



OPNFV

LF NETWORKING

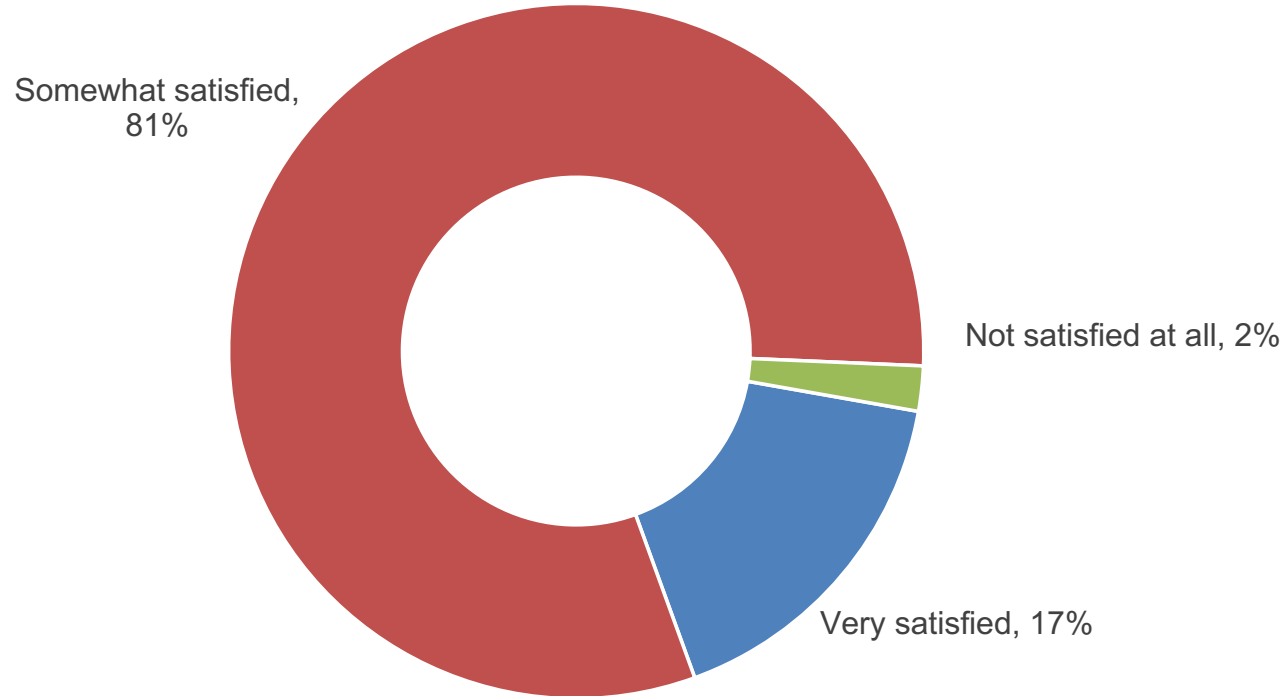
An Introduction to OPNFV

Please direct any questions to info@opnfv.org or lfn-info@linuxfoundation.org

We are an industry in transformation

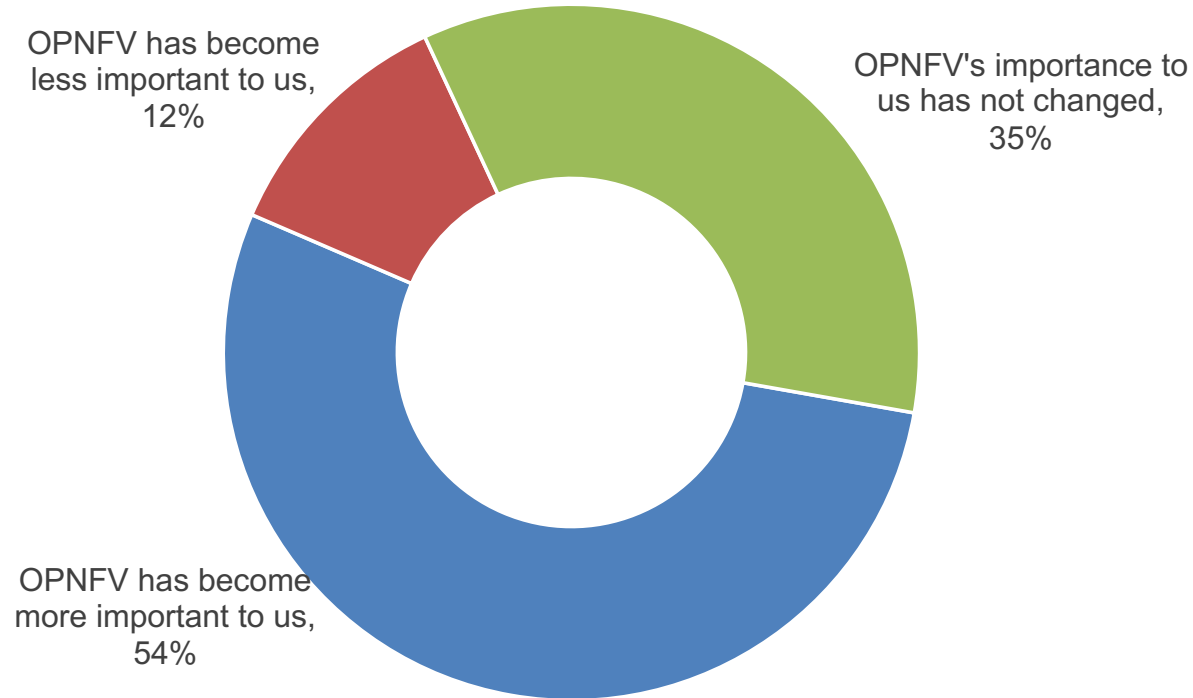


Satisfaction that OPNFV is delivering on its promises



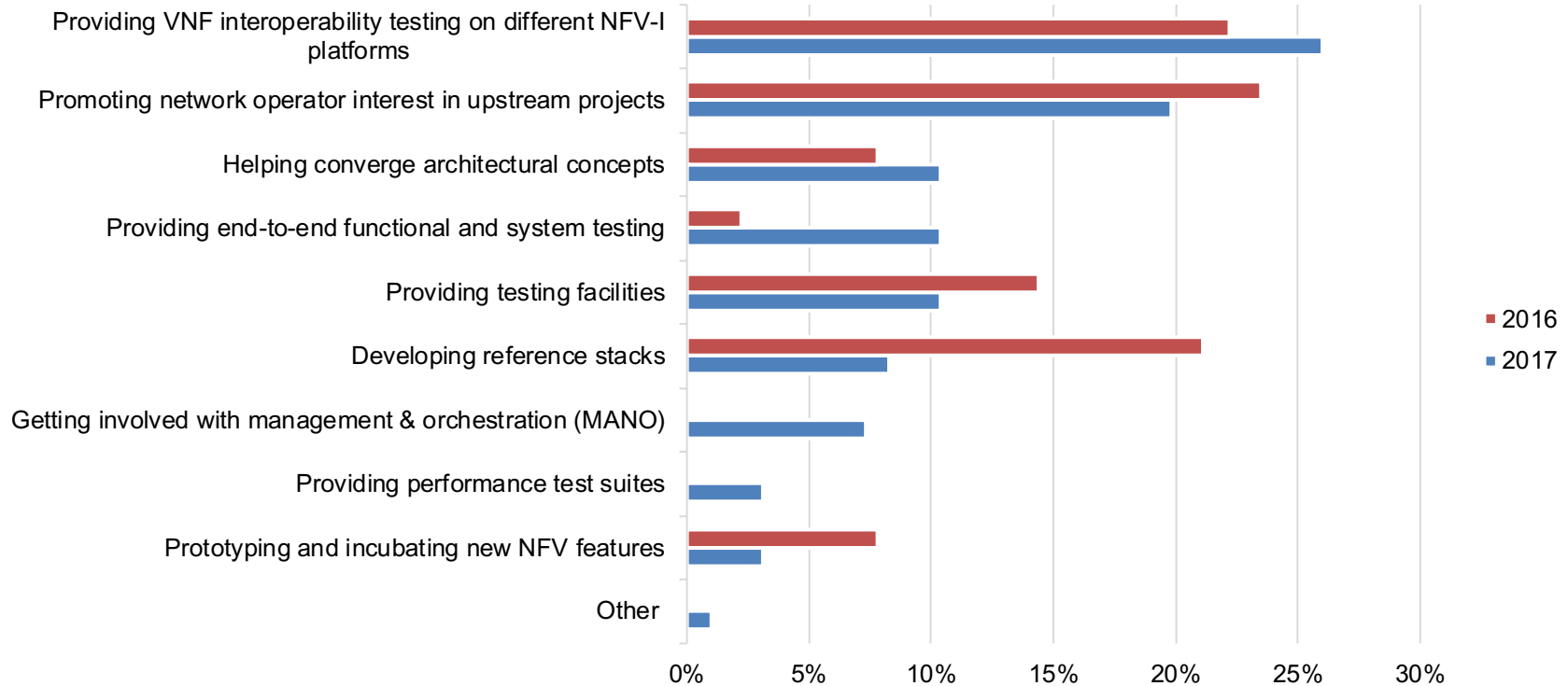
Source: Heavy Reading Service Provider Survey, June 2017 n=97

