



# Open Source in Networking

An Ecosystem Update  
ONF Connect 2019

Roy Chua




**If Software is Eating the World, and  
Open Source is Eating Software,  
is Open Source Eating the World?**





# What Open Source Likes to Eat



Proprietary  
Hardware



Proprietary  
Software



People?



# Types of Open Source



## HW Design/Architecture/Platform

OCP OpenRack, TIP, RISC V



## SW Architecture

Lean NFV, MEF LSO



## Language

P4



## Components/Libraries/SDK

DPDK, FD.io/VPP



## SW Platforms

OpenStack, OvS/OpenSwitch, ONOS, ODL, ONIE, Stratum



## Applications

FreeRange Routing, Quagga, XORP, SNORT



## Protocols and APIs

OpenFlow, MEF LSO - Sonata



## Reference Implementations

Code, Platforms  
OPNFV, MEF LSO, SEBA, COMAC



# Evolution of Open-Source in Networking

## Pre-SDN Era

Apache httpd, lynx, gopher, wu-ftp  
BIN, SSH + bunch of UNIX daemons  
Quagga, XORP  
Snort/BRO, ipfw, iptables etc

## SDN

OpenFlow, Mininet, Beacon, NOX, POX  
Floodlight, ODL, ONOS  
OpenStack Neutron

## vSwitches/vRouters/ Network Virtualization

OVS/OVN  
OpenSwitch  
Quagga, FreeRange Routing

## NFV/Edge

OpenStack  
DPDK, IOVisor, FD.io, VPP  
CORD/COMAC/SEBA/OMEC/VOLTHA  
StarlingX/Akraino

## Orchestration

OSM  
ONAP  
MEF LSO

## Hardware disaggregation

SONiC, Stratum  
dNOS, DANOS  
ORAN



# Open Source in Networking Ecosystem

Some More Prominent Organizations



Apache Software  
Foundation



MEF



OpenStack Foundation



ETSI



Open Compute Project  
(OCP)



Telecom Infra Project  
(TIP)



Linux Foundation -  
Networking (LFN)

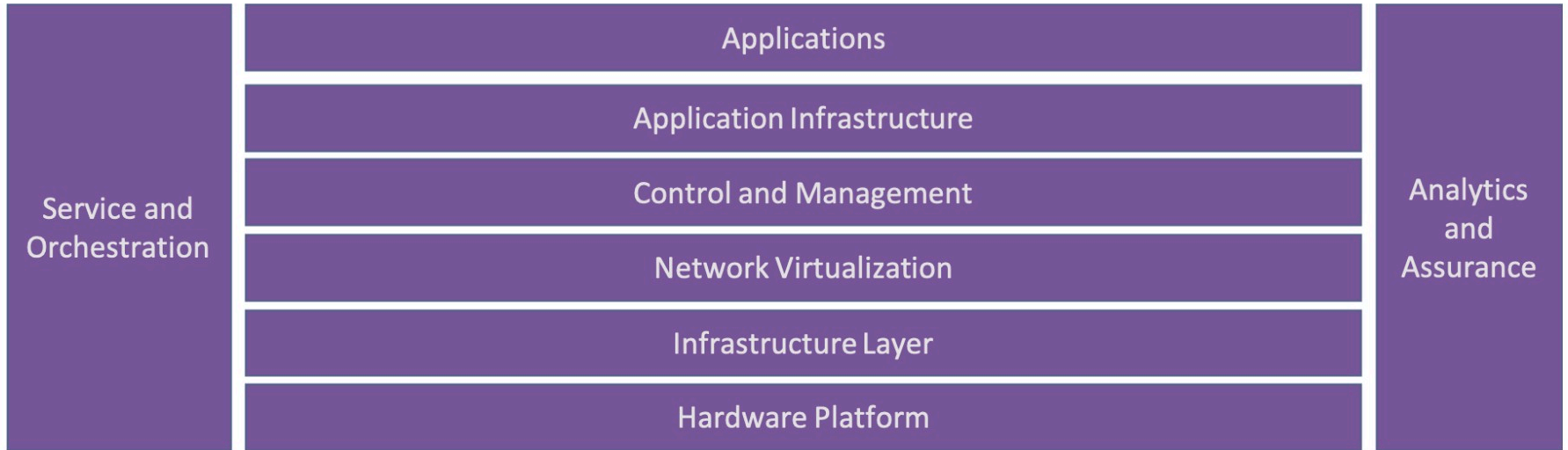


Open Networking  
Foundation (ONF)

