WHITE PAPER

Communications Service Providers
Testing Services

EANTC* Offers Advanced Testing to Vet NFV Software

Telecommunications test expert EANTC works with Intel® Network Builders ecosystem members to test NFV software for performance and functionality.

Intro

The Intel® Network Builders program is one of the leading network functions virtualization (NFV) ecosystems in the industry, helping Intel Network Builders members to build the software virtual network functions (VNF) needed to create this revolutionary shift in communications services provisioning. Intel has partnered with independent testing leader European Advanced Networking Test Center (EANTC)* to verify the performance and reliability of NFV implementations. The testing services offered by EANTC to members of the Intel Network Builders ecosystem allows members to test that their VNFs—and other NFV components—can perform at a carrier-class level.

Overview

Communications service providers (CommSPs) are eager to adopt NFV technologies to improve the economics and agility of their service deployments. But demonstrating functionality and performance is important, as many service providers need to be assured that they are not trading off customer service-level expectations for lower cost and increased agility. It's also crucial for NFV developers as they evolve their software so they understand how to engineer carrier-class services utilizing commercial off-the-shelf (COTS) systems.

The first proponents of NFV looked to the success of data center virtualization and asked if that could be duplicated in the networking world. One of the key issues in this regard is whether the general-purpose processor and the NFV infrastructure (NFVI) could be performance-tuned to match the deterministic packet processing throughput of purpose-built network appliances.

To answer these questions, Intel and EANTC have designed a testing program specifically for members of the Intel Network Builders ecosystem. It provides a focused service that measures and validates the functionality and performance of areas that have a critical impact on NFV performance:

- Data plane: The first thing CommSPs want to know is whether a VNF can match the data plane performance and efficiency of a single-function appliance. Most networking appliances depend on specialized packet processing ASICs for wire-speed data plane performance for even the fastest network speeds. The challenge is to equal this performance in an NFV system using industry-standard, high-volume servers with Intel® Xeon® processors. This has been made easier through the availability of the Data Plane Development Kit (DPDK), which is a set of open source data plane libraries and network interface controller drivers that improve data plane throughput substantially.
- Control plane: Control plane data traffic facilitates communication between VNFs to handle session set up, tear down, and policy enforcement. Control plane

Table of Contents

data flows are not as throughput-centric as data plane workloads, but these packets do need more processing by the CPU and often more storage, which can result in increased packet latency and jitter.

- Management plane: NFV management and orchestration has become the latest performance hot button as CommSPs create a management plane to orchestrate new services, manage the health and lifecycle of the VNFs, and control and manage the NFV infrastructure. The management plane is challenging as NFV components, which typically are from multiple vendors, need to integrate efficiently.
- Resource competition: The final element that impacts the performance of a virtualized service is competing VNFs that each require resources and may impact the performance of neighboring VNFs by consuming data plane, control plane, and management plane resources. VNFs can maximize their performance using technology such as SR-IOV or "CPU pinning," which trade off some scalability and agility benefits for maximum performance. This makes understanding CPU performance indicators very important, both in absolute performance numbers and efficiency metrics (performance per core, socket, or server; linear scalability; etc.).

In many cases the performance challenges of NFV are different from and more complex than those of a fixed-function server, requiring them to be carefully considered in a testing program.

EANTC Offers Testing Program to Intel Network Builders Members

Since 1991, EANTC has provided advanced networking test services from its visionary, prestigious primary lab in Berlin as well as on-site with manufacturers or CommSPs. The company is able to emulate real-world production network scenarios to replicate the environment that an NFV system would face in a production network. EANTC is a contributing member of the European Telecommunications Standards Institute's (ETSI) NFV Industry Specification Group (ISG) for testing. They also organized public multivendor NFV showcases continually since 2013.

Based on its telecommunications industry test experience, EANTC has developed a full range of NFV test services that are in accordance with the ETSI NFV Reference Model. In 2015, the test center joined forces with Intel to bring this NFV expertise to Intel Network Builders with a focus on functionality validation plus performance and efficiency benchmarking. The full list of services for Intel Network Builders ecosystem members includes:

- Performance and efficiency benchmarking of VNFs, NFVI, MANO, and integrated solutions
- Testing of virtualized versions of existing network systems and new network systems
- Functional validation testing of new NFV software and hardware
- New Intel hardware evaluations including servers, network interface controllers, acceleration technology

EANTC is a vendor-independent testing organization known for its objectivity and autonomy. Some NFV solution providers might have evaluated their solution as part of a vendor's ecosystem. EANTC and Intel both recognize that NFV success comes through orchestration and deployment interoperability, which is only achieved through independent, standardized, and transparent third-party testing.

