CableLabs Solution Brief

OPNFV Key to CableLab's NFV Innovation

CableLabs Accelerates NFV Transformation for Cable Providers by utilizing OPNFV Integration and Testing for R&D and Innovation Programs.

A Linux Foundation Collaborative Project

CableLabs®

COMPANY:

- Non-profit innovation and R&D Lab
- Wholly funded by cable operators globally
- Driving NFV ecosystem transformation for cable operators

SOLUTION:

- OPNFV Pharos and CI
- OPNFV test projects
- Participation in OPNFV Plugfests
- Contributions to OPNFV source code

CHALLENGE:

- Speed up and validate standards through implementation
- Need vendor agnostic NFVI reference implementation
- VNF onboarding
- NFV interoperability

BENEFITS:

- Open source NFV software integration
- Automated CI testing
- VNF onboarding and interoperability

"We saw a clear need in the industry to build upon and validate ETSI NFV ISG's standards with an open source software platform and that is why we have been a part of OPNFV from the planning stages. OPNFV's focus on integrating open source components to meet service provider requirements has been beneficial to CableLabs members."

— DON CLARKE, PRINCIPAL ARCHITECT, CABLELABS

THE BUSINESS

CableLabs is a non-profit innovation and R&D lab funded by cable operators. CableLabs has a global membership, with 57 members located in the United States, Canada, Mexico, South America, Europe, Asia and Australia. CableLabs' goal is to enable their members to become the providers of choice for end users, and to develop technologies and specifications around high speed data, video, voice and next generation services. The organization also provides testing, certification facilities and technical leadership for the industry.

CableLabs was deeply instrumental in the digital cable transformation and is best known for the Data Over Cable Service Interface Specification (DOCSIS). Now, CableLabs is leading the transformation around Network Function Virtualization (NFV). The promise of multi-gigabit, low-latency connections to the home and the enterprise is driving CableLabs to research technologies that will revolutionize immersive education, entertainment, video conferencing, multi-user gaming, collaboration, remote health, 3D TV and enterprise services. According to Randy Levensalor, Lead Architect at CableLabs, "Over half of our projects are focused on a 3-8 year horizon. In fact, we prefer to work on small, high-risk but high-reward initiatives." A short video produced by CableLabs is available at https://www.cablelabs.com/thenearfuture.

CHALLENGES

With revenue growth slowing in traditional video and voice businesses, cable operators need to grow their data and enterprise offerings. NFV promises to help accomplish this and fuel the next phase of the industry's growth and to provide more competitive choices for consumers and business users.

Benefits for the consumer include ability to introduce highly immersive and interactive services and enable 5G connected devices. Although 5G and cable might seem unrelated, the Cable 5G Wireless Enabler white paper observes that when Wi-Fi is included, cable networks carry over 67% of the current wireless traffic. As the boundaries between different types of wireless traffic blur, and fiber-based access networks are increasingly required for wireless backhaul, cable providers are expected to utilize their networks by leasing radio-access-networks. Hence cable operators are expected to play a significant role in 5G.

Benefits to the enterprise include ability to add enterprise services such as SD-WAN, managed router and managed Wi-Fi with a single click, while simultaneously slashing the cost of introducing new services. NFV can also reduce complexity, or reduce the number of customer premise equipment (CPE) devices, which is important as some CableLabs members have over 50 different types of CPE boxes that have to be supported and managed! All-in-all, NFV will allow cable providers to gain a greater share of the enterprise business and help create a brand new set of consumer services.

Underscoring the importance of NFV, Phil McKinney, president and CEO at CableLabs said during the May 2017 NFV World Congress, "Next generation services are wholly dependent on an SDN/NFV world to become a reality". CableLabs was a founding member and early proponent of OPNFV, hosting planning meetings at their facilities and participating in the discussions that outlined the future project. Consistent with these ideas, CableLabs is spending significant effort on solving many of the difficult NFV problems. Some of the key CableLabs activities include:

1. Leveraging open source software in addition to open standards as a way of rapidly developing prototypes to validate the CableLabs approach. Tetsuya Nakamura, Principal Systems Architect at CableLabs said, "We view open standards and open source as being complementary. OPNFV supplements our ETSI NFV ISG engagement to accelerate NFV adoption amongst cable providers."

2. Creating an open source reference architecture that could be deployed by cable operators across their geographic regions. The idea is to standardize features and functionality so member companies focus on deciding how to consume the technology rather than worrying about features.

3. CableLabs will also use the reference platform to study key characteristics such as low latency, physical proximity to customers and build additional automated tests to increase the value of the reference platform. This will increase our understanding on how to differentiate the distributed NFV cloud.

4. Using the reference platform for virtual network function (VNF) onboarding. It is not efficient for every cable operator to independently undertake the effort of on-boarding common VNFs, nor does duplication add value. One of the more unique cable industry-centric VNFs CableLabs expects to onboard is a Distributed Virtual Converged Cable Access Platform (vCCAP) core.

5. Using the reference platform for broader NFV interoperability testing. CableLabs already has a proven interoperability model for DOCSIS that can be extended to the NFV ecosystem in a manner that is unique and customized for the cable industry.

SOLUTION

OPNFV is a key tool to enable CableLabs to solve these challenges. “OPNFV provides an integration point for several open source NFV technologies that we are interested in such as OpenStack, ODL, OVS, DPDK and FD.io; and this frees us up to focus on POCs, new services, and applications,” said Levensalor. The open structure of OPNFV, allows competitors to collaborate in the open on core infrastructure aspects, interoperability, and feature development.

