Open Source Networking Software

Case studies and Roundtable

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GM, Networking

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Industry Progress towards Harmonization

1. Recap of Software Stack
2. Technical Collaboration
3. Bringing Global Community together
4. Deployment plans
5. Test & Certification Unification
6. Standards Collaboration
7. Beyond Telecom

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Open Source Networking Landscape
Linux Foundation hosts 9/10 Top projects

Linux Foundation Hosted

Outside Linux Foundation

Services

Application Layer / App Server

Network Data Analytics

Orchestration, Management, Policy

Software

Cloud & Virtual Management

Network Control

Operating Systems

Infrastructure

IO Abstraction & Data Path

Disaggregated Hardware

Product, Services & Workloads

CLOUD FOUNDRY

OPNFV System Integration & Test Automation

CI/CD

ONAP

pnda

SNAS.io

Open Source MANO

ARIA

openstack

CORD

ONOS

OPEN DAYLIGHT

OPEN SECURITY CONTROLLER

OPENCONTRAIL

FRR

Linux

Open Switch

OPEN CONTAINER INITIATIVE

OvS Open vSwitch

fd.io

VISOR PROJECT

DPDK

OpenDataPlane.org

OPEN Compute Project

TELECOM INFRA PROJECT

CLOUD NATIVE COMPUTING FOUNDATION

Standards

tmforum

ITU

MEF

NIST

ONF OPEN NETWORKING FOUNDATION

IETF

ETSI World Class Standards

IEEE 802

CableLabs

3GPP

OIF

Automation of Network + Infrastructure + Cloud + Apps + IOT

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Harmonization Beyond "Classic" Networking
Open Platforms are becoming de-facto standards

