

Does **YOUR** Telecom Cloud Infrastructure have the **COMPETITIVE EDGE?**



Extend the Reach of your Apps with **NFV ELASTICITY**



Executive Summary

Network Functions Virtualization (NFV) enables service providers and operators to rapidly deploy new services with greater flexibility, improving capital and operational efficiencies. NFV decouples functionality from location which allows software-based services to be run where required in central offices, enterprises and data centers. However, a gap existed to extend the differentiating benefits of NFV to access points, small cells and base stations.

Advantech's all-encompassing NFV Elasticity program closes this gap by supporting consistent, scalable platforms based on Intel® Architecture, with server-class processors that can run Virtual Network Functions (VNFs) at almost any location in the network. Service providers will now be able to cover peak loading using NFV-capable equipment in the core networks while efficiently provisioning a base line service capacity at the edge with enhanced access equipment running the same VNFs at lowest latency. This results in best subscriber experience and optimum resource utilization at the lowest cost.

This product brief describes the huge potential of Advantech's NFV Elasticity initiative and the network platforms that make it possible.

Mobile Edge Computing

The ETSI Industry Specification Group for Mobile Edge Computing adds cloud-computing capabilities to the edge of the mobile network, building an IT environment within intelligent base stations. This opens up a new value chain that operators are eager to exploit with premium services that create value from users' proximity.

Advantech's NFV Elasticity program enables this new breed of added value services, requiring near real-time response paired with best in class performance per watt of compute, under a common framework that allows VNF re-use across scalable platforms deployed at different locations in the network.

NFV Elasticity or How to Exploit the Network Edge

NFV brings to the telecom industry a disruptive approach to services deployment. By applying virtualization techniques to network functions, operators can delocalize services to respond faster and more efficiently to dynamic demands. VNFs share computing, I/O and storage resources to optimize the use of the network infrastructure, with CAPEX and OPEX reduction at the top of its claimed benefits.

But VNFs greatly differ from virtualized IT applications in computing and networking needs. Increasing network ports bandwidth and east-west traffic between virtual functions intensify the challenge of virtualizing the network infrastructure while maintaining line-rate performance. Virtualized network environments require evolved standard platforms able to support high speed network interfaces, accelerate critical functions, scale horizontally and meet industry's reliability standards. The resulting high end network platforms optimize the processing performance of data-plane intensive VNFs making a more efficient use of computing resources in central offices and data centers.

However, the core is not the only place in the network where the new NFV ecosystem can create great value. By opening the access network to VNFs developers, operators and service providers can deliver and monetize a differentiating subscriber experience with context-related premium services that leverage the low-latency, high bandwidth and real-time radio network information of the network edge.

Advantech's NFV Elasticity program enables this form of distributed cloud computing with a family of consistent and scalable

platforms that can run VNFs at almost any location in the network. Advantech's NFV Elasticity allows for simplified integration of the latest server processors from Intel® into equipment such as access points, small cells, base stations and demarcation boxes to run the same VNFs that run in the network core.

Packetarium XL: Network Platforms for the NFV Era

Advantech's Packetarium XL is a family of scale out network platforms that leverages IT and high end networking design principles to optimize the performance of enterprise and network applications in a virtualized environment.

Packetarium XL platforms take a microserver approach with a modular design that scales compute performance on Intel® Architecture processors distributed across high-speed switched backplanes for cost effective deployments with outstanding price-performance ratio.

The Packetarium XLc is a truly carrier-grade network platform for the telecom cloud infrastructure that optimizes VNFs performance, yet meets demanding industry standards with Five 9's availability and NEBS-3 compliance in a 6U, compact format with a reduced depth of 400mm. Packetarium

XLc is the first telco-grade server of its class to extend NFV elasticity to both edge and access equipment bringing higher processing densities, more memory for VNFs support and the scale-out headroom needed to meet stringent service level agreements.

The PAC-6009 is the flagship model in the Packetarium XLc for Carrier Networks series and is designed to help both vendors and operators make the transition to NFV from platforms such as ATCA at lower deployment costs. While removing overhead and costly legacy features, Packetarium XLc preserves known best practices for platform management and fabric connectivity allowing customers to easily migrate to this new platform. The PAC-6009 supports up to 9 single or dual node processing blades connected to redundant switch and system control modules based on Broadcom's StrataXGS® Trident II silicon with separate dataplane and control / management plane fabrics.



Figure 1. Packetarium XLc Carrier-Grade Network Platform

The enterprise version of the Packetarium XL family, the Packetarium XLe, achieves higher CPU and I/O density in a 4U, 27" deep system that meets the increased demand for faster packet handling at lower cost. The Packetarium XLe targets Network Intelligence deployments requiring accelerated packet processing performance in applications such as high-end network security, policy control and traffic analysis.

The first model in the Packetarium XLe for Enterprise series, the PAC-4010, supports up to up to 12 CPUs based on the Intel® Xeon® Processor E5-2600 v4, 720 Gbps of I/O and more than 1.2 Tbps of switching capacity. The integrated switch & system control module is based on the high capacity Broadcom StrataXGS® Trident II switch family managed by an Intel® Atom™ C2000 processor. I/O is implemented through hot swappable PHY mezzanine module (PMM) slots that can accommodate a wide choice of 10 GbE, 40 GbE and 100 GbE ports with optional LAN bypass support.

