# **SCOPNFV**

# **2017** OPNFV Year In Review

Transforming Networks Through Open Source NFV

188

## TABLE OF CONTENTS

2017 Member List	3
Message from the Board of Directors Chair - Prodip Sen	5
2017 Board Member List	7
State of the Project - Heather Kirkey	9
Message from the TSC Chair - <i>Tim Irnich</i>	10
Message from the Marketing Chair - Sandra Rivera	12
Message from the C&C Committee Chair - Chris Donely	14
Voice of the End User - Steven Wright	16
Market Impact	17
Thank You	19

## 2017 MEMBER LIST





## **2017** MEMBER LIST (CON'T)

### Silver

ADVA Arm Brain4Net CableLabs Canonical Cavium CertusNet China Telecom Ciena ENEA H3C KDDI Korea Telecom Mirantis Netscout NXP Orange Qualcomm Samsung Sandvine SK Telecom

Sonus Spirent Sprint VMware Wind River

### Associate

CENGN SDNFV ETRI Fraunhofer Institute (FOKUS)

Institute for Information Industry Okinawa Open Laboratory Synchromedia UNH IOL Lab

## **MESSAGE FROM THE** BOARD OF DIRECTORS CHAIR

**Prodip Sen**, OPNFV Board of Directors Chair; Chief Technology Strategist, HPE Pointnext

2017 has been the year where OPNFV has finally arrived at a place where we can fully address the original goals we started with and position ourselves optimally for continued success moving forward. It is a good time to look back briefly on our three-year OPNFV journey.

We set out in late 2014 with the goal of creating an open source reference implementation for NFV, consistent with the architecture framework defined by the ETSI NFV ISG, but not necessarily limited by it. We initially set some boundaries to focus our activities on the infrastructure in an attempt to build something achievable in a realistic timeframe. We started humbly with our first release, Arno, by building a system that included OpenStack-based virtualization management and an OpenDaylightbased SDN controller on a variety of hardware platforms. Later, we broadened our scope to cover the entire NFV architecture, and several projects started to cover other aspects of NFV increasing implementation choice for network functions. In 2017, this effort culminated in our latest release— Euphrates. Euphrates allows for the choice of a variety of control planes and data planes, supports VM-based and container-based virtualization mechanisms, and integrates orchestration capabilities related to VNF onboarding and application management. In addition to building and testing the software system itself, OPNFV has initiated a framework for development across open source communities by instituting a continuous integration process with several upstream projects.

Besides the technical aspects of our releases, we have contributed heavily towards the building

of community and fostering collaboration in the networking industry. As evidence of this, witness the growth of our own community and participation from the Arno to the Euphrates releases: 40 developers contributing to 197, 20 participating projects to 52, and 527 patches to 5772. We have proactively built bridges to other communities by participating in their events and inviting them to ours. We have held three annual Summits hosted on three continents—fostering both geographic and cross-community collaboration.

A major accomplishment for the project as we head into 2018 comes in the form of the OPNFV Verified Program (OVP)—a verification and testing program for vendors and suppliers who are creating systems consistent with the OPNFV reference platform. This serves to enhance interoperability between open source NFV components and allows end users to better understand the capabilities of products and services available for their networks.

2017 has also been a year of transitions and beginnings. It is the final year of OPNFV as an independent organization with its own governance structure and Board. Many of us on the OPNFV Board have been participating in the evolution of the Linux Foundation networking projects, to promote efficiency and collaboration, and meet the



needs of end users in a holistic way. Consequently we encouraged OPNFV to join a common umbrella organization that would house multiple open source networking projects.

We wanted to make sure, however, that all the technical activities of OPNFV (and of the other projects joining the new umbrella) would continue in the new structure with as much technical independence as possible. For this purpose, we helped to shape the charter and goals of the new structure: LF Networking (LFN). LFN will house all the technical activities of OPNFV, ONAP, ODL, FD.io and other joining organizations. The various TSCs will run the technical activities, and the LFN will control and allocate the funding, host events, and run the common infrastructure required for all the projects. OPNFV software, processes, programs, and tooling artifacts now address all aspects of the NFV architecture. Clearly, the coverage is not complete and there is a lot of work to be done; but I feel we have realized a major part of the original vision and shown the industry that our goal was achievable. It's been an amazing three-year journey as OPNFV and we are confident that the needs of the OPNFV community will be well served within LFN going forward. We look forward to crossing paths with many of you again in 2018.