Network Automation Platform

Central Office Re-design Platform

Cloud Automation Platform

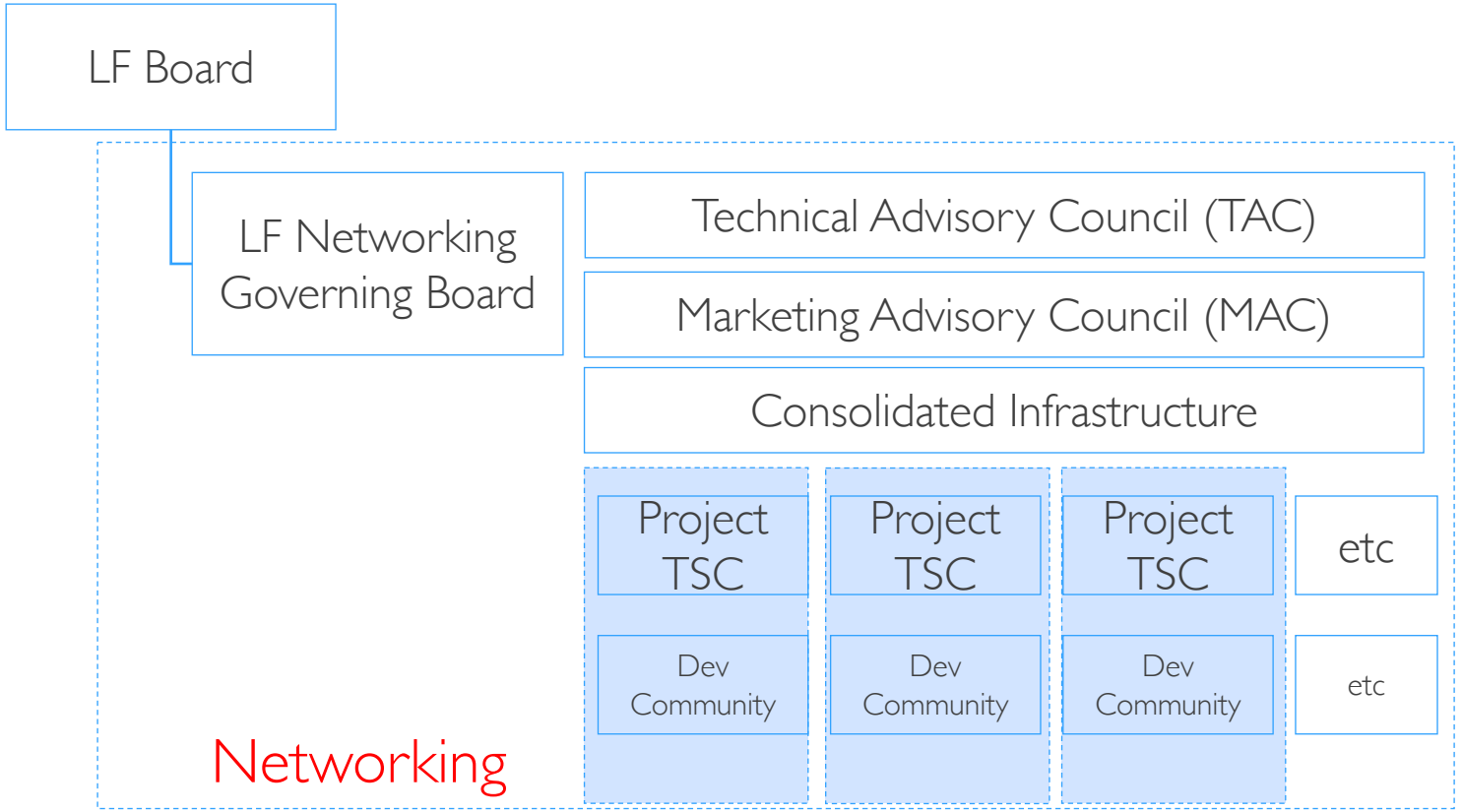
IOT Automation

Cloud Native App Platform

Blockchain Platform

AI Platform

LF Networking Structure Overview, effective Jan 1 2018



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

ONAP OPNFV OPEN DAYLIGHT .io pnda SNAS.io

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LFN: Bringing the Global Community Together: Ecosystem Leaders

LFN: Bringing Global Community Together

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ONAP Early Deployments, Building on ODL/OPNFV Foundation

AT&T

1. **Network on Demand** (today) with 100+ VNFs tested

2. **POCs with ONAP**
   + SON Use Case with LTE & physical boxes/Vendor A and ONAP modules (PNF+VNF)
   + RAN Use Case with Vendor

3. **CI/CD – ONAP**
   Pulling from ONAP into their internal environment
   Deploying it today with help from internal staff + vendors

中国移动 China Mobile

1. **NFV introduction case by case**
   Interworking with legacy PNFs/OSSs simultaneously
   Builds on NFVO orchestrator functionalities from ONAP (VFC, Multi-Cloud, A&AI, UUI)

2. **Reconstruct the whole network with a new DC-based infrastructure**
   Includes: units of TIC and SDN DCI connections, with components from ONAP, including (SDC, SO, SDNC, etc.) Ref: ONAP summit

orange

1. **PoC before Amsterdam**
   Q2-Q3 2017 vCPE
   Q4 2017 ONAP-MEF; 2 months already no issues
   Q4 2017 PCE Diversity Path (SDN-C for E2E connectivity)

2. **Open Lab and PoC**
   Q4 2017 launching OpenLab with XCI R1 installation
   Q1 2018 PoC vIMS and vMRF
   Q2 2018 PoC vProbe and Core network VNF
   Q3 2018 Field trial

ONAP Early Deployments, Building on ODL/OPNFV Foundation

Bell **In Production**

1. “As a member of ONAP, we look forward to working with our international partners to begin the implementation of Version 1 later this year"

2. "We also look forward to the integration of the ONAP Operations Manager expected in the spring."

3. Modularity Usage from ONAP including SDC, SO, SDN-C, A/AI, DCAE

vodafone

1. Analyzing elements of ONAP release for inclusion in “Ocean” transformation program

2. “Ocean” creates a global, automated service delivery platform using virtual elements (incl SDN/NFV) to deliver new services faster in both Core network and Enterprise markets

3. Modular use of ONAP enables common approach to virtual function onboarding control and service definition

Other Major Carriers/Vendors

1. POC with Amsterdam in DCs that need to be ready for 5G (multiple)

2. Modular Usage of ONAP platform
   - Multi-VIM for IT, Networking and cloud integration
   - DCAE closed loop automation for DC-DC optical traffic
   - MSFT Workloads (eg Exchange)

3. VoLTE (including vEPC, vIMS)
   - Commercial vEPC, vIMS VNFs, SDN controllers, cloud software

4. Vendor Announcements (from 11/3)
   - Fujitsu – Service on Demand
   - Amdocs - Virtualized intercarrier Service Orchestrator

ONAP Early Deployments, Building on ODL/OPNFV Foundation

中国电信 CHINA TELECOM

1. **OpenLab Amsterdam**
   Setup vCPE and VoLTE use case built on current OpenLab resource