The Packetarium XL family of fully integrated platforms leverages Advantech's Advanced System Manager which is based on the IPMI standard. Advantech's approach to platform management improves both functionality and usability with enriched features such as Advantech's SoL Proxy, which provides a single service access point for managing the system blades, or Advantech's Advanced BIOS Management, able to select a specific pre-



Figure 2. Packetarium XLe Enterprise Network Platform

configured set from the multiple BIOS configurations that can be stored in an Advantech's blade.

Packetarium XL network platforms seamlessly integrate with industry standard software frameworks in line with the NFV ecosystem to deliver outperforming VNF-ready platforms. Advantech is member of Intel® Network Builders program and works closely with partners such as 6WIND to enhance VNFs performance under the OpenStack umbrella.



Advantech's customers can easily develop unique NFV solutions without sacrificing costs

thanks to the built-in modularity of the Packetarium XL family. Starting from OEM-ready platforms, customers can leverage off-the-self building blocks to meet specific applications needs. Custom designed modules provide the ultimate uniqueness for each level of differentiation. This design concept is based on Advantech's Customized COTS approach.

From the blades to the system manager, Packetarium XL is designed in Advantech's own labs, manufactured on its own production lines and integrated by Advantech's engineering team. That way we manage the entire life cycle and control all costs to give customers the best service at the right price.

Advantech's close relationship with Intel® gives its customers early access to the very latest silicon technology. Packetarium XL customers will be able to integrate next-generation Intel® Xeon® processors in their new cloud product developments, minimizing time to market. The next generation Intel® Xeon® processors will be based on 14nm process technology and will scale Intel® Xeon® processor performance, features, and reliability to lower power design points, enhancing total cost of ownership for hyperscale workloads.

A Versatile Server Module for a Competitive Edge



Figure 3. Advantech's Added Value Platform Design

Advantech's Versatile Server Module (VSM) is a flexible new form factor server based platform tailored to support typical communications workloads while complying to equipment practices and environments prevailing at the edge of networks. VSMs simplify the integration of the latest, high performance Intel® processors into access equipment to run the same VNFs that run in the core network, enabling what Advantech terms as NFV elasticity. A VSM can be deployed as an embedded module in a small cell, a hot swappable FRU in a demarcation box or a Packetarium XL blade in the data center. This common building block brings greater cost efficiencies and economies of scale which can then be passed on to customers.

Advantech's Versatile Server Module carries a server class CPU subsystem including memory plus networking and I/O interfaces such as Gigabit Ethernet, 10 Gigabit Ethernet, high speed PCIe gen.3 along with standard platform I/Os like SATA, USB and legacy interfaces. Facilitated by a designed-for-versatility approach, extension with application specific devices such as hard disks, solid state disks, wireless modules or additional network ports can be supported outside the VSM or as an integrated, local extension module.

VSMs, in contrast to existing, general purpose Computer-On-Module standards, have been architected for the use in networking equipment from

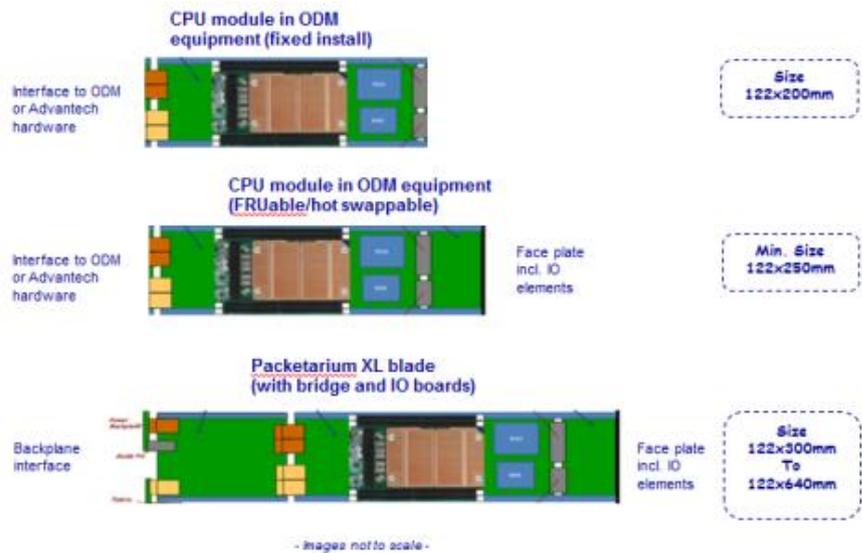


Figure 4. Advantech's Versatile Server Module

ground up: Communication workloads demand for server class CPUs with a memory subsystem large enough to support virtualized environments without sacrificing cost targets or creating supply chain issues. Interfacing to networking centric building blocks requires a differentiated set of interfaces while advanced thermal properties simplify the integration even in the most challenging environments such as in outdoor or NEBS-3 compliant equipment. Reliability, Serviceability and High Availability Requirements drive features such as hot swap and field replacement capabilities, remote equipment monitoring and control and fail-safe firmware/software updates.

Advantech's VSMs enable a new breed of services as depicted by the ETSI Mobile Edge Computing (MEC) consortium requiring low

latency, near real-time response paired with best in class performance per watt of compute. Applications such as augmented reality, content optimization, Internet-of-Things (IoT), as well as video and data analytics running on a Versatile Server Module close to subscribers not only enhance mobile experience but also alleviate the mobile core from additional congestion.

Contact Advantech to discover how our new NFV platforms can scale from full blown Cloud RAN deployment all the way down to a server node embedded inside an SDN-enabled Top of Rack Switch or how they can be adapted for use by Service Providers in a new breed of virtual CPE for the enterprise (vE-CPE).

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Enabling an Intelligent Planet



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