Change in OPNFV's importance to companies



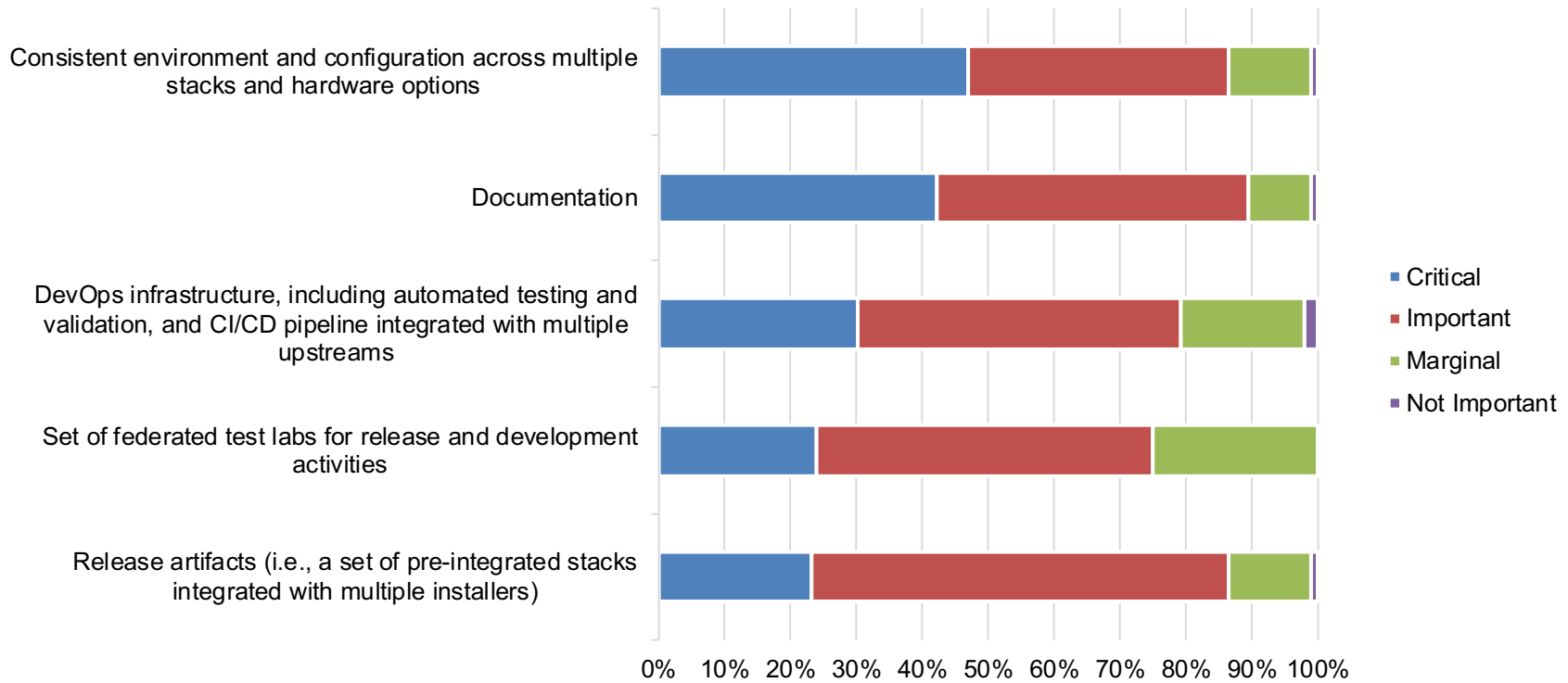
Source: Heavy Reading Service Provider Survey, June 2017 n=97

Most important thing OPNFV is doing



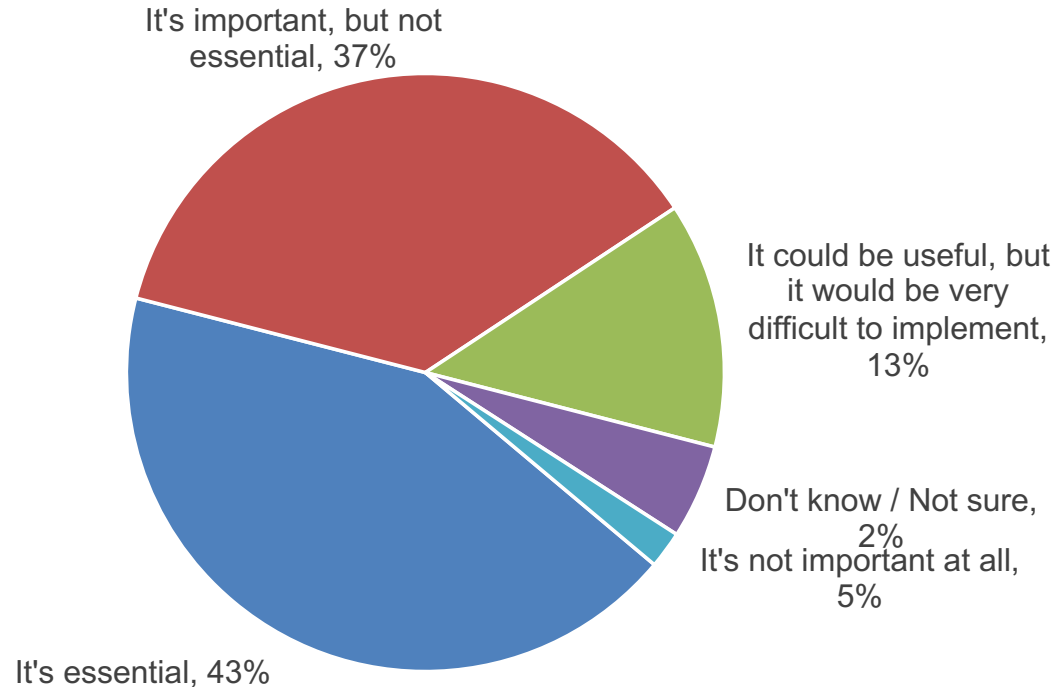
Source: Heavy Reading Service Provider Survey, June 2017 n=97

