

Advantech* Delivers NFV Platforms for the Virtual Edge Using Intel® Xeon® Processors



Overview

When representatives from 14 carriers came together to publish the white paper that would define network functions virtualization (NFV), they envisioned “leveraging standard IT virtualisation technology to consolidate many network equipment types onto industry standard high volume servers, switches, and storage.”¹

But the network environment of a communication service provider (CSP) is different from a standard IT environment and requires different kinds of server platforms to take full advantage of NFV. Brownfield central office and telco room deployments require servers that combine Intel® architecture performance, scalability, and carrier-grade design. Branch office equipment necessitates a range of on premises devices that offer economical and technical scalability from small, medium, and large branch offices to corporate headquarters.

Here, customizability is key to creating a price-, feature-, and cost-optimized server-grade device that matches each typical branch office size.

The ability to better operate, manage, and orchestrate transport, edge routing, and switching equipment can be addressed with easy-to-integrate, versatile server modules that enable flexible new service provisioning.

Advantech, working with Intel® technology, has delivered a new series of network server platforms with Intel server-class products for all parts of the network to help CSPs maximize the network elasticity benefit they can get from NFV.

Challenges

Network functions virtualization (NFV) is having a significant impact on networking systems in carrier central offices (CO), mobile switching offices, and distributed points of presence (POP) and even the customer premises. By facilitating the transition from fixed-function network services appliances to virtual network functions running on high-performance, low-cost Intel® architecture-based servers, CSPs are

able to dramatically reset network costs, increase network agility, and unleash services innovation.

NFV has also unleashed significant network elasticity, providing for the first time the possibility of running network functions at the edge of the network that traditionally have run in the core network. This lets CSPs deliver context-related consumer services and

¹ Network Functions Virtualisation; An Introduction, Benefits, Enablers, Challenges & Call for Action (PDF download) https://portal.etsi.org/nfv/nfv_white_paper.pdf

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reduce service latency for improved network performance. NFV has made possible initiatives like mobile edge computing and virtual customer premises equipment (vCPE), which are proving to be critical new capabilities.

But the CSPs' network environments are not like a standard IT environment. They put new demands on equipment, including different requirements for airflow, rack depth, and operating temperatures. Some environments require carrier-grade servers that feature the availability, scalability, manageability, and service response characteristics that carriers expect for equipment that will serve up to millions of customers. In such cases, this equipment must meet the safety and environmental design requirements of the Network Equipment-Building System (NEBS) standard that many CSPs adhere to for their CO-based network equipment.

In the enterprise, SD-WAN (software defined wide area network) and vE-CPE (virtualized enterprise CPE) platforms not only provide savings for capital and operational expenditures by replacing multiple special-purpose appliances with a single white-box solution, but they also greatly enhance operational flexibility for the addition of new services without the need for truck rolls. Service deployment cycles can be collapsed from months to hours, encouraging CSPs and enterprises alike to deploy these technologies faster and gain competitive advantages and operational benefits sooner.

Software solutions here need to offer performance and true multi-tenancy as well as carrier-grade robustness and service elasticity. White-box vE-CPE platforms need to offer more than commodity servers by matching the right I/O connectivity with the right Intel® processor-based system-on-chip (SoC) performance to best match typical branch office workloads,

throughput, and security needs. Platforms also need to be optimized for ease of deployment and enhanced security, as vE-CPE systems include critical router and firewall functionality.

In switching equipment, the addition of the latest generation server-class compute functionality allows vendors to build a new generation of intelligent switching platforms for software defined networks that provide the performance, flexibility, and port density required by highly virtualized enterprise and CSP networks. Pluggable module technology such as versatile server modules or processor advanced mezzanine cards (AMCs) bring flexibility and versatility to edge routing and switching equipment as well as converged packet optical gear for enhanced control and service plane processing. Telco cloud providers will be able to drive greater flexibility and efficiency into their software defined infrastructure to support the increasing demand for new and innovative services.

To take full advantage of NFV, new breeds of server platforms are necessary that combine commercial off-the-shelf (COTS) cost effectiveness, Intel architecture performance, customization, and carrier-grade features. Another key requirement is that these servers be scalable with products designed to deliver the same performance and functionality for CO and for the customer edge applications, which is critical for the deployment of elastic VNFs.

In these situations, and others, what's needed are servers that have been adapted to match the right I/O connectivity with the right Intel processor-based system-on-chip (SoC) performance to create a price-, feature-, and cost-optimized set of server-grade devices that better match virtual edge requirements. In addition, optional

carrier-grade features and the ability to customize standard product are important options in NFV applications running on equipment at the network edge. Many big IT server manufacturers don't offer this combination. Advantech does, giving its customers the benefit of what it calls "customized COTS."

Solutions

Advantech has delivered a range of compute solutions that provides the NFV elasticity needed for deploying VNFs where they are needed in the network. The company's "customized COTS" strategy combines a network server platform based on Intel® Xeon® processor D-1500 with the company's ability to customize any of these platforms with the right number of processor cores, networking, and storage options to meet the need of the service to be deployed.

The products in the Advantech NFV product line include:

Carrier-Grade, Modular-Blade Server:

With up to 288 cores, the Packetarium* XLc PAC-6009 nine-slot rack server system is Advantech's most powerful and scalable network server platform. The carrier-grade chassis offers the maximum compute density available in a 400 mm deep by 6U high chassis. The system features a carrier-grade design with hot-swappable blades, hard drives, switch/management modules, fans and power supplies, high reliability, NEBS compliance, and a power draw of 400W per RU, which enables the system to be deployed in standard 19-inch telecom equipment racks.

The nine front slots in the PAC-6009 chassis can host either single- or dual-node processor blades to power VNFs with an additional dedicated cloud control node that provides orchestration and virtual infrastructure management functions.

