

# Intel Select Solutions for uCPE with Advantech White Boxes

## Overview

Imagine a network where a new branch office or retail outlet can be brought online and securely connected to a corporate WAN via the internet in minutes. A network where managed service providers or enterprise IT departments are able to remotely deploy virtual network functions and instantiate new network service chains in a matter of seconds using state-of-the-art management and orchestration tools. A network store where network administrators can purchase and deploy new services at the click of a button through self-service portals. And ultimately a network that is abstracted from the physical to provide unprecedented agility and cost efficiencies.

There is no need to imagine further. Thanks to their increasing adoption of software defined networking (SDN), software defined wide area networking (SD-WAN) and network functions virtualization (NFV), service providers have been able to make significant changes in their approach to enterprise connectivity at the network edge. An approach which simplifies the way networks are designed, deployed, and managed. This translates to greater flexibility, enabling both provider and customer to monetize on new business models faster, and to lower costs.

Key to a successful transformation of the corporate WAN is the disaggregation of hardware and software. This not only allows service providers to manage software and hardware lifecycles separately, but also avoids fixed-function vendor lock-in and provides the means to self-maintain the same software platform across multiple generations of hardware.

The first step to achieving greater network agility begins by disaggregating physical network elements such as routers, firewalls, application delivery controllers and SDWAN appliances into virtual network functions (VNFs) then reunifying them on open universal customer premise equipment (uCPE) based on Intel architecture that can be scaled to meet performance, throughput and connectivity needs and programmed to fulfill new functions on the fly.

To support these platforms, Intel has developed the Intel Select Solutions for uCPE reference design that combines Intel's expertise with NFVI systems architecture requirements with the performance foundation of Intel Xeon D and 2<sup>nd</sup> Gen Intel Xeon Scalable processors. This brief describes the Advantech products that are validated as Intel Select Solutions for uCPE.

## DEPLOYMENT ACCELERATION

The Advantech FWA-3050 & FWA-5070 provide the ultimate choice in white-box uCPE scalability and are verified as Intel Select Solutions for uCPE. They provide enterprise customers and communications service providers faster access to optimized and stable platform configurations to accelerate deployment of uCPE solutions.

## REMOTE EVALUATION SERVICE

Ready to ship as pre-configured platform and also available for benchmarking in Advantech's Remote Evaluation Service labs, service providers and enterprise IT departments can utilize this platform to conduct testing and modelling of solutions that will define next-generation services.

### Hardware Platform

- Compact 1U white box uCPE architected around Intel Xeon processors
- Flexible GbE, 10GbE, 25GbE and 40GbE connectivity
- 1+1 redundant PSU
- Advanced management and security features

### Software Platform

- Fully verified with ADVA Ensemble Connector, CentOS and Ubuntu
- Wide support from Advantech uCPE Ecosystem partners





**White Box uCPE**

A white box uCPE can be defined as a commercial off-the-shelf server-grade appliance operating on the customer premises where close proximity to users provides lower latency services. It is used for hosting VNFs that run on an open operating system such as Ubuntu, CentOS or Red Hat Enterprise Linux and provides a virtualization layer for resource abstraction and control.

Both open-source and commercial software solutions can be hosted and zero touch provisioning at power-on can connect the uCPE to the internet using a secure and automated process over a choice of WAN connections. Encryption can be performed in software or accelerated by hardware based on Intel QuickAssist Technology (Intel QAT) to ensure secure communications.

Advantech’s latest FWA-5070 white box uCPE is powered by 2<sup>nd</sup> Generation Intel Xeon Scalable processors and will allow Communication Service Providers (CommSPs) to leverage the benefits of higher packet processing throughput and increased virtual machine density across a fully scalable product line with up to 28 processor cores and higher base frequencies. This complements the Intel Xeon D processor based FWA-3050 which covers cost-efficient mid-range needs and scales to 16 processor cores.

