Solution Brief

Intel® Select Solution for NFVI with Advantech Servers & Appliances

Overview

Communications service providers (CoSPs) are seeking to change the economics and service deployment agility of their networks by embracing network functions virtualization (NFV)-based services. This network revolution provides the agility and flexibility to support new high-bandwidth applications like 5G and new high device-count services such as Internet of Things.

NFV replaces fixed-function appliances with virtual network functions (VNFs) that run on general-purpose Intel® architecture-based servers. With an NFV server in place, a CoSP can remotely turn up or turn down services in a very short time. Networks can be lower cost through the general-purpose nature of the server as well as the ability to use the server for multiple services.

Intel® Select Solutions for NFVI address the complexity that CoSPs face in choosing the right infrastructure to for NFV by providing a verified hardware and software stack. They enable a fast path for CoSPs to efficiently deploy network function virtualization infrastructure (NFVI) and achieve reliable, more secure, and workload-optimized deterministic performance on a balanced platform.

Advantech has chosen to partner with Intel to verify its FWA-6170 workload-optimized network appliance and SKY-8201 carrier grade server as Intel Select Solutions for NFVI. This lets users of the systems benefit from Intel's experience in the NFV market and get workload-optimized performance from Intel® Xeon® Scalable processors.

The Advantech FWA-6170 and SKY-8201 are verified Intel Select Solutions for NFVI that benefit communications service providers by providing developers faster access to optimized and stable platform configurations to accelerate development of NFV solutions.

Ready to ship as pre-configured platforms and also available for benchmarking in Advantech's Remote Evaluation Service labs, communications service providers can utilize these platforms to conduct testing and modeling of solutions that will define next-generation services.

Hardware Platforms	Software Platforms
• *Compact, high performance, next generation rackmount appliances and servers based on dual Intel® Xeon® Platinum and Gold processors*	• *Fully tested with Red Hat Enterprise Linux (RHEL)*

intel XEON PLATINUM inside

intel XEON GOLD inside

(intel) IoT Solutions Alliance Premier

(intel) select solution

ADVANTECH Networks & Communications
Your NFVI Partner for the New IP Infrastructure

Advantech's New Verified Intel® Select Solutions for NFVI
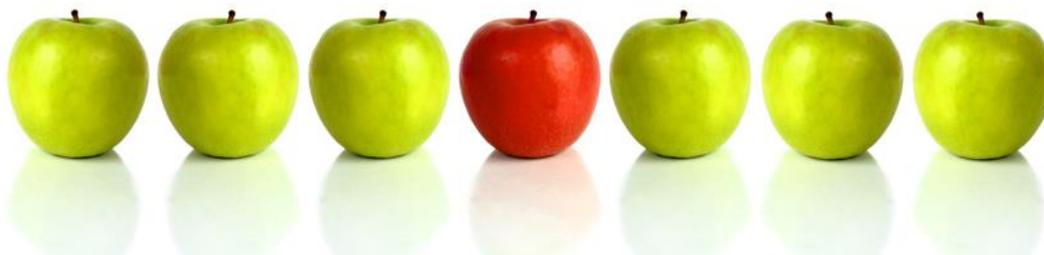
Introduction to Intel Select Solutions for NFVI

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, verified Intel Select Solutions for NFVI, are built around the following architectural and deterministic performance features of the Intel Xeon Platinum processor-based server board:

- 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): two dual 40GbE Advantech Ethernet Cards based on Intel® Ethernet Controller XL710-BM2. One NIC per socket, four 40GbE ports in total, which gives aggregated theoretical throughput of up to 160 Gbps per server in this

configuration. Both systems support further expansion.

- 2 x 1TB Advantech SATA SSDs and 4 x 2TB Intel® SSD Data Center P4500 Series that deliver a blend of high performance, storage density, manageability, and reliability at an affordable price. 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 QAT acceleration built into the Intel® C620 series chipset (C627 on FWA-6710, C628 on SKY-8201) to improve performance and efficiency by offloading compute-intensive 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

Two minimum configurations are defined per Intel Select Solutions for NFVI:

1. **Intel® Select Solution for NFVI Plus Configuration** – This configuration is based on the high-performance Intel Xeon Gold 6152 processor. It specifies network, storage and integrated platform acceleration products from Intel to maximize virtual machine density.