#### **Prodip Sen**

OPNFV Board of Directors Chair; Chief Technology Strategist, HPE Pointnext

### **2017 OPNFV** BOARD OF DIRECTORS

### **Platinum Board Members**

Bryan Sullivan *AT&T* 

Chris Wright *Red Hat* 

Frank Brockners (Treasurer) Cisco

Igor Marty *Lenovo* 

Jonne Soininen *Nokia* 

Kyle Mestery *IBM* 

Lingli Deng (Vice Chair) China Mobile Research Institute

Pierpaolo Marchese Telecom Italia Group Prodip Sen (Chair) HPE

Sandra Rivera (Marketing Committee Chair) Intel

Susan James *Ericsson* 

Thomas Di Giacomo SUSE

Toshiyuki Tamura NEC

Wenjing Chu (Secretary) Huawei Technologies Co. Ltd.

Xing Chen *ZTE* 

## **2017 OPNFV** BOARD OF DIRECTORS (CON'T)

### **Silver Board Member**

Bob Monkman, *Arm* 

### Silver End User Board Member

Jamil Chawki *Orange* 

### **TSC Chair**

Tim Irnich *Ericsson* 

### **Committer Board Member**

Dave Neary Red Hat

### **STATE** OF THE PROJECT

Heather Kirksey, OPNFV Director; VP Community and Ecosystem Development, The Linux Foundation

It is with gratitude and pleasure that I look back on our accomplishments of 2017 and with excitement for the future as I look ahead to our path as part of LF Networking in 2018. We have come such a long way together since our founding over three years ago and this moment of transition marks a great opportunity to reflect on our impact.

Starting with the unique mission to do systems integration as an open source project, we have become the engine room for integration, testing, and automation, and new NFV feature validation across the open source development ecosystem. What I am most proud of is the strong and collaborative relationships we have built with our key upstream partners, from OpenStack to OpenDaylight to Kubernetes, to data plane and acceleration groups like FD.io and DPDK, to hardware partners like Open Compute Project. 2017 also saw us incorporating MANO and analytics capabilities with ONAP, Open Baton, PNDA, and Calipso.

This work would not be possible without our extraordinary community and its welcoming global culture. This year saw two productive plugfests, hosted by Orange and Intel, the continuing growth of the XCI initiative, our Danube and Euphrates releases, and an extraordinary OPNFV Summit hosted in Beijing. We presented at Open Source Leadership Summit, ONS, China SDN/NFV, OpenStack, Light Reading's Big Communications Event, and CableLabs Summer conference. We built our first ever community demo showing an integrated stack for the Virtual Central Office, and are about to launch our long-awaited OPNFV Verified Program.

Most importantly, we made friends, we shared beers, we debated, we worked to make our community more inclusive, we solved technical problems, and we reached out to forge ties across multiple communities. As we look forward to being part of LF Networking this year, I know that we will bring this spirit of working together to help all our networking projects bring value and change the world in 2018. Let's go collaborate!

#### Heather Kirksey,

OPNFV Director; VP Community and Ecosystem Development, The Linux Foundation

## MESSAGE FROM THE TSC CHAIR

**Tim Irnich**, OPNFV TSC Chair; Program Manager, Cloud Open Source & Ecosystem, Ericsson

It is a great honor to be elected the OPNFV TSC chair this year and I want to thank the TSC members and the OPNFV community for their trust in me. I also want to thank our previous TSC chair, Tapio Tallgren, for his leadership over the past year and for handing over the project in such a steady and calm state. Having been on the job for only a few months now (and I must admit that it rather feels like just a few days), I can say that this is definitely one of the most interesting and rewarding community positions the industry has to offer.

Looking back on 2017, there were many technical achievements—far too many to list all of them here—so, I will focus on just a few.

We released our 4th major release called "Danube" in April and our 5th release called "Euphrates" in October. The Danube release brought first steps towards MANO integration, the introduction of NFVi platform stress testing, as well as data plane performance enhancements (FD.io integration, enhanced DPDK integration and hypervisor performance tuning) and performance testing in various shapes and forms. The Euphrates release debuted container integration (both in terms of supporting container-based workloads and containerized OpenStack control plane via Kolla), introduced a more flexible release model providing more recent versions of upstream components ("latest track"), added a new components for network visualization (Calipso) and telemetry (Barometer and Doctor), and introduced new testing features such as realistic VNF workload models and end-to-end data plane performance benchmarking.