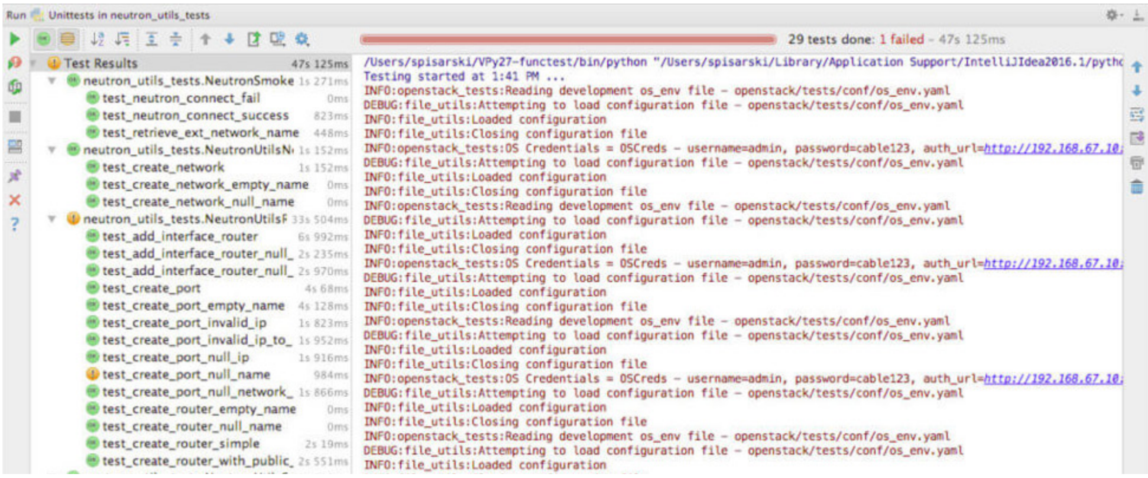
Kyrio, a CableLabs subsidiary, will provide NFV interoperability testing with a focus on VNF onboarding. Kyrio will use OPNFV scenarios (specific combinations of components) and collaborate with operators, vendors, developers, integrators, researchers to demonstrate capabilities, use cases and interoperability.

Currently, CableLabs is concentrating its efforts around the OPNFV Pharos (hardware specification), CI (continuous integration), Functest (functional testing), Yardstick (performance testing), and Dovetail (compliance testing) projects. CableLabs is also enthusiastic about the potential of the Models and SampleVNF projects.

More specifically, CableLabs’ involvement in these projects include:

• **OPNFV Pharos and CI:** CableLabs and Kyrio have used the Pharos specification to set up 6 PODs. Most PODs consist of 6 servers. Using OPNFV CI tools, the CableLabs team is able to change and redeploy an entire POD in less than 3 hours with a few simple commands. This has been very useful for trying out different parameters or different components, e.g. comparing vSwitches.

• **OPNFV Functest:** CableLabs utilizes Functest to perform functional testing on the NFVI/VIM layer and regularly contributes patches back to the respective upstream project. To further simplify application and test suite development on top of OpenStack, CableLabs has created a new open source object-oriented API middleware and test framework called SNAPS-OO. SNAPS-OO has been successfully integrated with OPNFV Functest. Steven Pisarski, Architect at CableLabs and SNAPS-OO developer said, “I’m thrilled by how eagerly and rapidly the OPNFV community has embraced SNAPS-OO.”



SnapsOO Screenshot

• **Dovetail:** Kyrio will create its VNF validation program based on the OPNFV Dovetail compliance test suite that is part of the OPNFV Compliance Verification Program (CVP).

For management and orchestration, CableLabs has utilized Cloudify—and in a somewhat more limited fashion—OpenStack Tacker with the OPNFV reference platform. Future testing may include the Open Source MANO (OSM) and ONAP projects. Finally, to underscore their commitment to OPNFV, CableLabs hosted the inaugural OPNFV plugfest in early 2016, creating a foundation for all subsequent plugfests to build upon.

RESULTS

CableLabs has gained both experiential and technical value from the OPNFV project. The former is particularly valuable, and now a broad set of individuals at CableLabs are working actively with OpenStack, SDN controllers, NFV use cases, and has the ability to deploy and use OPNFV software.

On the technical side, CableLabs has now has a repeatable integration and testing process based on OPNFV tools and scenarios that is vendor independent. OPNFV allows CableLabs to leverage integration and testing of different components. Leveraging OPNFV has resulted in substantial time savings, especially as CableLabs utilizes more scenarios in the future.

Kyrio is creating a VNF onboarding and interoperability program. OPNFV scenarios and Dovetail form the basis for Kyrio to test VNFs against different scenarios on different hardware. As OPNFV integrates additional MANO software, Kyrio will be able to test VNFs against different orchestrators as well. CableLabs also benefits from projects such as ARMBand where OPNFV was ported to ARM. Had CableLabs done this on its own, it would have taken many months of effort.

In summary, the results prove out that participating in OPNFV has helped with the key challenges for CableLabs: i) using open source in addition to, and to validate open standards, ii) gaining access to a reference architecture, iii) VNF onboarding, and iv) NFV interoperability.

REFERENCES

CableLabs produced video about future services
https://www.cablelabs.com/thenearfuture

Cable 5G wireless enabler white paper
https://cablelabs.com/wp-content/uploads/2017/02/cable-5g-wireless-enabler.pdf

SnapsOO blog
https://cablelabs.com/snaps-oo-open-sourced-collaborative-development-resource/

Blog about the inaugural OPNFV plugfest
https://cablelabs.com/opnfvs-inaugural-plugfest-hosted-by-cablelabs/