What to Expect from the Testing Program

When a company participates in the testing program through Intel Network Builders, the goal is to deliver an environment that represents real-world carrier conditions, but also facilitates the evaluation of value-added features built into the system. The EANTC team works closely with each company to determine realistic production network scenarios and to select the right lab equipment to emulate that scenario. Other steps in the process include:

- Working with Intel and the NFV vendor, EANTC will guide test plan definition.
- Tests will be executed by EANTC in Berlin or at vendor site.
- EANTC creates a detailed test report that is then reviewed by Intel and the vendor.
- EANTC and the NFV solution provider post the report on their respective websites.

Sandvine* Validates Load Balancing Performance

Sandvine's* Traffic Steering Engine (TSE)* is an innovative virtual load balancing function that can distribute data between multiple network policy control engines to boost throughput for applications such as traffic classification. Sandvine's approach utilizes service function chaining (SFC), which routes data packets through a specified group of VNFs in order.

The company engaged EANTC to test the TSE when used with multiple instances of its Policy Traffic Switch (PTS)* Virtual Series. Testing took place in EANTC's Berlin lab and involved a leading-edge server bed and virtual test bed that generated stateful data traffic, emulated two DDoS attacks, and measured the impact of these on the performance of the Sandvine VNFs.

The tests verified the scale-out performance of the PTS Virtual Series instances in a TSE-enabled environment. EANTC was able to validate the two SFCs between PTS Virtual Series instances and verified the traffic mechanism between both chains. The results showed an impressive 361 milliseconds failover time for PTS with hitless recovery. In the lab's real-world security test, the PTS was able to detect and mitigate a DNS application DDoS attack and to successfully block 2.2 Mpps of SYN flow DDoS attacks. In both cases, there was no effect on legitimate traffic.[1] Read the report in this PDF download.

The test report aims at verifying marketing claims about the solution. The reports, which are typically around 10 pages in length, are highly detailed descriptions of the goals, parameters, and results and covering in detail the functionality and performance verification. Equipment used is spelled out, as are other evaluation conditions to ensure reproducibility of the test. Diagrams and tables display architecture, results, and test bed details. This gives customers the assurance that the features provided in the VNF are complete and that they operate with the right throughput levels.

How to Participate

The program is open only to Intel Network Builders members, who should discuss their interest with their Intel Network Builders account representatives. Some of the key questions that should be considered before undertaking this thorough testing include:

- Are the features of the solution ready to withstand production network volumes of data?
- Is there a specific publication date that should be taken into account (conference, launch, etc.)?
- What are the functional and performance test goals?

Conclusion

NFV is a revolutionary change for CommSPs, and they are both excited and nervous about adopting the technology. Independent and objective testing can help to ease the objections by proving performance and functionality claims. That is why Intel and EANTC have combined to offer a testing program to members of the Intel Network Builders ecosystem.

Metaswitch* Compares Virtual and Appliance-Based SBCs

EANTC worked with Metaswitch* to evaluate its Perimeta* virtual session border controller (SBC). The goal was to determine if Perimeta could replace a fixed-function Perimeta system with complete functionality, performance, and NFV agility and scalability. A unique aspect of this set-up was that the performance of the virtualized Perimeta solution was compared to that of an appliance-based solution for an apples-to-apples comparison.

The report is an example of EANTC performing tests in Metaswitch's lab. This location flexibility allows Intel Network Builders members to work where it's most convenient for them. In this case, EANTC augmented the company's own environment to ensure that it had the state-of-the-art traffic generators and analyzer tools required to measure call set up and other key measurements.

Overall, the outcome found that the virtual Perimeta product had the same functionality as its appliance-based counterpart, including the service assurance server function, which delivers alarms, event logging, and call analysis tools. In the lab, the high number of data packets pushed the product into overload mode, but it continued to deliver reliably stable performance. From a performance perspective, Perimeta managed up to 700 signaled calls per second and up to 78,000 simultaneous media sessions.[2] Read the report in this PDF download.

ADVA* Proves Hardware Performance

This hardware-focused test allowed ADVA* to communicate the performance benefits of its new ADVA FSP 150 ProVMe server platform. The platform is based on the Intel® Xeon® processor D family. The company wanted to verify the claim that the device successfully integrated fiber-based network access with an open, VNF-hosting platform for customer premises applications.