Rating importance of OPNFV activities



Source: Heavy Reading Service Provider Survey, June 2017 n=97

Importance of DevOps to NFV success



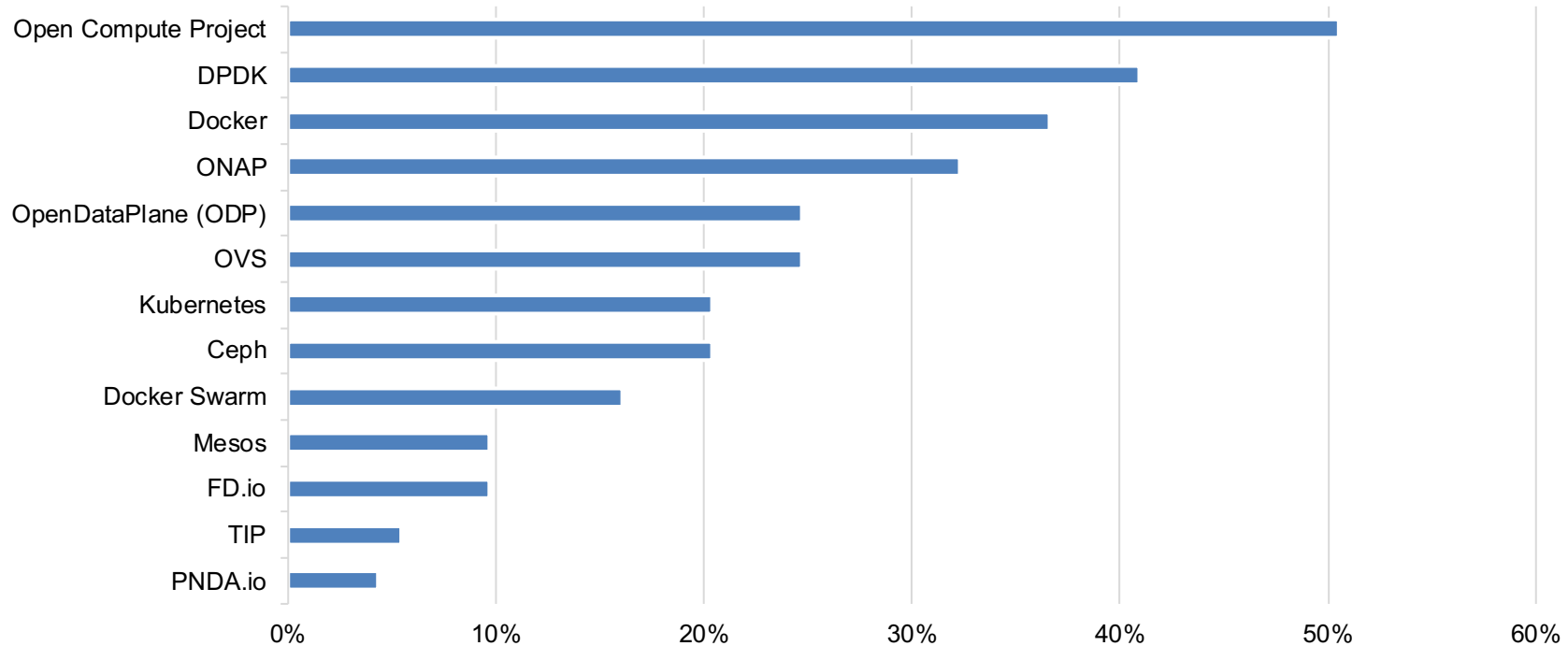
Top expected benefits from OPNFV



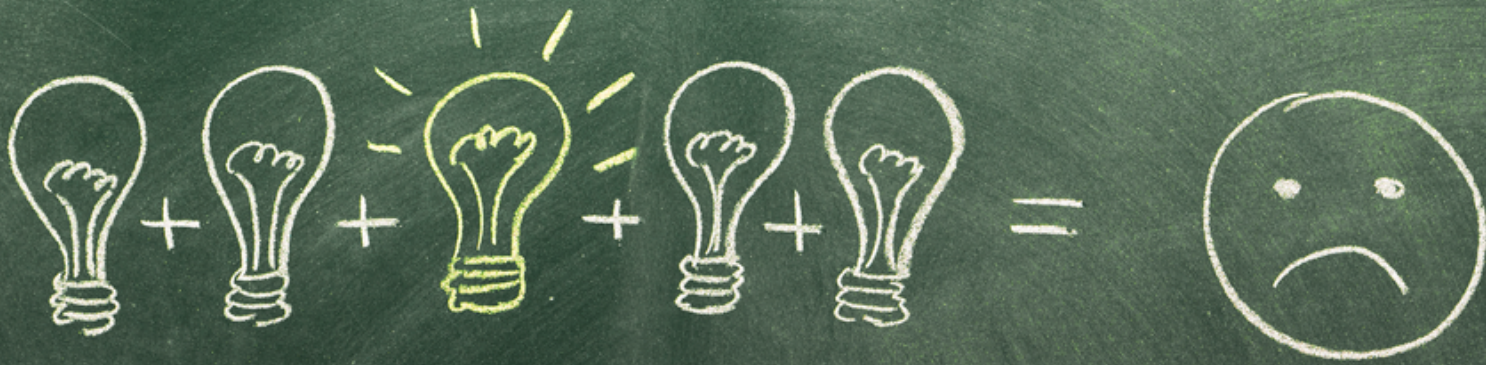
Overall Rank	Item	Score
1	Easier integration	143
2	More rapid deployment of NFV	105
3	Accelerated adoption	89
4	Consistent environment across multiple architectures/stacks	79
5	Higher-quality products	73
6	Reduced risk	55
7	Increased understanding of underlying technologies	35

Source: Heavy Reading Service Provider Survey, June 2017 n=97

In addition to OpenStack and SDN controllers (e.g., OpenDaylight, ONOS, OpenContrail), which upstream projects are most important to the success of OPNFV?



Source: Heavy Reading Service Provider Survey, June 2017 n=97



We Need To Work Together



OPEN BATON

MEF

CLOUD NATIVE
COMPUTING FOUNDATION

I E T F

Open Source
MANO

openstack.

OPEN
Compute Project

SNAS

ETSI

OVN
(Open Virtual Network)

ONF
OPEN NETWORKING
FOUNDATION

THE
LINUX
FOUNDATION

OVS
Open vSwitch

OPNFV

ceph

CORD
Control Ofte Re-architected as a Datacenter

DPDK

OPENCONTRAIL

KVM

OPENDAYLIGHT

kubernetes

OpenDataPlane
.org

pnda

.io

ONOS
Open Network Operating System

ONAP
OPEN NETWORK AUTOMATION PLATFORM

OPEN CONTAINER
INITIATIVE

OPEN AIR
INTERFACE



Open Platform for NFV (OPNFV) facilitates the development and evolution of NFV components across various open source ecosystems.

Through system level integration, deployment and testing, OPNFV creates a reference NFV platform to accelerate the transformation of enterprise and service provider networks.

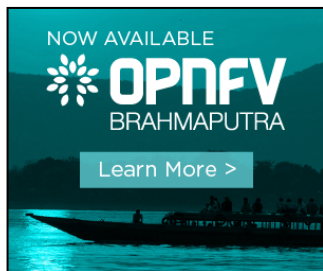
OPNFV Release History



June 4, 2015



March 1, 2016



Sept 26, 2016



April 4, 2017



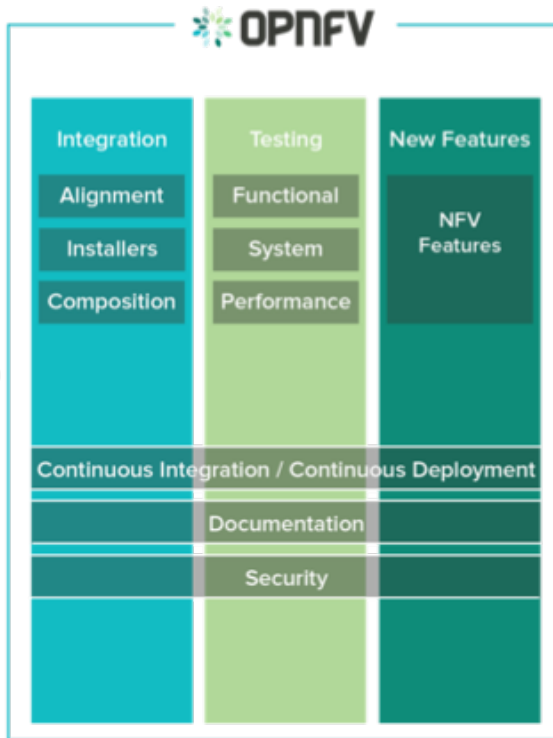
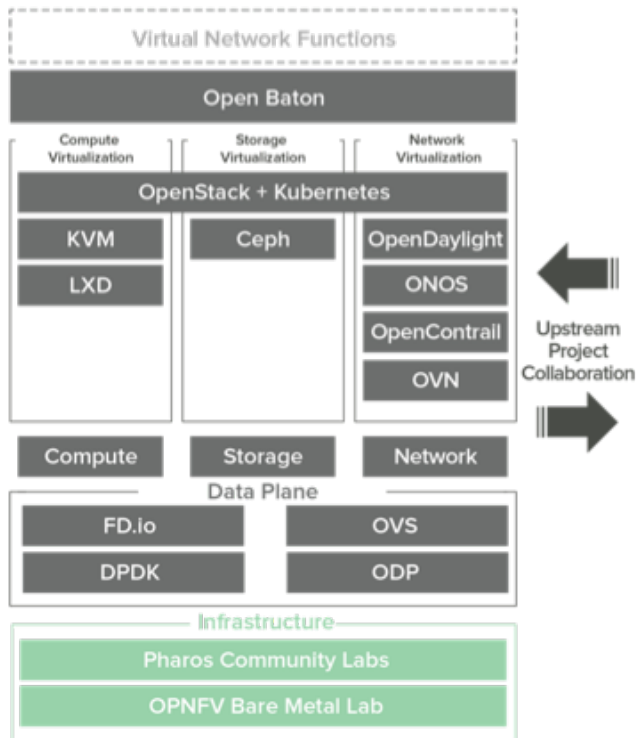
Oct 24, 2017





OPNFV

EUPHRATES



During the Euphrates Release Cycle...

- 36 Projects
- 200+ Developers
- 8K+ Commits
- 30+ Orgs Committing

8K+ Functional Test Runs (FuncTest)

4 Interns Contributing

Plus deployment of other upstream software including
Kubernetes, ONAP, DPDK, FD.io, OVS, and more.

3K+ OpenDaylight Deployments

8K+ OpenStack Deployments

OPNFV Euphrates

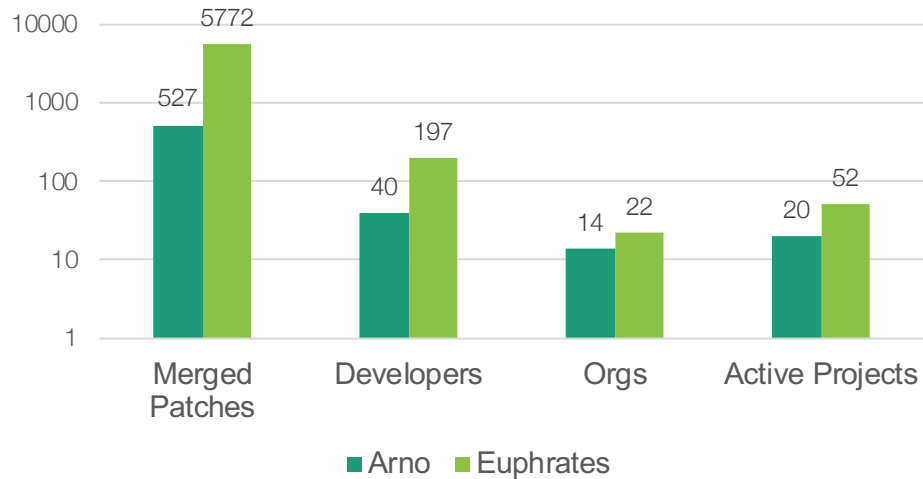


- Introduces Kubernetes container orchestration engine as an alternative VIM, and with SDN controllers including basic functional and performance testing capabilities, plus a containerized version of OpenStack
- Integrates cross-community continuous integration (XCI), where the OPNFV CI pipeline integrates the latest upstream code, reducing feedback time on new features or bug-fixes from months to days.
- Integrates most recent versions of upstream projects and now OVN network virtualization.
- Delivers an extensive set of tools to test the NFVI/VIM layer (i.e. NFV cloud), VNFs and complete network services, with two new projects: SampleVNF and NFVbench
- Includes new carrier-grade features through a new project, Calipso, where operators gain visibility to their complex virtual networks and access a powerful service assurance framework.
- Performance improvements on the ARM architecture and in L3 performance with FD.io; new security, SFC, FD.io and EVPN features.