**Introduction to Intel Select Solutions for uCPE Configurations**

The Intel Select Solutions for uCPE were defined based on the functional requirements of a wide range of uCPE use cases to arrive at a verified and workload-optimized configuration for VNFs and other NFVI applications. Intel has designed Base and Plus product configurations as part of the Intel Select Solutions for uCPE reference design tested with CentOS, Ubuntu and ADVA Ensemble Connector distributions. These software and firmware configurations gives customers a hardware-software solution that is pre-integrated and ready to deploy.

Three configuration variants of the Advantech FWA-3050 white-box uCPE passed Intel Select Solutions for uCPE base and plus configuration tests, integrating Intel Xeon D-2123IT processors, Intel Xeon processors D-2145NT and Intel Xeon D-2187NT processors. One configuration variant of the FWA-5070 was verified with an Intel Xeon Scalable processor and passed Intel Select Solutions for uCPE plus performance thresholds. Tables 1-4 show the exact Advantech hardware configurations verified as Intel Select Solutions for uCPE and compare them to the reference specifications.

| Table 1: FWA-3050 Compatibility with Intel Select Solution for uCPE Base Configuration |   |   |
|--|---|---|
| Platform   | Intel Reference Platform  | Advantech FWA-3050-4CA1S  |
| Processor  | Intel Xeon D-2123IT processor, 4 core, 2.2 GHz, 60 W, or higher SKU   | Verified with Intel Xeon D-2123IT processor, 4 core, 2.2 GHz, 60 W  |
| Memory   | 16GB DDR4 2133 MHz, 4 * 4GB (16GB Total)<br>Minimum all 4 memory channels populated (1 DPC) to achieve 16GB (i.e., 4 * 4GB RDIMM) | Configured with 4 * 4GB (16GB Total)  |
| NICs   | 2 x 10 GbE integrated Ethernet ports  | 4 x 10 GbE integrated Ethernet SFP+ ports<br>2 x RJ45 mgmt ports<br>8 x 1GbE RJ45 Ethernet ports<br>1 Network Mezzanine Card slot (NMC) for expansion |
| Intel QAT  | Integrated Intel QuickAssist Technology (recommended but not required)  | Without Intel QAT   |
| Storage  | Intel Solid State Drive Data Center S3110 256GB 2.5" internal solid state drive (SATA or M.2)                                     | 2 x Intel Solid State Drive Data Center S4510 2 x 960GB Family  |

**Table 2: FWA-3050 Compatibility with Intel Select Solution for uCPE Base Configuration**

| Platform  | Intel Reference Platform  | Advantech FWA-3050-8CA1R  |
|-----------|---|---|
| Processor | Intel Xeon D-2123IT processor, 4 core, 2.2 GHz, 60 W, or higher SKU   | Verified with Intel Xeon processor D-2145NT, 8 core, 1.9 GHz, 65 W  |
| Memory    | 16GB DDR4 2133 MHz, 4 * 4GB (16GB Total)<br>Minimum all 4 memory channels populated (1 DPC) to achieve 16GB (i.e., 4 * 4GB RDIMM) | Configured with 4 * 4GB (16GB Total)  |
| NICs      | 2 x 10 GbE integrated Ethernet ports  | 4 x 10 GbE integrated Ethernet SFP+ ports<br>2 x RJ45 mgmt ports<br>8 x 1GbE RJ45 Ethernet ports<br>1 Network Mezzanine Card slot (NMC) for expansion |
| Intel QAT | Integrated Intel QuickAssist Technology (recommended but not required)  | Integrated Intel QuickAssist Technology 20G   |
| Storage   | Intel Solid State Drive Data Center S3110 256GB 2.5" internal solid state drive (SATA or M.2)                                     | 2 x Intel Solid State Drive Data Center S4510 2 x 960GB Family  |