The report evaluates how the hardware performed key virtualization tasks leveraging Intel and open source technologies as well as networking performance and, critically, performance of PTP synchronization to show support for time-sensitive applications. The key results of the tests included validating the platform's support for OVS and SR-IOV operation and demonstrating the ability to deliver full line rate 1 Gbps throughput in both SR-IOV mode and OVS mode (for packet sizes above 128 bytes).[3]

The test results also demonstrate VNF lifecycle management and automated connectivity management with Modular Layer 2 plugin—both of which are key features of OpenStack* Neutron. Additionally, the set-up measured hardware performance assurance that network connectivity and VNF hosting don't consume compute resources and that the precision time synchronization is done independent of the traffic load. Link to PDF download.

About EANTC

EANTC (European Advanced Networking Test Center) is an internationally recognized independent test center for telecommunication technologies. Based in Berlin, the company offers vendor-neutral consultancy and realistic, reproducible high-quality testing services since 1991. Customers include leading network equipment manufacturers, tier-1 service providers, large enterprises, and governments worldwide. EANTC's proof of concept, acceptance tests and network audits cover established and next-generation fixed and mobile network technologies. More information is at info@eantc.com or http://www.eantc.com/.

About Intel Network Builders

Intel Network Builders is an ecosystem of independent software vendors (ISVs), operating system vendors (OSVs), original equipment manufacturers (OEMs), telecom equipment manufacturers (TEMs), system integrators (SIs), enterprises, and service providers coming together to accelerate the adoption of network functions virtualization (NFV)-based and software-defined networking (SDN)-based solutions in telecom networks and in public, private, and hybrid clouds. The Intel Network Builders program connects service providers and enterprises with the infrastructure, software, and technology vendors that are driving new solutions to the market. Learn more at http://networkbuilders.intel.com.

[1] Test conducted by EANTC. Hardware configurations: one HPE ProLiant DL380 Gen9 with two Intel Xeon processors E5-2699 v3, two dual-port 10 GbE Intel Ethernet Converged Network Adapters X520-SR2, one dual-port 40 GbE Intel Ethernet Converged Network Adapter XL710-DA2, two HP EG1200JEHMC 1.2 TB SAS HDD (RAID 1), 512 GB DDR4 memory, and hypervisor qemu-kvm-1.5.3-105el7_2.7.x86_64. Sandvine TSE Instance configuration: Flavor: TSE-BG1; CPU Allocation: 10 vCPUs; Data Ports: Two 10 GbE (Passthrough); Service Ports: One 40 GbE (SR-IOV); Software Version: svtse-1.00-0036.pts_tse_dev_integration, svpfm-7.40-0036.pts_tse_dev_integration. Sandvine PTS Instance configuration: Flavor: VPL-1MD; CPU Allocation: 10 vCPUs; Data Ports: Two 10 GbE (Passthrough); Service Ports: One 40 GbE (SR-IOV); Software version: svptsd-7.40-01 1 8.pts_tse_dev_integration, svptsm-7.40-01 1 8.pts_tse_dev_integration, svpts-7.40-01 1 8.pts_tse_dev_integration.

[2] Test of virtualized solution performed by EANTC. Hardware configurations for virtualized solution: Dell* PowerEdge* R630 with two 12-core Intel Xeon processors E5-2690 v3, 2.6 GHz (hyperthreading enabled), two Intel® 82599ES 10 Gigabit Ethernet Controllers, two Intel® Ethernet Server Adapters I350, and 12 Hynix* 16 GB DDR4-2133 SDRAM. Software: Hypervisor: QEMU 2.1.1, VMware* ESXi 6.0.0; OpenStack* Kilo; Metaswitch Perimeta V4.0.00_SU3_P01. SSC: 8 vCPUs, 16 GB RAM, 4 vNICs. MSC: 8 vCPUs, 8 GB RAM, 4 vNICs. Test of appliance-based solution performed by Metaswitch. Hardware configurations: 2 x Hewlett Packard* ProLiant* BL460C Blade with 2 x 8-core Intel Xeon processors E5-2600 v4. Software: Metaswitch Perimeta V3.5.00_SU19_P01.00; firmware: V1.1.01_SU2_P01.

[3] Test performed by EANTC. Configurations for PTP tests: ADVA FSP 150 ProVMe (F2.6.x8.C.S), Ixia* IxNetwork* 8.10 EA, Calnex* Paragon X 12218, Brocade* VNF Router. Configurations for additional tests: FSP 150 ProVMe (F2.6.x4.C), Ixia IxNetwork 8.10 EA, Calnex Paragon X 12218, Brocade VNF Router.

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