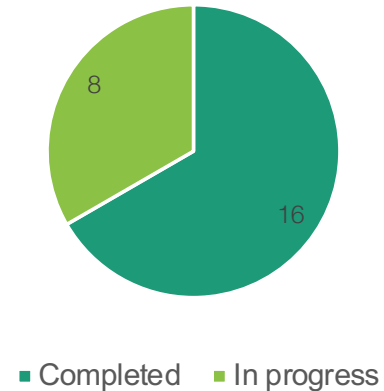
OPNFV Developer Community Growth



Arno vs. Euphrates Timeframe



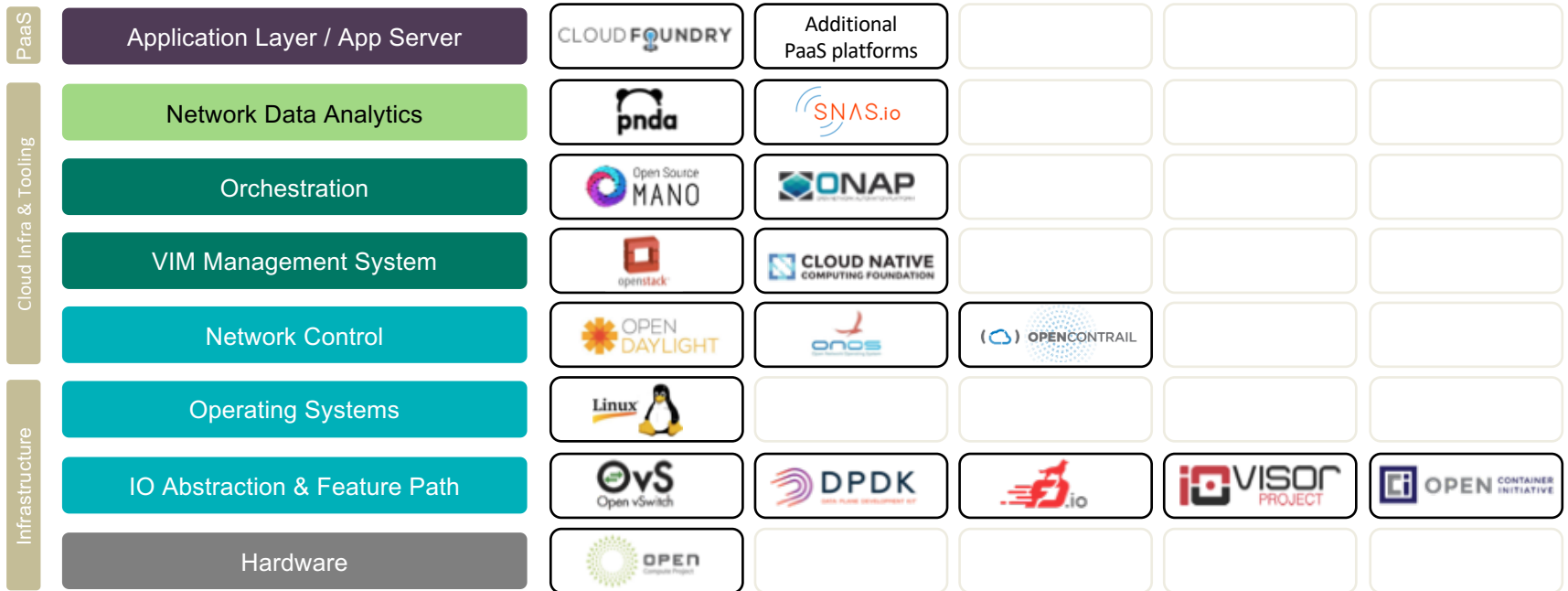
Intern projects (since program launch in Q1'2016)



Create.Compose: A typical workflow



Open Source Building Blocks



Composing the NO-STACK-WORLD



Application Layer / App Server

Network Data Analytics

Orchestration

VIM Management System

Network Control

Operating Systems

IO Abstraction & Feature Path

Hardware

Evolve/Integrate/Install/Test

- Compose
- Deploy
- Test
- Evolve
- Iterate



The "No-Stack-Developer"



OPNFV

Infrastructure – Distributed Labs (Pharos Project)



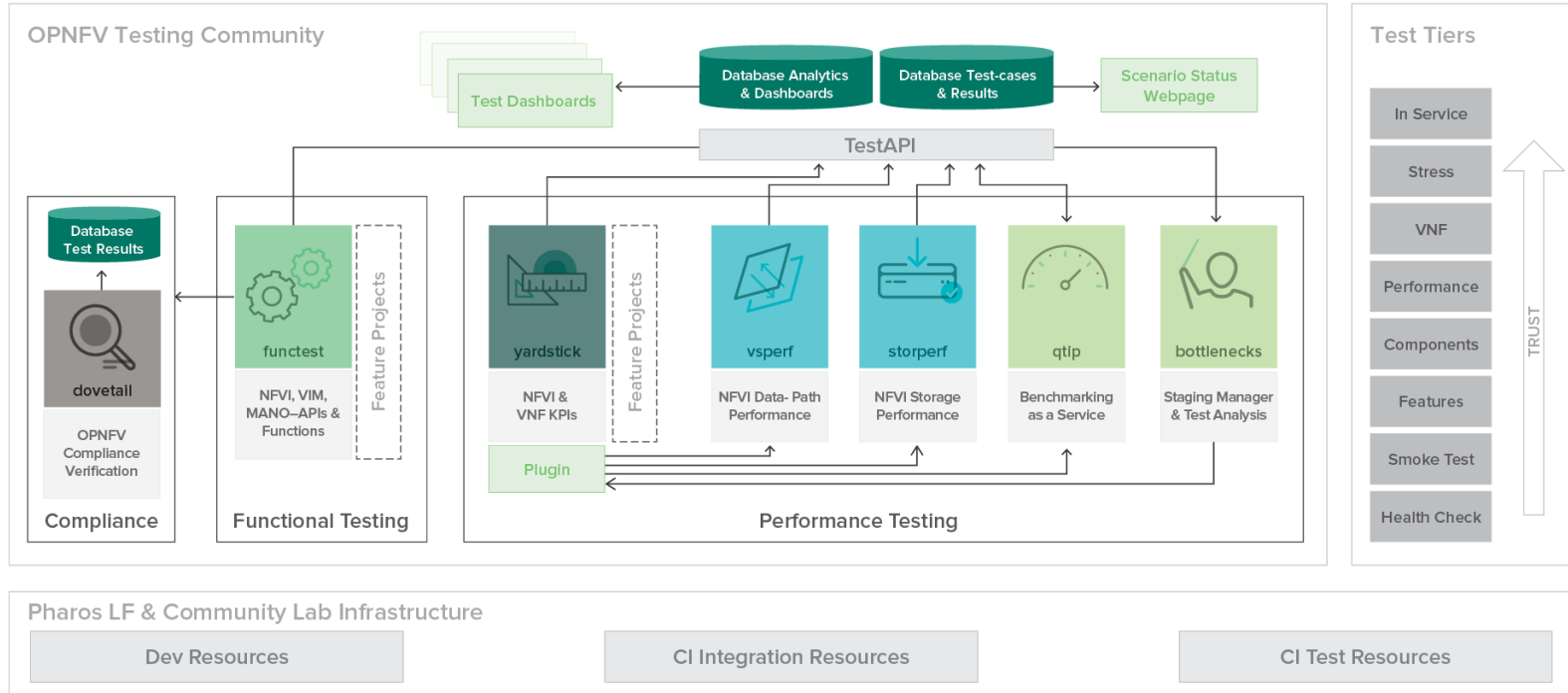
- Facilitates collaborative testing
- Ensures OPNFV applicability across architectures, environments and vendors
- Creates more robust, interoperable releases
- Pharos Lab-as-a-Service (LaaS) to perform a virtual deployment of OPNFV
- XCI Sandbox where developers and testers can create a virtual environment with the latest upstream code