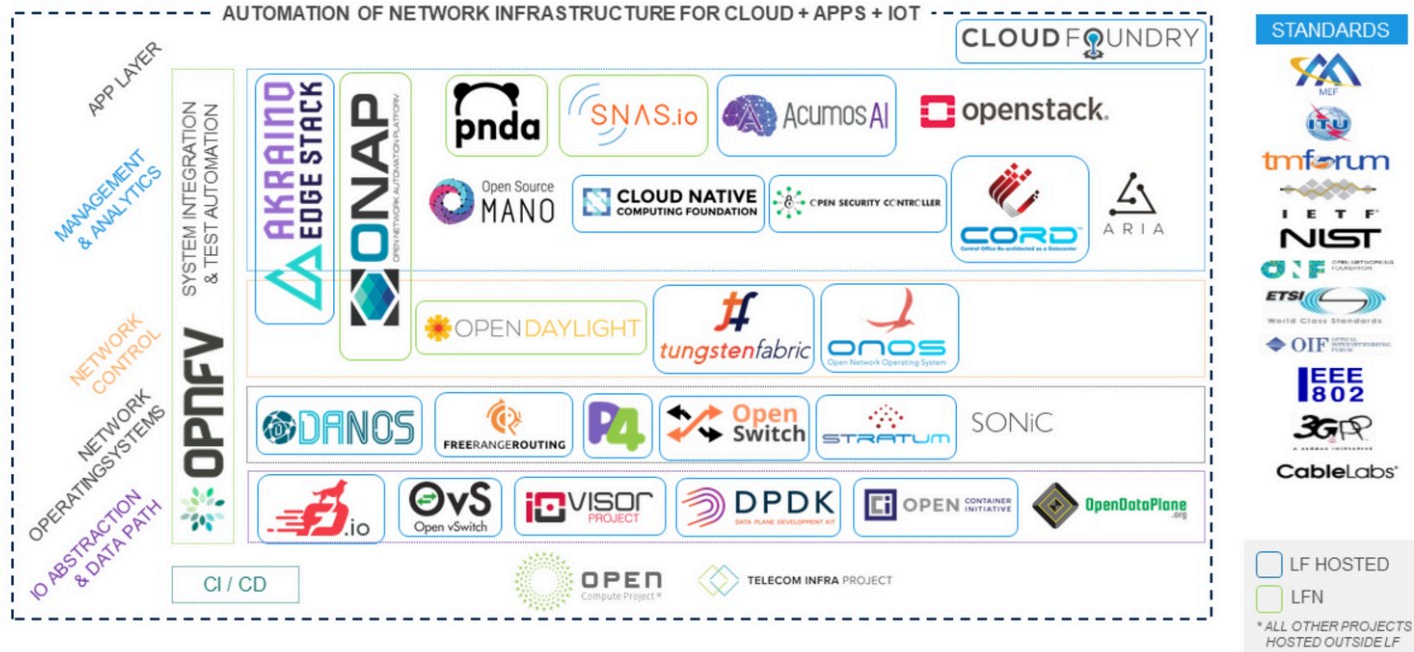
Plus many independent projects



# Layered View of Open Source in Networking



# Open Source/SDO Ecosystem - View from LFN

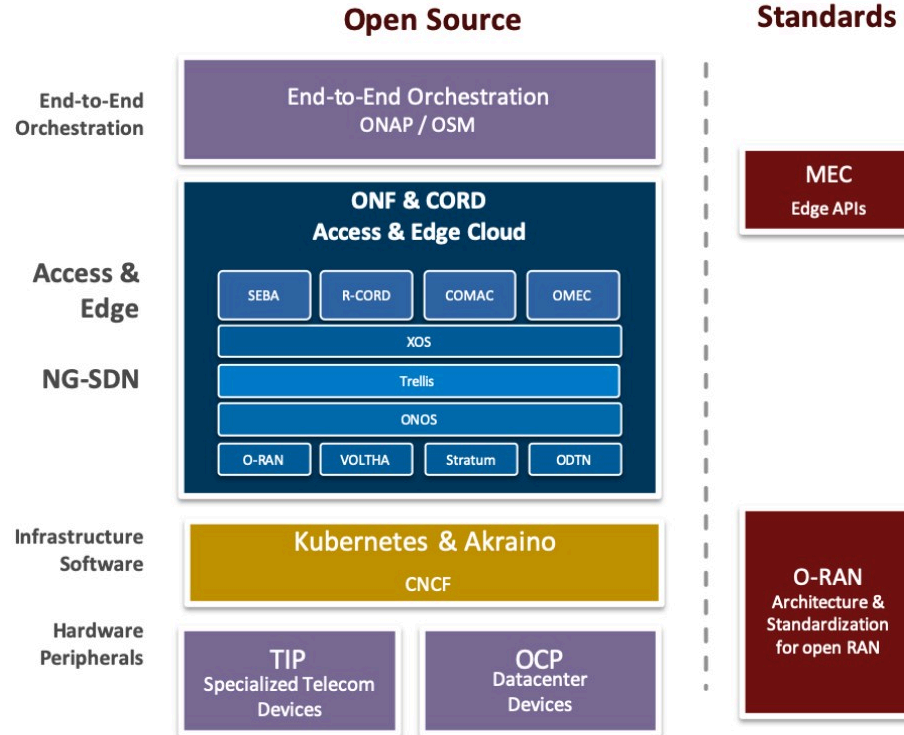


View from Linux Foundation (from Harmonization 2.0 paper) (slightly dated)





# Open Source Ecosystem - View from ONF



# Different Viewpoints

## Cloud Providers

Love open-source networking  
Taking advantage of it  
Sometimes give back

## Service Providers

Love open-source networking  
Trying to take advantage of it  
Figuring out how to give back (except for a few)

## Enterprise

Not sure how to deal with open-source networking  
Not sure how to take advantage of it  
Give what? (with exceptions)

## Vendors

Love/hate open-source networking  
Taking advantage of it?  
Sometimes give back



# A Problem with Open Source in Networking?

Where are the boundaries?

## Hardware Related

SONIC, ONIE, P4

## Orchestration

ONAP, OSM, Cloudify

## Security

BRO, Suricata, etc

## Automation

Ansible, Puppet, Chef, and more

## App Infra

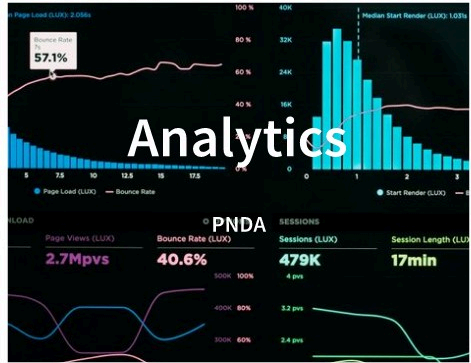
Service Mesh - Istio, Envoy, Linkerd

## Infrastructure

OpenStack, KVM, Network Service Mesh, Calico

FD.io VPP, DPDK

## Analytics



## and more...

kitchen sink - anyone?



# Timely Topics in Open Source

- **Dealing with a hundred (thousand) flowers**

- Keep track of projects

- One hit wonders

- Darwinism time

- Assisted pruning

- Selecting smartly

- **Role of standards today**

- Less of debate - but still ongoing

- When and where do standards come in

- Organic, ad-hoc versus structured

- Battle of code contributions