**Table 3: FWA-3050 Compatibility with Intel Select Solution for uCPE Plus Configuration**

| Platform  | Intel Reference Platform  | Advantech FWA-3050-16A1R  |
|-----------|---|---|
| Processor | Intel Xeon D-2177NT processor, 14 core, 1.9 GHz, 105 W, or higher SKU   | Verified with Intel Xeon D-2187NT processor, 16 core, 2.0 GHz, 110 W  |
| Memory    | 64GB DDR4 2667 MHz, 4 * 16GB (64GB Total)<br>Minimum all 4 memory channels populated (1 DPC) to achieve 64GB (i.e., 4 * 16GB RDIMM) | 64GB DDR4 2667 MHz, 4 * 16GB (64GB Total)   |
| NICs      | 4 x 10 GbE integrated Ethernet ports  | 4 x 10 GbE integrated Ethernet SFP+ ports<br>2 x RJ45 mgmt ports<br>8 x 1GbE RJ45 Ethernet ports<br>1 Network Mezzanine Card slot (NMC) for expansion |
| Intel QAT | Integrated Intel QuickAssist Technology   | Integrated Intel QuickAssist Technology 100G  |
| Storage   | Intel Solid State Drive Data Center S3110 512GB 2.5" internal solid state drive (SATA or M.2)                                       | 2 x Intel Solid State Drive Data Center S4510 2 x 960GB Family  |

### Advantech FWA-3050

The Advantech FWA-3050 network appliance is a compact 1U system based on Intel Xeon D-2100 processors. With over 1.7x performance improvement from previous generation, the FWA-3050 has been optimized to run enterprise SD-WAN and SD-Branch workloads. Designed for minimum downtime, this versatile white-box solution provides advanced LAN bypass and remote management features base on Advantech design IP such as fail-safe firmware redundancy for zero-risk upgrades. The platform has been validated as a VNF-ready system integrating the CentOS and Ubuntu open source operating systems, and Adva Ensemble Connector.



*Figure 1. Advantech FWA-3050 with one Network Mezzanine Card (NMC) and one PCIe adapter slot*

The FWA-3050-4CA1S configuration verified to meet Intel’s Base reference benchmark-performance threshold was equipped with a 4-core, 2.2 GHz Turbo boost to 3.0GHz, 60W Intel Xeon D-2123IT processor, while the FWA-3050-16A1R configuration verified to meet Intel’s plus reference benchmark-performance threshold was equipped with an Intel Xeon D- 2187NT processor, 16 core, 2.0 GHz Turbo boost to 3.0GHz, 110W. In response to market demands for acceleration from the entry level,

Advantech has verified the FWA-3050-8CA1R Base configuration featuring the Intel Xeon D-2145NT with Intel QAT 20Gbps encryption/decryption support.

The Intel Xeon D-2100 processor product family has been designed for high density implementations, leveraging essential Data Plane Development Kit (DPDK) and Intel QuickAssist Technology acceleration for high-performance packet processing which makes it an ideal choice for lower TCO solutions at the customer edge.

Additional configurations of the FWA-3050 allow from 4-to-18 core Intel Xeon D-2100 processors with or without Intel QuickAssist Technology acceleration. The platform supports 4 DDR4 DIMMs for up to 256GB of ECC memory for highly virtualized environments. Support for one internal low-profile PCIe x8 add-on card enables further encryption offload or internet broadband connectivity extension.

The FWA-3050 integrates up to four fixed 10GbE SFP+ ports and eight 1GbE RJ45 ports. Customers can match specific deployment needs within the same platform thanks to an additional Advantech Network Mezzanine Card (NMC) slot that can be populated with a choice of 1GbE, 10GbE, 25GbE and 40GbE network interfaces.

Please contact an Advantech representative for more information on further LTE and Wi-Fi connectivity options.

### Advantech FWA-5070

The FWA-5070 is a versatile white-box verified to meet the criteria for the Intel Select Solutions for uCPE plus configuration. It has been optimized to run enterprise workloads in a compact 1U enclosure that provides advanced security and management features. The platform has been validated as a VNF-ready system integrating CentOS and Ubuntu open source operating systems and ADVA Ensemble Connector. Table 4 below shows the exact hardware configuration verified as Intel Select Solutions for uCPE plus configuration and compares it to the reference specifications.