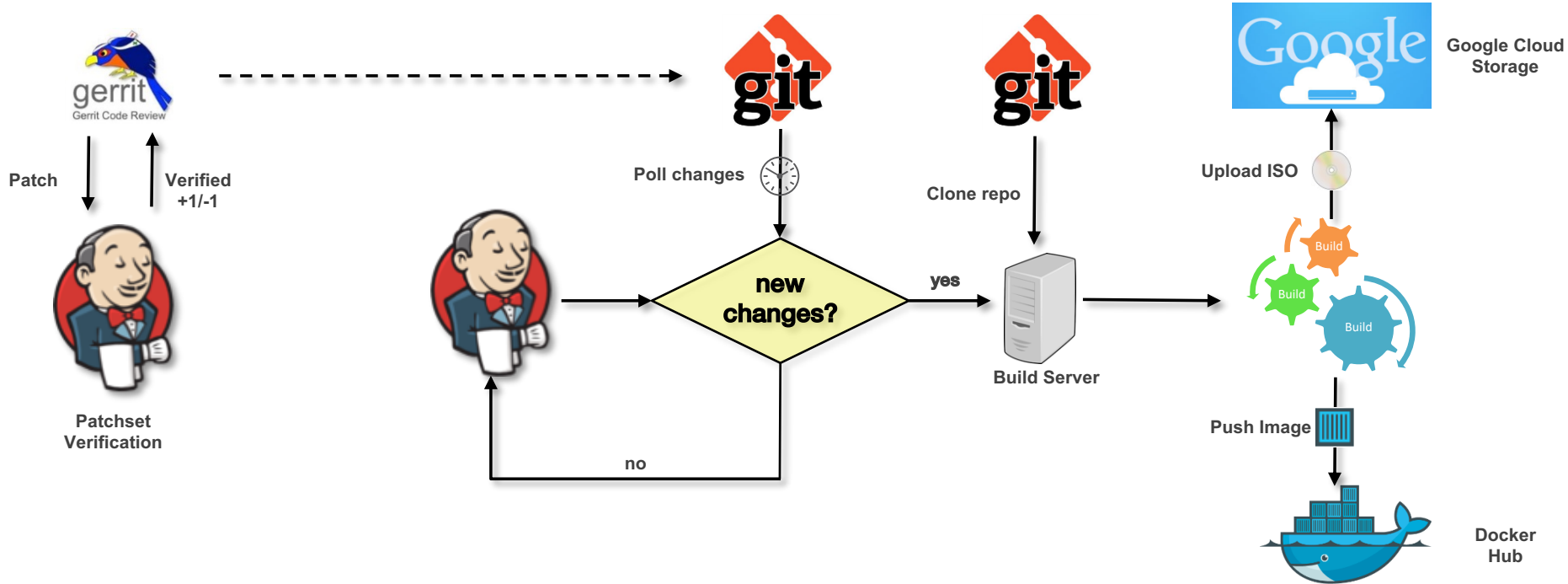
<https://www.opnfv.org/community/projects/pharos>

<https://wiki.opnfv.org/display/pharos/Pharos+Home>

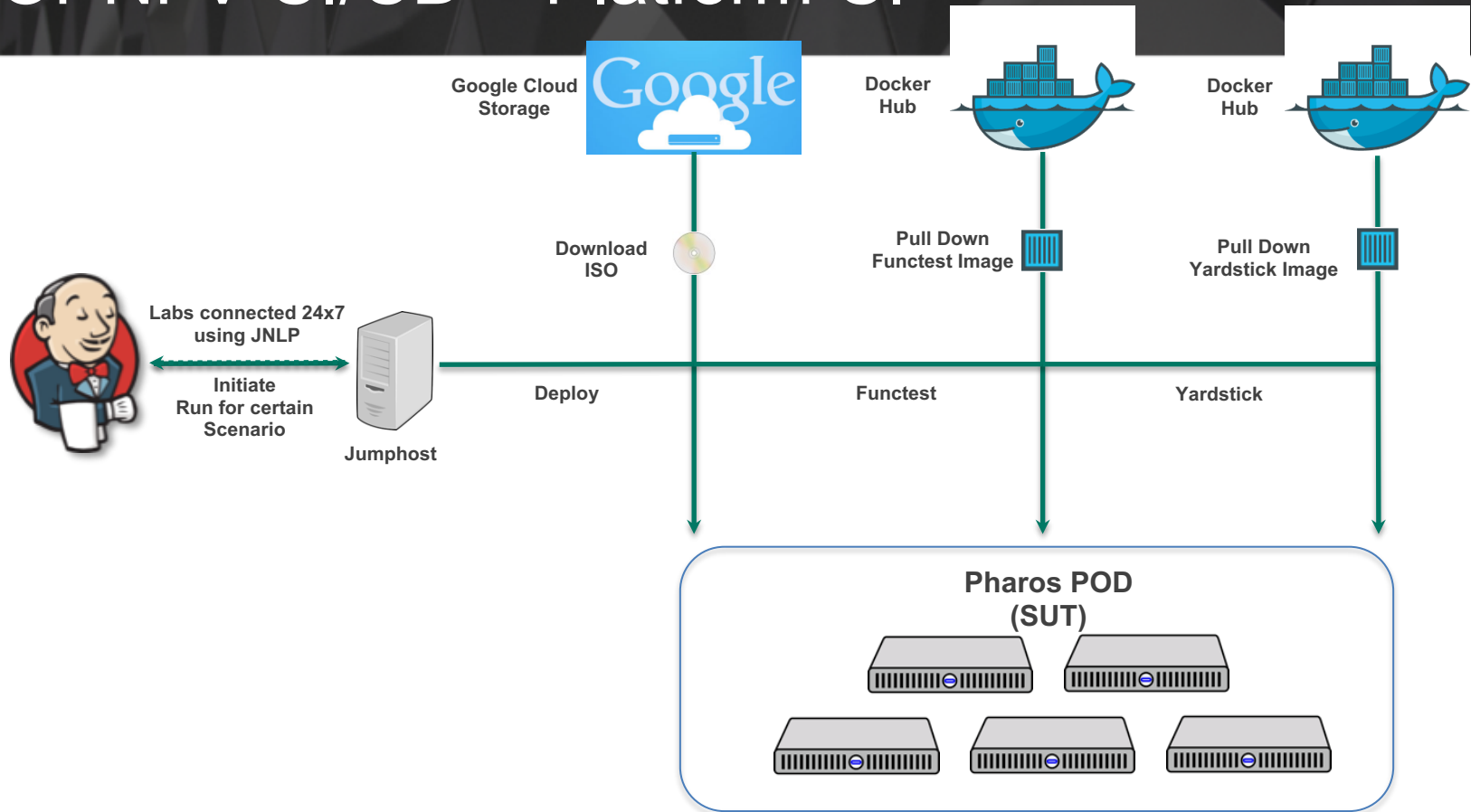
OPNFV Testing Community



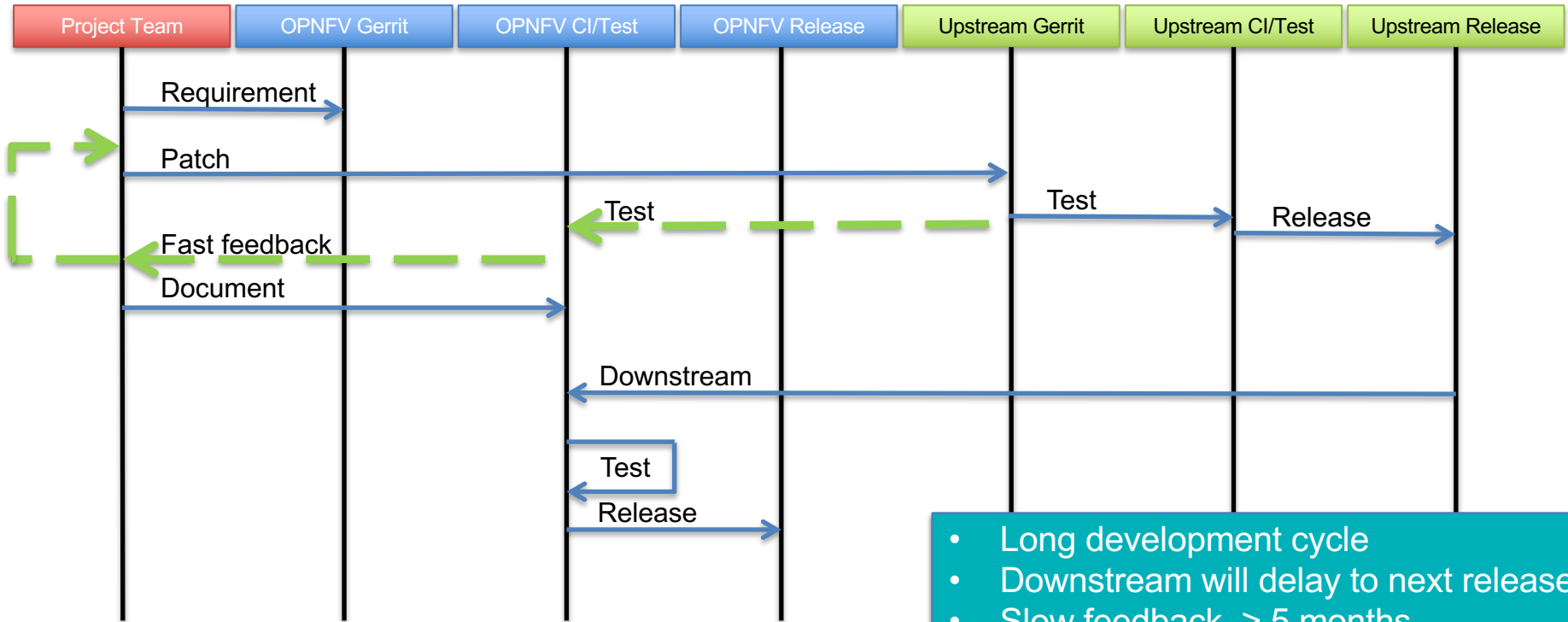
OPNFV CI/CD – Project CI



OPNFV CI/CD – Platform CI



OPNFV Development Workflow



- Long development cycle
- Downstream will delay to next release
- Slow feedback, > 5 months
- OPNFV specific issues cannot be tested/detected in time