2. **ONAP introduction in the next generation operation system**
   Introduce ONAP automation platform into our operation system design and POC

3. **Introduce More SDN/NFV capability into ONAP**
   Contribute our SDN/NFV consideration and network capability into ONAP, enhance SDNC, SO, A&AI, etc.

verizon

1. **SDN/NFV journey** and push for intelligence and automation.
2. **Why ONAP**
   Post multiple fragmented efforts, industry harmonization is finally happening and it is also pulling standards along with it.
3. **Key focus areas**
   - Simplify and accelerate onboarding & interop of network functions
   - Greater agility in network management, service creation and provisioning
   - Drive reference standards to vendors and partners for consistent deployment

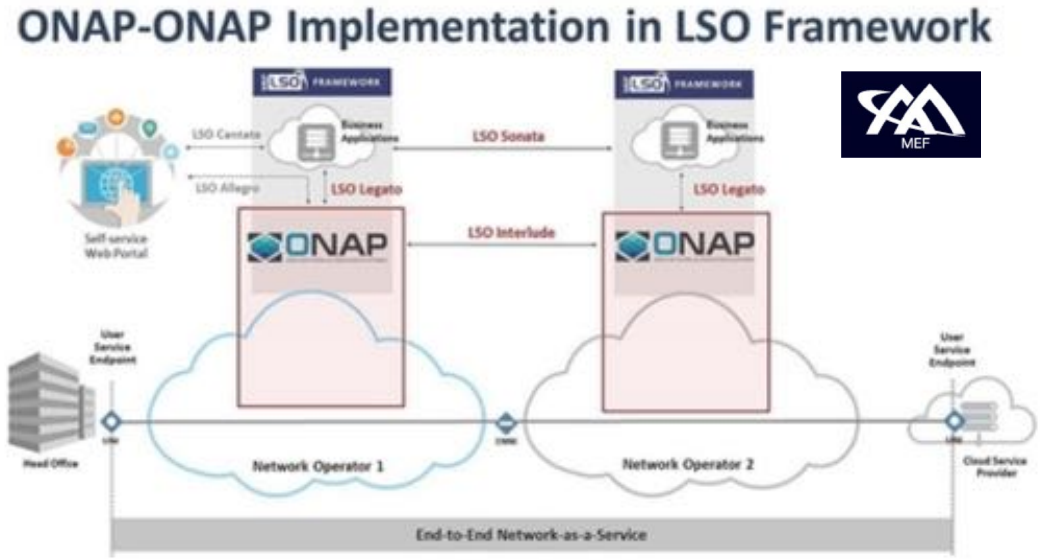