2. **Intel® Select Solution for NFVI Base Configuration** – This configuration is based on the Intel Xeon Gold 6138T processor and includes network, storage and add-in platform acceleration products from Intel for carrier-class use cases that require long life, high reliability and high TCASE capabilities.

Both Advantech platforms passed Intel® Select Solution for NFVI Plus Configuration tests. The FWA-6170 was validated with Intel Xeon Platinum 8176 processors, while the SKY-8201 was validated with Intel Xeon Platinum 8160M processors

Figure 1. Advantech FWA-6170 with 7 out of 8 Network Mezzanine Cards (NMC) slots populated

and Intel Xeon Gold 6154 processors.

Advantech FWA-6170

The FWA-6170 high-end network appliance meets the criteria for the Intel® Select Solution for NFVI plus configuration, and it has been designed for maximum performance, scalability and functionality in a 2U rack mount footprint. The configurations verified to meet Intel's reference benchmark-performance threshold were equipped with dual Intel® Xeon® Platinum 8176 processors (28 cores each, 2.1GHz). The platform is also available with a broader choice of processors from the Intel Xeon processor Scalable family.

The FWA-6170 is a high-end network communications appliance 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 new Intel® Ultra Path Interconnect (Intel® UPI) for increased bandwidth and transfer rates between sockets at up to 10.4GT/s.

In addition, the new processor family introduces Intel® Advanced Vector Extensions 512 (Intel® AVX-512) with 512-bit vector capability at up to 2x improvement in peak performance over Intel® Advanced Vector Extensions 2 (Intel® AVX2)

for the acceleration of enterprise-class workloads.

Each socket supports 6 memory channels and up to 12 DDR4 RDIMMs, an increase of 1.5x over the previous generation FWA-6520, with a speed increase to 2666 MHz for up to 768GB of ECC memory using the latest technology. Advanced RAS modes such as mirroring and sparing increase platform reliability.

The FWA-6170'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 FWA-6170 can support up to 8 Network Mezzanine Cards (NMCs) for modular, configurable networking I/O and acceleration. PCIe Gen3 technology on all NMC slots provides sufficient bandwidth to support multiple 40GbE and quad 10GbE modules as well as double sized NMCs for 100GbE connectivity.

Support for two internal low-profile PCIe add-on cards enables further encryption offload in addition to on-chip PCH-based Intel QAT depending on the appliance model.

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 FWA-6170 an ideal platform for mission-critical and highly available networks. For enhanced platform security the FWA-6170 provides Trusted Platform Module TPM 1.2/2.0 support. Front and rear hot swappable FRUs such as power and fan modules along with service friendly design features such as fan failure LEDs further help to reduce system down time and enhance serviceability.

Management, I/O and storage elements include two management Ethernet ports, two 10GbE SFP+ ports, a console port, two USB ports, a graphic-mode LCD module, LEDs for power/location/alert indication and two front-loadable 2.5" SATA HDDs/SSDs as well as two internal M.2 2260/2280 slots.

An optional Storage Expansion Kit replacing the top row of NMCs provides eight 2.5" drive bays

A new removable front panel cover placed in front of the 2.5" SATA bays allows fast and simple logo customization.

The FWA-6170 is CE, FCC, UL, CB, CCC, and RoHS compliant.

Table 1 below shows the exact hardware configurations of the FWA-6170 verified as an Intel Select Solution for NFVI and compares it to the reference specifications.