Cross-Community Continuous Integration (XCI)



- System level integration testing and creation of NFV reference platform
- Empowers innovation by increasing collaboration between OPNFV and upstream communities
- Facilitates development and integration of open source components
- Regularly integrates the latest from each supported branch of select upstream projects, slashing the time to implement new features and address bugs from months to days.
- <http://docs.opnfv.org/en/latest/infrastructure/xci.html>

OPNFV Verified Program



- ***Announced Feb 6, 2018***
- Demonstrates the readiness and availability of commercial products based on OPNFV
- Uses an open source platform as referent to measure compliance of commercial products—a new and innovative step for the industry
- Automated test suite developed by the OPNFV community
- Initial version tests NFVI and VIM
- Supports both self-testing and third-party lab testing
- Expands market for OPNFV-based infrastructure and applications



OPNFV Verified Program



- Key Benefits of Vendor Participation
 - Shorten sales cycle and equipment acceptance times by demonstrating compliance to standardized baselines.
 - Improve the quality of infrastructure products by verifying hardware and software platform interfaces and components in unison.
 - Reduce test costs by leveraging pre-canned test content that can be incorporated into CI/CD tool-chains.



OPNFV Verified Program



- Key Benefits of Service Provider Participation

- Accelerate deployments by ensuring component interoperability and reducing adoption risk.
- Reduce time to qualify NFV building blocks through baseline compliance and focus on validating specific features.
- Alleviate integration risks when using a blend of open source and commercial products.



OPNFV Verified Program



- Get Started Today:
 - Overview Page: <https://www.opnfv.org/verified>
 - Portal: <https://verified.opnfv.org>
 - Questions: verified@opnfv.org



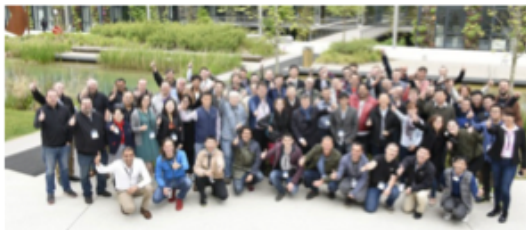
OPNFV Plugfests



May 9-13, 2016 at CableLabs in Louisville, CO



December 5-9, 2016 at UNH in Durham, NH



April 24-28, 2017 at Orange in Châtillon, France



December 4-8, 2017 at Intel in Hillsboro, OR

OPNFV Plugfests



- Held twice per year after each OPNFV major release (4 to date)
- Opportunity to meet and work with key PTLs
- Includes Hackfests with various OPNFV projects, especially testing projects
- Regular participation from non-members (including service providers)
- Participation has grown significantly (104 in December 2017)
- Next Plugfest to be co-located with ETSI, June 4-8, Sophia Antipolis, France

OPNFV Plugfests



- December Plugfest Highlights:
 - Access to 14 PODs (6 on-site) from 8 organizations
 - Container orchestration
 - VNF onboarding, cross-community CI (XCI)
 - Impact of noisy neighbors on performance
 - Service function chaining (SFC)
 - Intel Purley hardware
 - Testing projects (Dovetail, NFVbench, Yardstick, VSPERF and Storperf)
 - December 2017 Plugfest Report Now Available:
<https://www.opnfv.org/resources>



Coming up for OPNFV



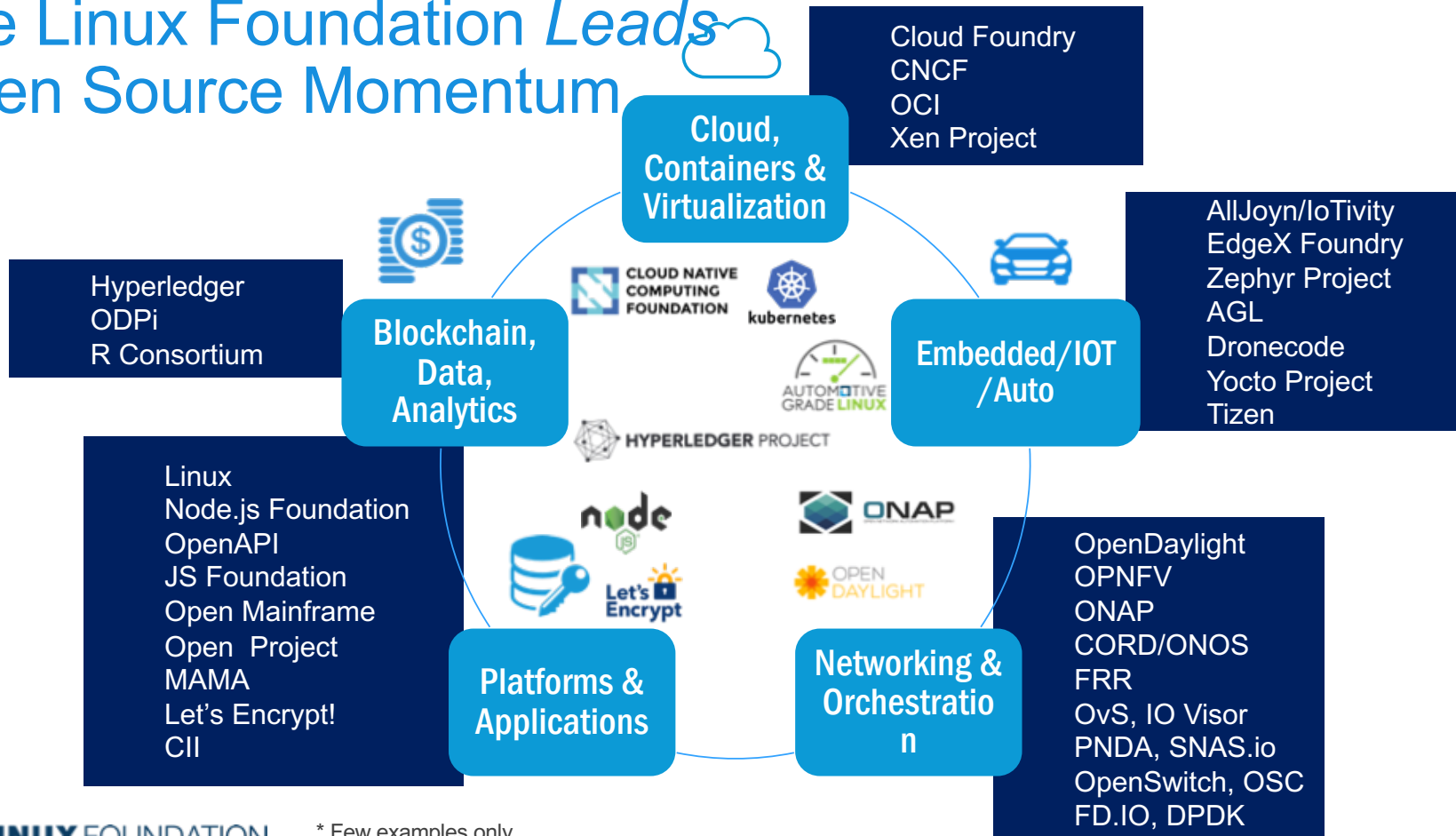
- OPNFV Lab-as-a-Service Initial Roll-out (March)
- ONS North America (March 26-29, Los Angeles, USA)
- OPNFV Fraser Release (April)
- OPNFV/ETSI Plugfest (June 4-8, Sophia Antipolis, France)
- VCO 2.0 Demo (1H2018 TBD)
- ONS Europe (September 15-27, Amsterdam, Netherlands)
- OPNFV Gambia Release (November)
- 2H2018 Plugfest (Location/Date TBD)

A background graphic featuring a network of glowing blue lines connecting numerous yellow circular nodes, set against a dark blue gradient background. The nodes and lines are scattered across the frame, with a higher density on the right side.