The Cross-community Continuous Integration initiative, also known as XCI, gained significant traction and experienced a surge of contributions. We are now capable of deploying OpenStack directly from the master branch of the ongoing Queens development cycle that is passing many of our basic functional tests. OpenDaylight integration, including clustering, as well as Open vSwitch integration are close to completion. We can deploy Service Function Chaining in XCI and the BGPVPN scenario is making progress as well.

Recently, OPNFV acquired approximately 50 Intel and Arm servers for the Lab-as-a-Service initiative, which will be hosted by the University of New Hampshire InterOperability Laboratory (UNH-IOL). We will use this infrastructure to provide developers of OPNFV and the other LFN projects with development resources ranging from virtual machines to complete preprovisioned OPNFV deployments.

We held two combined Plugfests/Hackfests and one Summit during the year. The first Plugfest was hosted by Orange in their facilities near Paris and



offered a unique opportunity for the community to focus on OPNFV matters for an entire week in close collaboration with a major telecom operator.

The highlight of the year was the 2017 OPNFV Summit in Beijing which showed the amazing support and commitment for OPNFV and open source in the Chinese development community and NFV ecosystem.

The second Plugfest took place in December at the Intel campus near Portland, Oregon and we welcomed a record number of participants (104), flying in from all over the world to collaborate. We made great progress testing the Euphrates release and in many areas of compatibility. All this would not have been possible without our fantastic plugfest hosts Orange and Intel, as well as our Summit sponsors, and of course the Linux Foundation team. On behalf of the technical community, I want to thank all of them for their support, since OPNFV would not be what it is today without them.

With the transition into the LF Networking (LFN), OPNFV is entering a new phase. We will be working even more closely with some of our most important upstream components and have many new opportunities to create something that is greater than the sum of its parts. With our industryleading integration expertise, toolchains and the test infrastructure, OPNFV is well positioned to provide unique value to the lineup of projects within LFN.

#### Tim Irnich

OPNFV TSC Chair; Program Manager, Cloud Open Source & Ecosystem, Ericsson

## **MESSAGE FROM THE** MARKETING COMMITTEE CHAIR

Sandra Rivera, OPNFV Marketing Chair; Senior Vice President, General Manager, Network Platforms Group, Intel Corporation

The OPNFV marketing committee is comprised of members from leading companies in our industry. Our primary purpose is to drive awareness, engagement and support of the OPNFV project. We develop strategies and execute key programs and events to help accelerate the availability and deployment of commercial NFV solutions. We do this by driving results around deepening community engagement, increasing developer and end user participation, and driving increased visibility of OPNFV releases and features.

I am extremely proud that the OPNFV fifth release, Euphrates, has brought containers and DevOps into the next-generation networking stack, along with advancements in functionality, interoperability and performance to the industry. This has furthered OPNFV's mission to accelerate the transformation of service provider networks to embrace server and virtualization technologies. Overall, 2017 saw two major platform releases, two interoperability plugfests, an OPNFV book, an OPNFV Summit in China, a Virtual Central Office (vCO) proof of concept demo showing rapid innovation towards a major industry use case, and much more.

Our strategic marketing goals this year were to engage and educate end users on how to leverage OPNFV, facilitate developer participation, demonstrate market impact, and harmonize with fellow networking projects and upstream communities. We made significant progress in a majority of the goals we set for ourselves. OPNFV continued its industry leading engagement with NFV end users, producing detailed solution briefs with CableLabs and Orange, and facilitating 58 industry speaking engagements for end user executives, architects, and developers at OPNFV and industry events. OPNFV also united with OpenDaylight and ONAP to produce 6 Open Source Networking (OSN)



Days events in Europe and Japan, exceeding our goal of 3 OPNFV Days with members and user groups. We also produced and promoted multiple OPNFV webcasts across Linux Foundation and member channels that reached 1K+ registrants, added hundreds of new email subscribers, and provided valuable introductory content to the OPNFV community.

We fell slightly short of our goals in producing and promoting end user stories on OPNFV and in featuring new upstreams with pages on opnfv.org. We also have more work to do to recruit developers to take the OPNFV training course we're planning to launch in Q12018, to produce business briefs that show the ROI of participating in open source NFV, and to expand PR coverage across industry and broad tech publications. These will be areas of focus for next year.