Table 1: FWA-6170 Compatibility with Intel® Select Solutions for NFVI Plus Configuration		
Platform	**Intel Reference Platform**	**Advantech FWA-6170**
Processor	Intel® Xeon® Gold 6152 processor, 2.1 GHz, 22 C, 140 W or higher number Intel Xeon Gold or Platinum processor	Validated with Intel® Xeon® Platinum 8176 processors (2.1 GHz, 28C, 165W)
Memory	24 x 16 GB DDR4 2667MHz (384 GB Total) Minimum all 6 memory channels populated (1 DPC) to achieve 384 GB (i.e., 6 x 32 GB RDIMM)	Configured with 24 x 16 GB DDR4 2667 MHz
NICs	2 x Dual Port 25 GbE Intel® Ethernet Network Adapter XXV710 SFP28+ or 2 x Dual Port 40 GbE Intel® Ethernet Converged Network Adapter XL710	2 x Advantech NMC-4006 Dual Port 40GbE QSFP+ Network Mezzanine Cards based on Intel® Ethernet Converged Network Adapter XL710-BM2
Intel® QAT	Intel® C620 series chipset with Intel QAT integrated on motherboard	Tested with Intel C627 chipset. Ships with Intel C627 Chipset. Intel C627 and C626 chipset PCIe adapters are also available from Advantech (PCIE-3030NP and PCIE-3031NP)
Storage	Minimum 2 x 480 GB Intel® SSD Data Center Family for SATA or equivalent boot drive, plus 4 x Intel® SSD Data Center P4500 Series 2.0 TB recommended, symmetrically attached to both CPU sockets	2 x 480 GB Intel® SSD Data Center Family for SATA and 4 x Intel® SSD Data Center P4500 Series using Advantech NMC-S01
BIOS	Specific settings for deterministic performance measurements, including Intel® Boot Guard enabled.	Compatible with specs

Advantech SKY-8201

The Advantech SKY-8201 carrier grade server also meets the criteria for the Intel® Select Solution for NFVI plus configuration. It is a highly configurable high performance server designed to balance server-class processing with maximum I/O and offload density in a 20" depth chassis. The system is a cost effective, robust platform optimized for high reliability in network, edge and industrial 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. Eight I/O slots provide a wide range of expansion choice.

The power and cooling options along with the streamlined mechanical design make it ideal for demanding applications requiring high performance acceleration technologies such as Intel QAT, GPU and FPGA cards.

Architected around the Intel® Xeon® processor Scalable family, (Intel® Xeon® Platinum 8160M processors and Intel Xeon Gold 6154 processors in Intel® Select Solution for NFVI configurations) the dual-socket SKY-8201 combines high performance with the ruggedness, reliability, and long system lifecycles required by the industry. With integrated Intel C628 chipset in configurations complying with Intel® Select Solution for NFVI plus, the system offers optimum integration in a compact 2U, 20"

deep form factor. The SKY-8201 is designed to withstand extended shock, vibration and operating temperature conditions. A replaceable front air filter is supported to cope with dust. Redundant power supplies, the ability to withstand single fan failures, redundant firmware images with failsafe upgrades and hot swappable FRUs make the SKY-8201 a platform of choice for applications requiring zero downtime.

The SKY-8201 is designed for NEBS Level 3 carrier grade environments and where limited rack space is available.

The SKY-8201 is CE, FCC, UL, CB, CCC, VCCI, RCM and RoHS compliant.