- **Independent developers and open-source organizations**

- Role of LF, ONF, MEF, ETSI

- Marketing vehicles

- Active communities

- Giving the independents voice

- **Absorptive capacity and contribution capability**

- Many organizations can't consume open-source

- Security and legal worries hold many back

- Organizations don't understand how to interact with and contribute back to open-source projects



# Where Do We Go From Here?

- **Continued scope expansion**

Data center

Campus

WAN (SD-WAN)

Public Clouds

Transport

Edge

- **Growth of vertical stack - up and down**

Containers and app infrastructure - service mesh

NICs/FPGA

Switches, Routers

Chips

- **Continued cross-org efforts**

Watch out for platitudes versus real cross-pollination and integration

More neutral parties - Intel, ARM, CSPs, cloud providers play role

- **Ecosystem will grow before it shrinks**

Waiting for the Kubernetes moment (when it all folds in)

Open-source orgs must cull and retire mature but projects past-prime (e.g. data center and NV stacks)

Meanwhile, dilution of resources, battle of egos, end-user confusion and Darwinian battles

Cloud providers can play key role - selecting winners

- **Momentum rules**

For most enterprises and CSPs, align with high-momentum projects

Ecosystem support important

Enterprises/CSPs not equipped to consume OSS directly should still choose OSS-based solutions (support, compatibility, feature velocity, potential portability)

Large scale CSPs and cloud providers still free to do what they want





# Thank You!

AvidThink.com  
@avidthink  
research@avidthink.com

Roy Chua (@wireroy)