LF Networking Overview

 THE **LINUX** FOUNDATION

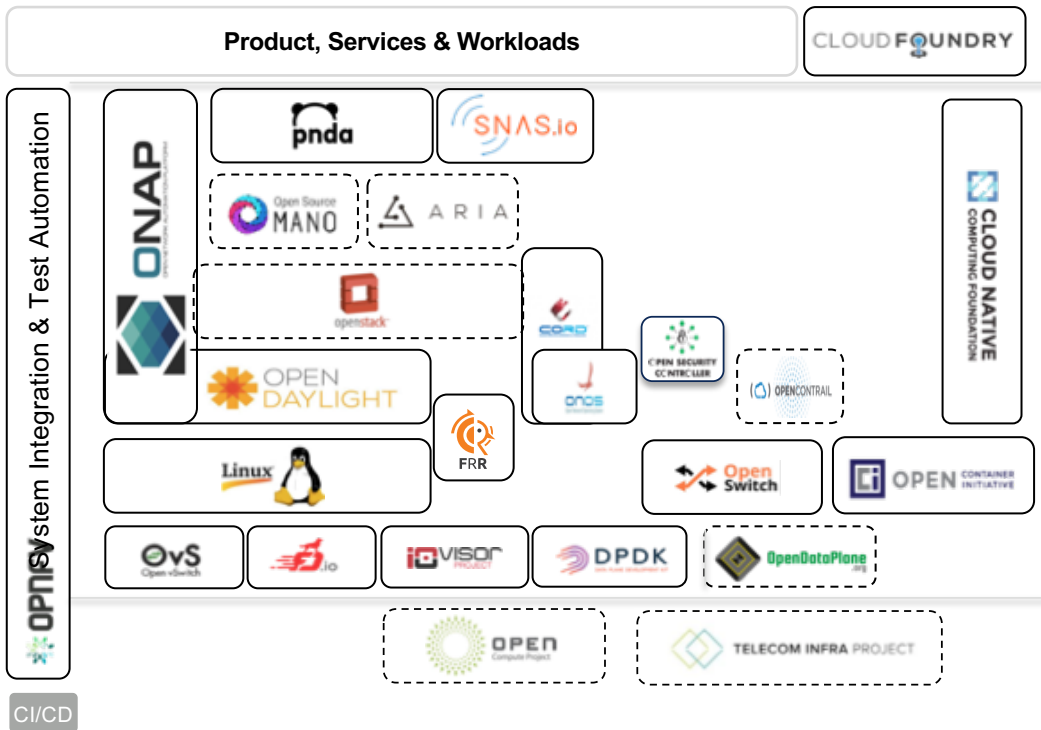
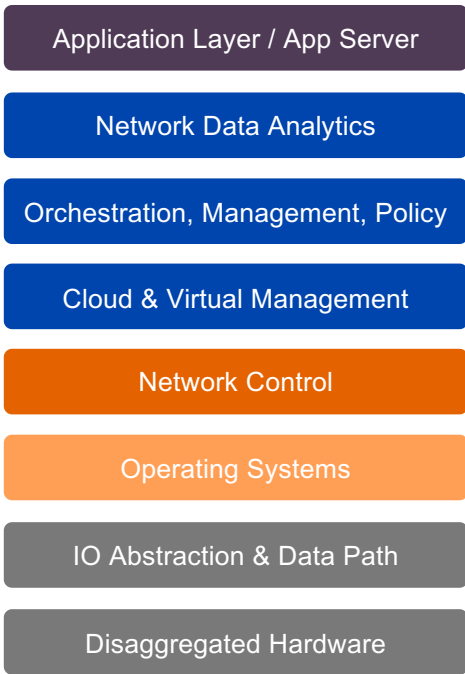
The Linux Foundation *Leads* Open Source Momentum



Open Source Networking Landscape

Linux Foundation Hosted
 Outside Linux Foundation

Services
 Software
 Infrastructure



Introducing LF Networking

Governance Integration + Technical Independence

 **LF** NETWORKING

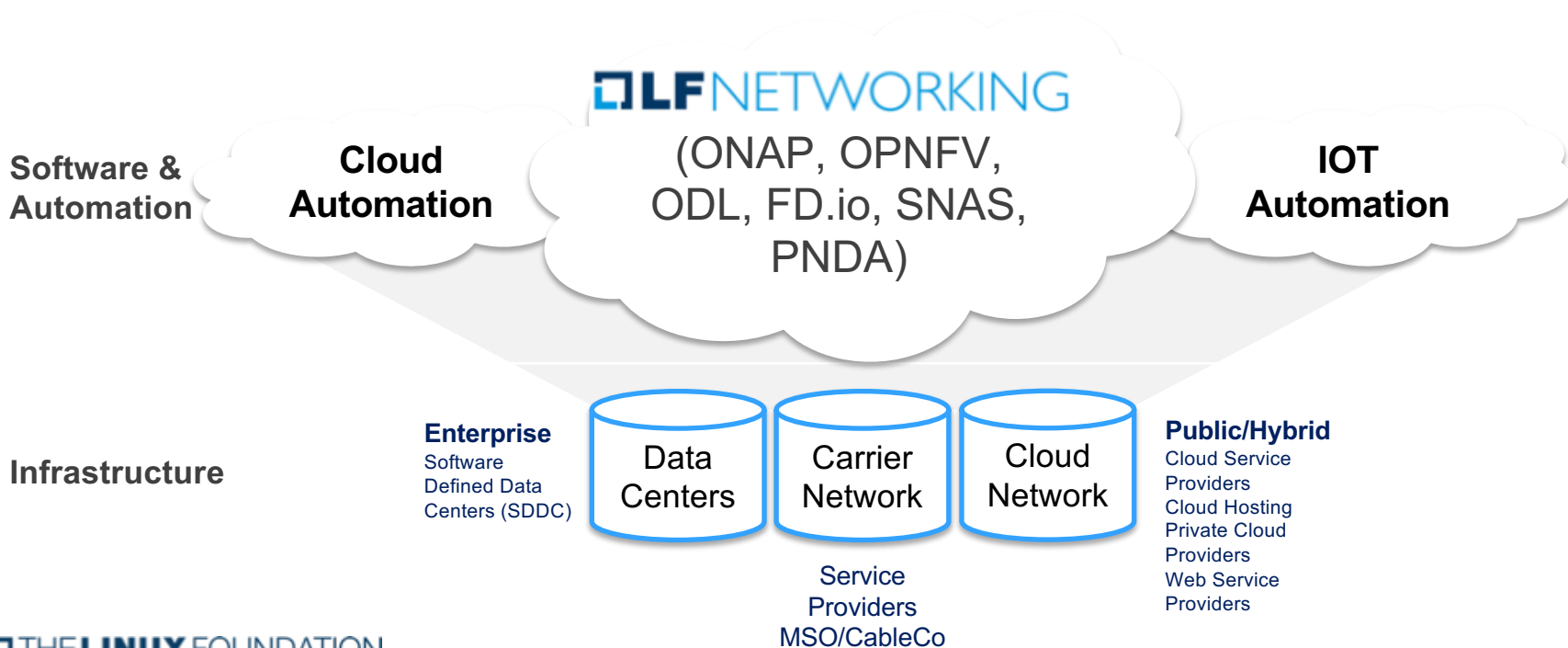
 **THE LINUX** FOUNDATION

Open Source and The LF: Foundation for Rapid Innovation

- › For carriers and service providers: open source = foundation of 5G and beyond
- › For enterprises and cloud providers: next-generation private/public/hybrid cloud networking & orchestration
 - › VMs, Containers, or the next technology not yet imagined
- › LF networking projects separately have each dramatically accelerated networking innovations over the past 5 years
 - › Deployed at scale in major carriers and cloud providers around the globe
- › Together, they will enable data networking advancements at an unprecedented rate for decades to come

Vision: Automating Cloud, Network, & IOT Services

Services **Cloud Services** Residential Services Enterprise Services IOT Services



Founding and Future

Founding projects



Future additions & Examples

- › Voluntary opt-in via approval by the board of the new project
- › Governance alignment
- › Examples of Cross-Project Architecture
 - › VNF on-boarding
 - › End to End Lab Testing
 - › CI/CD Efficiencies
 - › OpenStack Dependencies
 - › Kubernetes Integration
 - › SDO Collaboration
 - › Multi-Cloud Integration

Portfolio Introduction

Design, creation, orchestration, automation, and life cycle management of networks

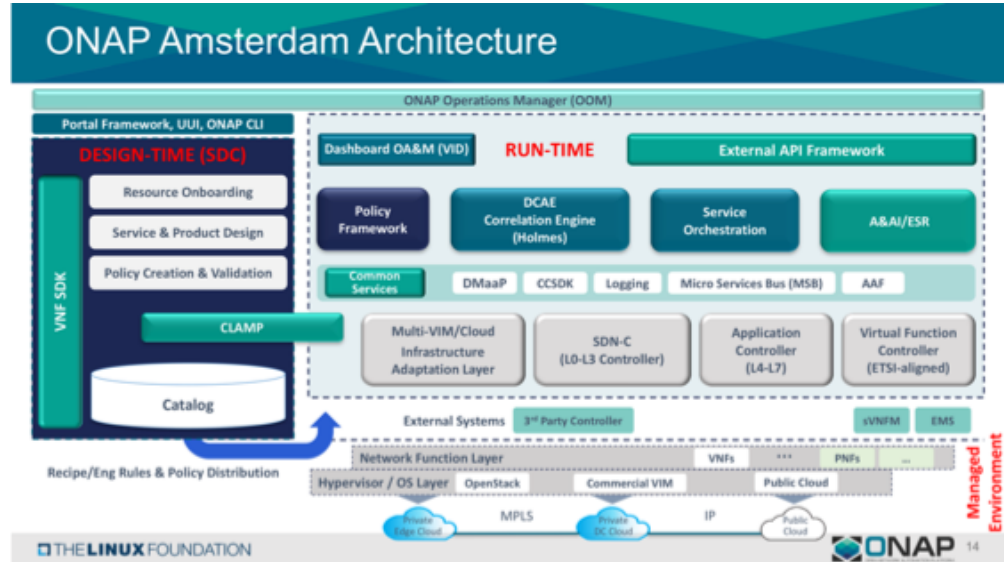
Project launched March, 2017

Number of contributing organization s in 2017 22 – Total Members 60 (Top 10: AT&T, Huawei, ZTE, Amdocs, Intel, China Mobile, VMWare, Bell Canada, Orange, Tech Mahindra)