The system's compute blades include:

- **The MIC-8302C** is based on a single Intel® Xeon® processor E5-2600 v3 with up to 14 cores.
- **The MIC-8304C** is based on a single 8- or 16-core Intel Xeon processor D.
- **The MIC-8303C** is a dual node blade equipped with 8- or 16-core Intel Xeon processor D.

The system includes a 9-slot mid-plane connecting two switch/management modules to each of the nodes and the infrastructure components within the chassis.

Carrier Grade 1U Server: The SKY-8100 is Advantech's best price/performance 1U server and combines cost-effectiveness with processor performance for advanced VNF and networking functions. The system is a 20-inch deep server that combines high-performance compute modules based on server-class Intel Xeon processor D-1500 with up to 128 GB of memory. Connectivity options include four 1GbE ports, two 10GbE ports, and other I/O including four USB, two VGA, and a TAM alarm module connector. The NEBS-certified system can be used in central offices. It also features two hot-swappable HDDs and two PCI Express* (PCIe*) expansion slots. The system has redundant 500W power supplies and hot-swappable fans combined with a mechanical design with front-to-back airflow that gives the system the feature set for digital signal processing applications.

White-box Appliances for vE-CPE and SD-WAN:

The FWA-3260 is a server-class 1U-high compute and network appliance based on the Intel Xeon processor D with up to 16 cores and up to 128GB of memory. The system offers flexible connectivity with up to four 1GbE ports and up to two 10GbE SFP+ ports. A mezzanine card bay provides

the ability to add in more I/O, including a PCIe gen.3 card with additional 1/10/40GbE connectivity. The system offers storage flexibility with two 2.5-inch SATA HDD/SDD sockets. This flexibility and performance makes the FWA-3260 ideal for virtual enterprise CPE (vE-CPE) applications. In addition, the FWA-3260 has the option for a card featuring Intel® QuickAssist Technology, which provides hardware acceleration of encryption and compression workloads that are required in network security applications.

Versatile Server Modules (VSM):

In applications like mobile edge computing, where VNFs are run at the network edge, there's a need for a server module like the Advantech MIC-8304 Versatile Server Module (VSM). The VSM combines both server-class compute power and I/O or networking capability. VSMs come with either Intel Xeon processor E5-2600 v3 or Intel Xeon processor D series processors, configurable memory, 1GbE or 10GbE network connectivity, PCIe gen.3 I/O or other interfaces such as SATA or USB. The module is built using a design-for-versatility approach that makes it easy to configure the module with a variety of storage (HDD or SDD) options, wireless technology, and more. This flexibility makes the VSM optimized for NFV workloads. In the MEC example, small cell base station manufacturers can easily build the module into a base station. Similarly, CSPs could build the VSM into a customer premises demarcation system to add flexible new service provisioning functionality.

Advanced Mezzanine Cards

(AMC): In many cases, CSPs have already standardized on Advanced Telecommunications Computing Architecture (ATCA) chassis for their networking equipment. The Advantech MIC-5604 is designed with the compute and LAN performance to that form

factor. The MIC-5604C, powered by Intel Xeon processor D-1500, can be configured with up to eight cores. The board can include up to 16GB of DDR4 memory and features a Gigabit quad-port Intel® Ethernet Controller I350-AM4 providing two RJ-45 connectors and two Serializer/Deserializer links to the mezzanine card ports.

Intel Technology Provides NFV Performance, Design Simplification

Advantech is an Intel® Network Builders member and depends on several key Intel technologies in its network server platforms:

- The company has standardized on the Intel Xeon processor D-1500, a processor system on a chip (SoC) based on the company's 14nm process technology. The Intel Xeon processor D-1500 can include up to 16 cores, 128MB of memory, and dual 10GbE Intel® Ethernet ports. The multicore SoC features Intel® Virtualization Technology, which makes virtualization practical for data center and network infrastructure workloads by eliminating performance overheads and improving security. For Advantech, the Intel Xeon processor D-1500 is a cost-effective, low-power device that can be used in its entry-level and

high-end systems. The SoC features extensive feature integration, simplifying the design process.

- The Advantech systems for NFV applications are based on Intel® Open Network Platform (Intel® ONP) Server.

Intel ONP Server is a server reference architecture that guides companies on which open source software should be used for optimum interoperability and performance. Intel ONP Server consists of released open-source software such as Open vSwitch,* DPDK, OpenStack,* OpenDaylight,* and Linux*/KVM. The Intel ONP Server simplifies solution development and improves system performance by validating and integrating the required open source software.

Conclusion

NFV ensures network elasticity by replacing expensive and limiting fixed-function network appliances with Intel architecture-based servers that can run VNFs in all parts of the network. Advantech has built its entire range of network server platform to deliver maximized network elasticity with systems based on Intel technology that have been adapted for applications in all parts of the network.

About Advantech

Advantech Co., Ltd., provides trusted, innovative products, services, and solutions. Advantech offers comprehensive system integration, hardware, software, customer-centric design services, embedded systems, automation products, and global logistics support. Advantech cooperates closely with its partners to help provide complete solutions for a wide array of applications across a diverse range of industries. Our mission is to enable an intelligent planet with automation and embedded computing products and solutions that empower the development of smarter working and living.

About Intel

Intel (NASDAQ: INTC) is a world leader in computing innovation. The company designs and builds the essential technologies that serve as the foundation for the world's computing devices. As a leader in corporate responsibility and sustainability, Intel also manufactures the world's first commercially available "conflict-free" microprocessors.² Additional information about Intel is available at newsroom.intel.com and blogs.intel.com and about Intel's conflict-free efforts at conflictfree.intel.com.



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