In 2018, we also plan on developing more content in concert with members, including thought leadership pieces, business case studies that demonstrate TCO (Total Cost of Ownership) savings and commercial NFV deployments. We'll host and promote this new content across our OPNFV channels, as well as leveraging the broader LFN channels. We will also increase our efforts to recruit more developers to OPNFV.

Thank you to all Marketing Committee members for helping us deliver such a high-impact year. OPNFV's continued success is driven by active engagement and you are a key part of our vibrant, growing community. We look forward to your contributions in 2018 as we challenge ourselves to achieve even more ambitious goals in our effort to accelerate the adoption and broad-scale deployment of NFV in the market.

#### Sandra Rivera

OPNFV Marketing Chair; Senior Vice President, General Manager, Network Platforms Group, Intel Corporation

### **MESSAGE FROM THE** C&C COMMITTEE CHAIR

**Chris Donley**, OPNFV Certification & Compliance Committee Chair; Senior Director, Open Source Ecosystems, Huawei

2017 was an eventful year for the Certification & Compliance Committee. As we start 2018, we are very proud to be launching the OPNFV Verified Program ("OVP"). The program is designed to simplify adoption of NFV in commercial products by establishing an industry threshold based on OPNFV releases. The fact we are using an open source platform as referent to measure compliance of commercial products—not necessarily based on its source code—is a new and innovative step for the industry.

OVP facilitates both vendor self-testing and thirdparty lab testing using the Dovetail test suite. In our initial version, we will be testing NFV infrastructure components: NFVI and VIM. In the future, we may expand the program to cover VNFs and other components, as well. In December, we conducted a "beta program" with several vendors: Huawei, Nokia, Wind River, and ZTE. These companies provided valuable feedback while we refined and finalized the program. They also represent the first cohort to received the privilege of using the OPNFV Verified mark and logo. Congratulations to these companies and we welcome additional members of the open NFV ecosystem to join us!

OVP is designed to help operators establish entry criteria for their trials and RFPs. We have worked closely with end user advisor operators to establish a framework and an initial bar to support their requirements. OVP will also reduce operator testing load by identifying a set of common tests and executing them once under the auspices of

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the OVP, rather than in many individual operators' labs. As OPNFV and the industry at large continues to mature, we will steadily raise the bar in future versions. We expect to release two OCP versions per year, denoted with the month and the year to make it easy to identify the compliance level of submitted products.

With the formation of Linux Foundation Networking (LFN), we are well positioned to expand OVP to support other projects in the future. Even before the official launch, we initiated discussions with related projects on leveraging OVP to support the wider open source community. The C&C is also exploring additional operator use cases that we can incorporate into our compliance test suite.

I am excited about the launch of OVP and I hope you will join us in 2018. To operators, I invite you to share your use cases and functional requirements, and please consider incorporating OVP into your RFP process or lab trials. To vendors, I hope you'll download the Dovetail tool and test your commercial offerings. If you're looking for assistance, several third-party labs are eager to help.

#### Chris Donley,

OPNFV Certification & Compliance Committee Chair; Senior Director, Open Source Ecosystems, Huawei



## VOICE OF THE END USER

**Steven Wright**, EUAG Chair, OPNFV; Lead Member of Technical Staff, AT&T

Five years since the original NFV whitepaper was published, the state of NFV across service provider networks—in PoCs and deployments—varies greatly. For some in the industry, NFV is maturing more slowly than was originally imagined. But in a <u>Heavy Reading Survey</u> of service providers last May, more than 20% indicated they were already in production deployment with NFV. The carriers of today face similar challenges but also have unique perspectives of overcoming the obstacles to integrating NFV, SDN, and cloud into their networks.

This is why we started the OPNFV End User Advisory Group (EUAG) in June of 2016: to solicit participation of leading end users in the OPNFV community, to better understand their needs, and integrate this feedback into the priorities and processes of the OPNFV technical community. Since this time, we've worked to uncover the perceptions, insights, and actionable elements from group members working diligently to craft and apply their respective NFV strategies.

