the latest technology, which accelerates their next generation product

designs. As a result, they can apply innovative new technology sooner to reduce operating expense and grow new revenue faster. RES offers an evaluation framework that brings together members of the Intel® Network Builders community who share similar philosophies about telecom and edge cloud architecture and where they can openly collaborate together on a range of platforms from two Intel® Atom® processor cores to several hundred Intel® Xeon® processor cores.

With RES, developers can get ahead of the curve and begin to test different NFV infrastructures on platforms destined for deployment closer to the subscriber in the access network, mobile edge and in customer premises (uCPE) as well as the network core and telecom data center.

For more information on how to access RES for an evaluation of the Advantech verified Intel® Select Solutions for NFVI, or to order a platform:

Email: ncg@advantech.com

Advantech's 2nd Generation Intel® Xeon® Scalable landing page: <u>http://www.advantech.com/nc/Spotli</u> ght/NCG/Intel-CLX



For more information on Advantech solutions please contact us at:

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www.advantech.com/nc

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