Other Major Carriers/Vendors

Q1 updates

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

SDO+OSS: First Major Collaborative Effort, Enabled by LF



ONAP and TM Forum to advance automation

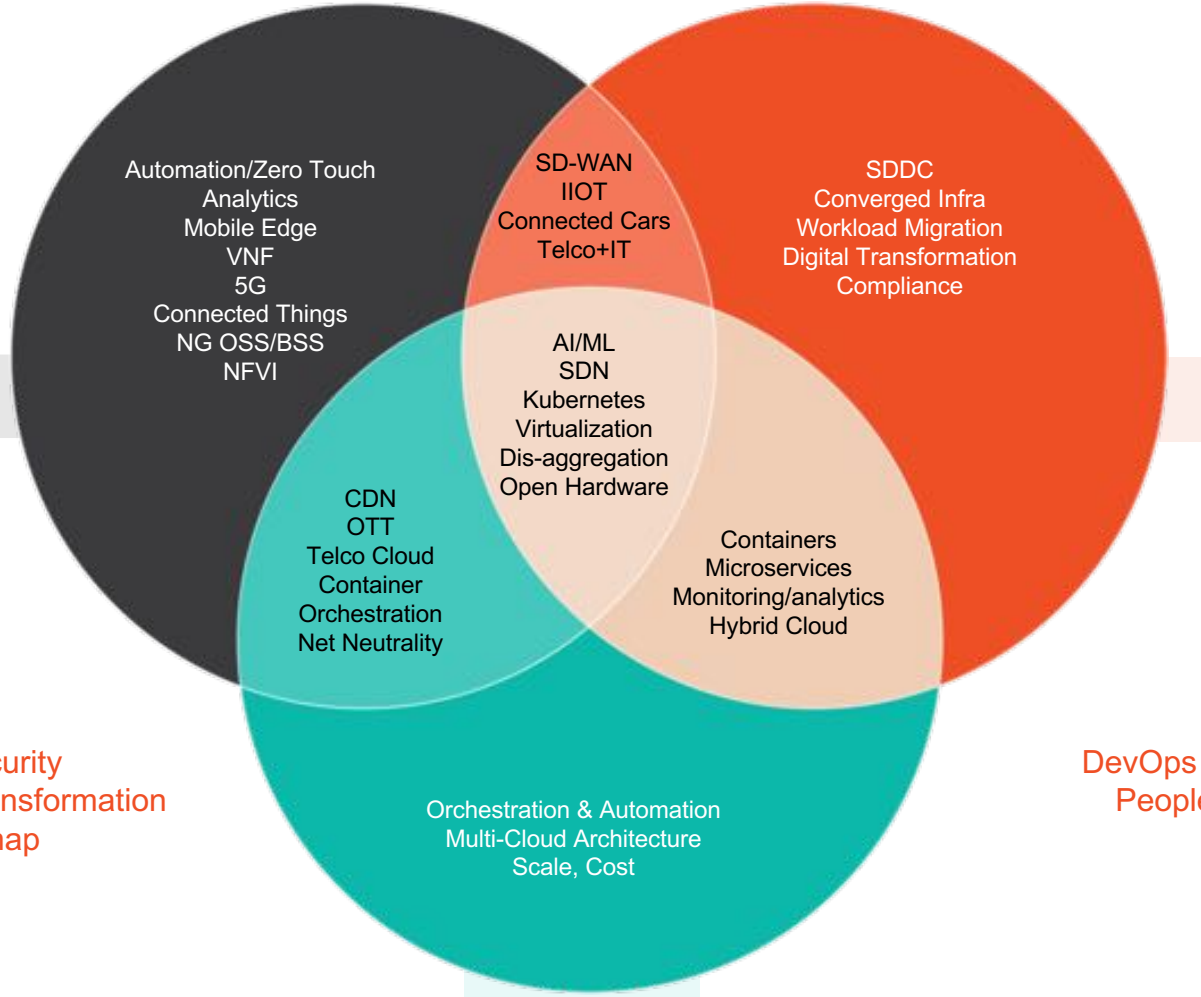
tmforum

Several SDO study groups initiated with ONAP/LFN
3GPP, ETSI, ITU… more details at ONS2018

3GPP ITU ETSI World Class Standards ONF Open Networking Foundation IETF

Open Networking Summit- March 26-29
Discount code: ONSOCS18

Adjacent Technologies at ONS



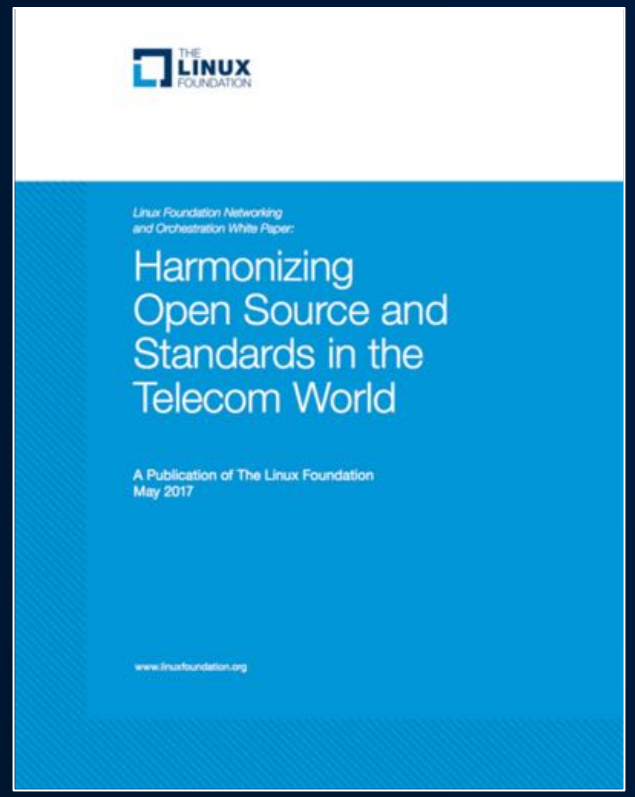
SERVICE PROVIDERS

ENTERPRISES

CLOUD

High Availability + Scalability + Security
Architecture + ROI + Business Case + Transformation
+ Migration + Learnings + Roadmap

DevOps + NetOps + SysOps + SecOps
People + Process + Best Practices



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