This process received a substantial boost in July when Randy Levensalor of CableLabs came on as the EUAG vice chair. He has been "hands on" in the OPNFV community since the beginning and has taken point on reframing our long list of NFV pain points into categories, clearly defining the requirements, and starting to map these to the current and future OPNFV project roadmap. Thanks Randy! In 2017, we analyzed the results from two surveys of the group around a broad range of industry topics as well as those specific to working in OPNFV. These, along with member interviews, and a deepened focus on framing the pain points, has moved us closer to actualizing group outputs into developer tasks that support a project trajectory in line with "real world" networks.

As the open networking stack comes into clearer focus in 2018, we look forward to examining integration points with other open source projects, and applying new discoveries.

#### Steven Wright

EUAG Chair, OPNFV; Lead Member of Technical Staff, AT&T

"As 5G changes the carrier landscape, we'll see some key technologies like NFV act as the underpinning for the transition. Open source software—and now even open source hardware—will be critical components....the next generation of communications technology will be driven more by open source organizations like OPNFV, OpenStack, OpenDaylight, DPDK, FD.io, ONOS and ONAP as the underpinnings of 5G will be virtual and very cloud-centric."-*Forbes* 

### **INDUSTRY** IMPACT

#### By the Numbers

- 7311 total media clips (-21% YOY)
- 54 total press/analyst briefings
- 11,077social followers (+26% YOY)
- 27 official speaking engagements outside of the OPNFV Summit
- 7 press releases
- 44 total blog posts:

OPNFV hit its stride in 2017, having established itself as the place for open source NFV. Given OPNFV's current maturity and partnership with strong upstream communities, press coverage volume decreased, which is expected at this stage in the project lifecycle. 2018 is expected to yield more cross-stack conversation as OPNFV works even more collaboratively across the open source networking ecosystem, evolving further to meet changing needs of demanding networks.

#### Media Highlights

Scontral February 16, 2017 OPNFV Tests its Software on OCP Hardware

#### **PACKET**PUSHERS

April 4, 2017 The OPNEV Garage: Making Open Networking Work Together

#### NETWORKWORLD

April 5, 2017 OPNEV "Danube" upgrade looks to spur open source NEV expansion

#### *CWEEK*

April 6, 2017 Open Networking Takes Next Steps Up the Stack

#### ≡ Forbes

June 20, 2017 China Is Driving To 5G And IoT Through Global Collaboration

#### THENEWSTACK

December 11, 2017 With OPNFV, Orange Plans a Full-Scale Rollout of Network Functions Virtualization

#### **FierceTelecom**

June 14, 2017 Service Providers' Confidence in OPNFV is growing, Survey Finds

#### LightReading

October 24 2017 OPNFV's Euphrates Sails Toward Cloud Native Shores "The purpose of OPNFV was not to create a separate platform for NFV, but to integrate NFV features across the stack while identifying gaps—a role that, with Danube, is clearly taking shape.." -Michael Cooney, Network World

> "OPNFV is now migrating from carrier proof of concept and into production. Besides OpenStack and SDN controllers, service providers are seeing the importance of additional supports needed for open source telco designs." - Sean Buckley, Fiercetelecom

### What Operators Think About OPNFV: A Heavy Reading Survey

Analyst firm Heavy Reading conducted a second survey in spring 2017 to analyze telecommunications network operator perceptions of how OPNFV impacts the industry. The data indicated continued confidence in OPNFV. Specifically:

- 98% of survey respondents agreed that at almost three years in, OPNFV is delivering on its promise to accelerate open source NFV
- 54% said OPNFV has become more important to their organization over the past year
- 80% feel DevOps is essential or important to the success of NFV



### **OPNFV** Onstage at Industry Events

#### FOSDEM

Open Compute Summit Open Networking Summit Linux Foundation Collaboration Summit Mobile World Congress (HPE Discussion Zone) Linux Foundation Collaboration Summit China SDN/NFV Conference Global Future Network Development Summit (GFNDS) OpenStack Summit Boston Big Communications Event LinuxCon Japan OPNFV Summit Global SDN/NFV Technology Conference OpenStack Days Tokyo Light Reading's UpskillU Broadband World Forum CableLabs Summit Huawei Connect NFV and Carrier SDN Open Networking Days OAI Paris Workshop QSynergy TIP Summit DARPA Hackfest Global Network Technology Conference

## THANK YOU TO THE OPNEV COMMUNITY FOR A SUCCESSFUL 2017!



Learn more and get involved: opnfv.org