Figure 2. Expansion options on Advantech SKY-8201 Server
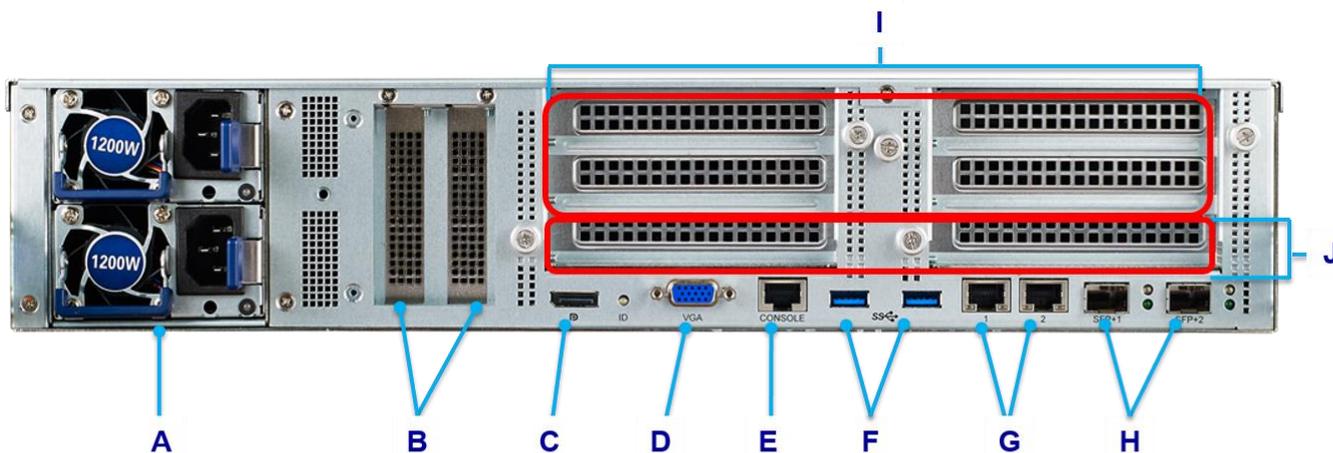
A	Hot swappable, redundant CRPS AC/DC PSU	F	2x USB 2.0/3.0 Type A ports
B	2x Low profile PCIe gen3 x8 extension slots	G	2x Copper GbE management ports
C	Display port	H	2x 10GbE SFP+ ports
D	VGA port	I	4x FH/FL single deck PCIe cards
E	Console port	J	2x FH/HL (or LP / Advantech PersCard) single deck PCIe cards

Table 2: SKY-8201 Compatibility with Intel® Select Solutions for NFVI Plus Configuration		
Platform	**Intel Reference Platform**	**Advantech SKY-8201**
Processor	Intel® Xeon® Gold 6152 processor, 2.1 GHz, 22 C, 140 W or higher number Intel Xeon Gold or Platinum processor	Validated with Intel® Xeon® Gold 6154 processors (3.0 GHz (18C, 200W) and Intel® Xeon® Platinum 8160M processors (2.1 GHz, 24C, 150W)
Memory	24 x 16 GB DDR4 2667MHz (384 GB Total) Minimum all 6 memory channels populated (1 DPC) to achieve 384 GB (i.e., 6 x 32 GB RDIMM)	Configured with 12x Micron DDR4 2666MHz 32GB ECC RDIMM for total 384GB requirement
NICs	2 x Dual Port 25 GbE Intel® Ethernet Network Adapter XXV710 SFP28+ or 2 x Dual Port 40 GbE Intel® Ethernet Converged Network Adapter XL710	2x Advantech PCIE-2320 dual port 40GbE NIC cards based on Intel Ethernet Converged Network Adapter XL710
Intel® QAT	Intel® C620 series chipset with Intel QAT integrated on motherboard	Tested with Intel® C628 chipset, Additional PCIe adapters with Intel C627 and C626 chipsets are also available from Advantech (PCIE-3030NP and PCIE-3031NP)
Storage	Minimum 2 x 480 GB Intel® SSD Data Center Family for SATA or equivalent boot drive, plus 4 x Intel® SSD Data Center P4500 Series 2.0 TB recommended, symmetrically attached to both CPU sockets	2x Advantech 1TB SATA SSD + 4x Intel SSD DC P4500 Series 2.0 TB with PCIe NVME interface
BIOS	Specific settings for deterministic performance measurements, including Intel® Boot Guard enabled.	Compatible with specs

Enhanced Features

Advantech's networking platforms 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 FWA-6170 and SKY-8201 verified Intel® Select Solutions for NFVI, or to order a platform:

Email: ncg@advantech.com

Advantech's Intel Select Solutions landing page:
http://www.advantech.com/nc/Spotlight/NCG/ISS/

Web: www.advantech.com/nc

Advantech Contact Information

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Regional phone numbers can be found on our website at **http://www.advantech.com/contact/**

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