Number of releases 1

Planned releases in 2018 Beijing (May) & Casablanca (November)

Number of Projects 30



ONAP is the de-facto automation platform for 60% of Global Subscribers

Portfolio Introduction

Open source SDN controller, widely deployed globally

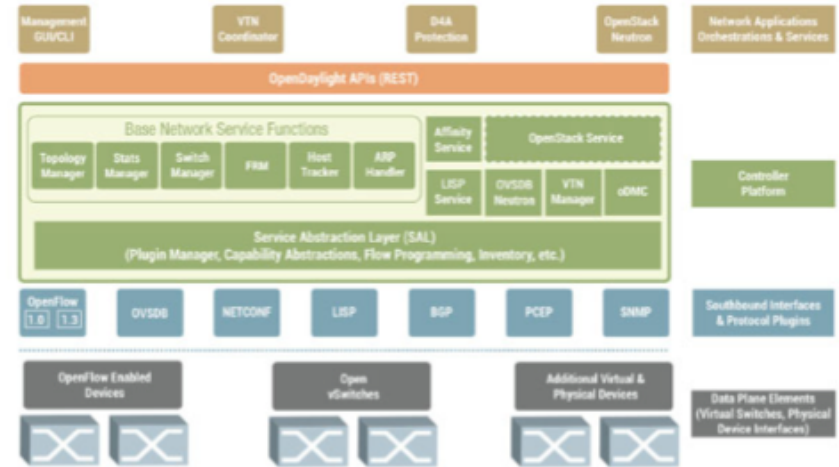
Project launched April, 2013

Number of contributing organizations in 2017 15
(Top 10: Cisco, Red Hat, Ericsson, HPE, Inocybe, Brocade, ZTE, Lumina, HCL, 6Wind)

Number of releases 7

Planned releases in 2018 Oxygen (March) + Fluorine (September)

Number of Projects 82



- **Supports ~1B global Subs in production**
- **Most popular controller for hybrid and brownfield transition to SDN**
- **Carrier, Cloud and Enterprise use cases**

Portfolio Introduction



Open Source high-performance IO services framework for dynamic computing environments

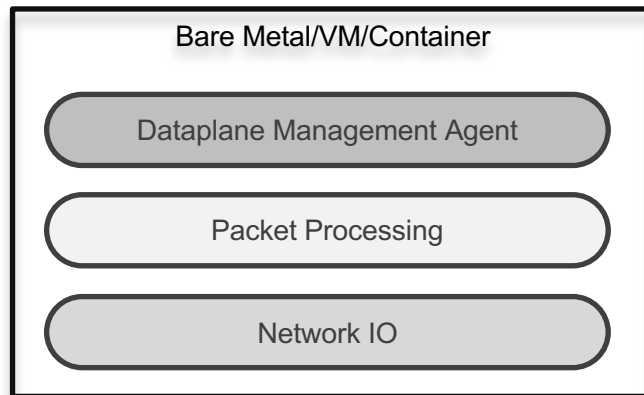
Project launched February, 2016

Number of contributing organizations in 2017 52 organizations
217 Contributors

Number of releases 5

Planned releases in 2018 18.01 (January) + 18.04 (April) + 18.07 (July) + 18.10 (October)

Number of Projects 17



- **Network IO, Packet Processing, Dataplane Management Agents**
- **Commercial Ready**
- **Breaking Terabit barrier, winner of L123 innovation award**

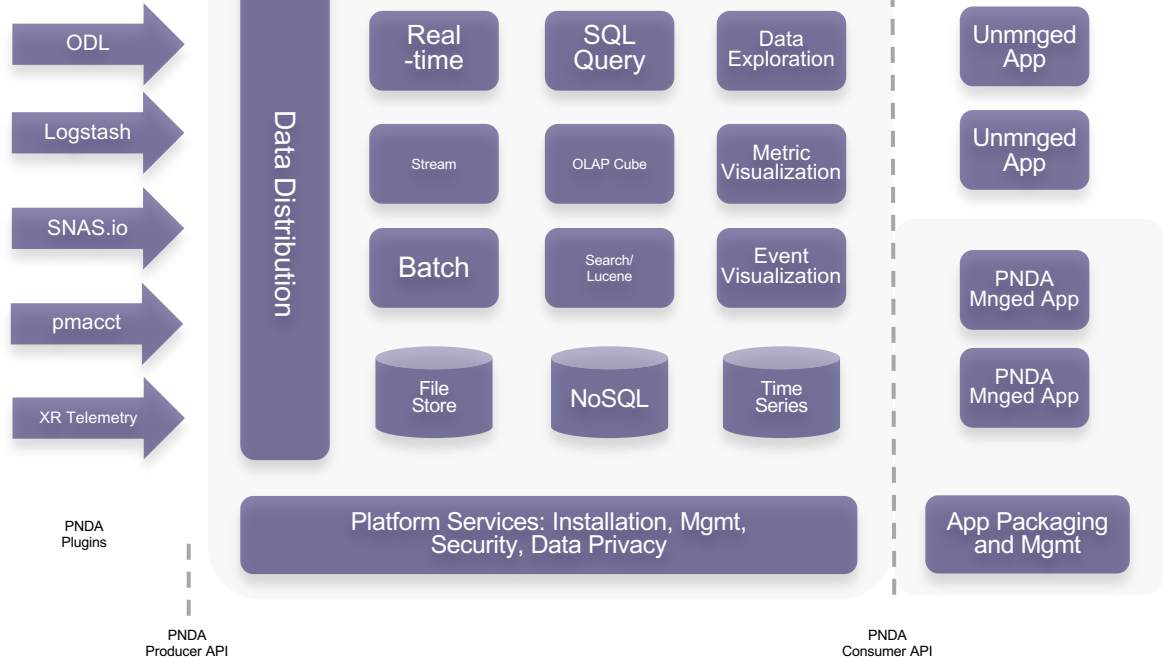
Portfolio Introduction



PNDA: Data Analytics

<https://github.com/pndaproject>

- Open big network data analytics platform
- Provides a common set of services for developing network analytics applications
- Decouples data aggregation from data analysis
- Leverages best current practice in big data analytics for network applications



Portfolio Introduction

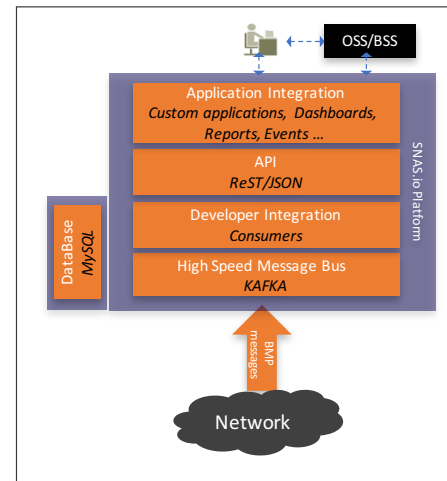
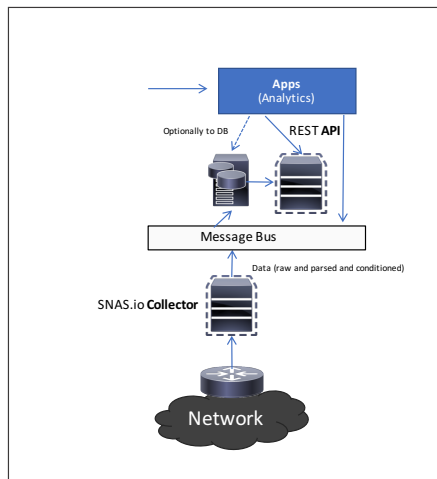


Predictive Network Analytics

Streaming Network Analytics System (project SNAS) is a framework to collect, track and access tens of millions of routing objects (routers, peers, prefixes) in real time.

<https://github.com/OpenBMP>

- Open platform for streaming, storing, and providing live routing and load data to SDN applications
- Decouples network from network applications
- Identifies changes, performs de-duplication, conditions data
- Enables microservices applications



Founding Platinum Members



Founding Gold & Silver Members

Gold



Silver (51)





Thank You!

Please direct any questions or comments to info@opnfv.org or lfn-info@linuxfoundation.org.