| Table 4: FWA-5070 Compatibility with Intel Select Solution for uCPE Plus Configuration |   |   |
|--|---|---|
| Platform   | Intel Reference Platform  | Advantech FWA-5070-00A1R  |
| Processor  | Intel Xeon D-2177NT processor, 14 core, 1.9 GHz, 105 W, or higher SKU   | Verified with Intel Xeon Gold 6226R processor 16 core, 2.9 GHz, 150 W   |
| Memory   | 64GB DDR4 2667 MHz, 4 * 16GB (64GB Total)<br>Minimum all 4 memory channels populated (1 DPC) to achieve 64GB (i.e., 4 * 16GB RDIMM) | 96GB DDR4 2667 MHz, 12 * 8GB (96GB Total)   |
| NICs   | 4 x 10 GbE integrated Ethernet ports  | 2 x RJ45 management ports<br>1 x NMC-4005 Network Mezzanine Card (NMC) with 4 x 10GbE SFP+ ports<br>1 x NMC-0805 NMC with 4x 1GbE ports |
| Intel QAT  | Integrated Intel QuickAssist Technology   | Internal Advantech PCIE-3031 adapter card with Intel C627 chipset (3 x Intel QAT Engines)   |
| Storage  | Intel Solid State Drive Data Center S3110 512GB<br>2.5" internal solid state drive (SATA or M.2)                                    | 1 x Intel Solid State Drive Data Center S4610 960GB   |

The FWA-5070 is single socket design supporting the entire range of 2<sup>nd</sup> Generation Intel Xeon Scalable processors. It brings cost savings to next generation designs where just-in-time integration flexibility based on a broad choice of build options help optimize uCPE supply chain costs and alleviate buffer stocking constraints.

With a choice of Intel Xeon Scalable processors up to 28 cores, Intel QAT and 1GbE, 10GbE, 25GbE and 40GbE network interfaces, the FWA-5070 will allow vendors to cost-optimize compute and acceleration for a broad range of desired VNF and application workloads while meeting throughput requirements up to 200 Mbps. The single socket design with higher core count processor SKUs offers further economies of scale over dual socket designs at lower power budgets while meeting the workload demand for mid to high-range deployments.

The FWA-5070-00A1R configuration verified to meet the Intel Select Solutions for uCPE plus configuration reference benchmark performance threshold was equipped with a 16-core, 2<sup>nd</sup> Generation Intel Xeon Gold 6226R processor (2.1 GHz Turbo boost to 3.2GHz, 100 W). Additional configurations of the FWA-5070 allow integration of Intel Xeon Scalable processors between 8 and 28 cores.

The platform supports 12 banks of DDR4 DIMMs for up to 384GB of ECC memory offering high speed memory access. Support for one internal low-profile PCIe x8 add-on card enables further encryption offload or internet broadband connectivity extension. The 4 x 10GbE SFP+ ports specified in the Intel reference configuration are controlled by an Intel Ethernet XL710-BM1 Controller on an Advantech NMC-4005.

Customers can match specific deployment needs within the same platform thanks to additional NMC slots that can be populated with a choice of 1GbE, 10GbE, 25GbE and 40GbE network interfaces. LTE and Wi-Fi connectivity options are also available.



*Figure 2. Advantech FWA-5070 with four Network Mezzanine Card (NMC) slots for Front-access network ports, storage and acceleration cards*

## Common Feature Set

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-3050 an ideal platform for mission-critical and highly available networks. For enhanced platform security the FWA-3050 and FWA-5070 provide Trusted Platform Module TPM 1.2/2.0 and Intel secure boot with optional Intel Boot Guard support. The FWA-3050 and FWA-5070 are CE, FCC, UL, CB, CCC, RoHS, WEEE and UL60950/62368 compliant.

## 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
  - Remote Virtual Storage Media
  - 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 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 the Advantech FWA-3050 and FWA-5070 verified Intel Select Solution for uCPE, how to access RES for an evaluation, and how to order a platform, please visit: [www.advantech.com/nc/spotlight/Intel-uCPE](http://www.advantech.com/nc/spotlight/Intel-uCPE)

For information on Advantech's Intel Select Solutions for NFVI please visit Advantech's dedicated landing page: <http://www.advantech.com/nc/spotlight/Intel-NFVI>

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