

# SONA: SDN based OpenStack Networking

## Indonesia Open Infrastructure Day 2019

Zufar Dhiyaulhaq

Open Networking Foundation

Surabaya, 2 November 2019



L<sup>A</sup>T<sub>E</sub>X



Biznet



Mellanox  
TECHNOLOGIES



# Self Introduction

- Zufar Dhiyaulhaq
- ONF ambassador
- Cloud Engineer @ Btech
- Undergraduate Student @ Telkom University



ABOUT

REFERENCE DESIGNS

EXEMPLAR PLATFORMS

PROJECTS

SOFTWARE DEFINED STANDARDS

EXECUTIVE TEAM

TLT

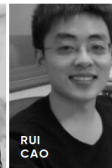
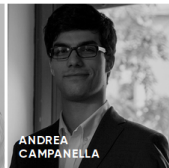
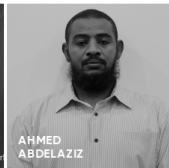
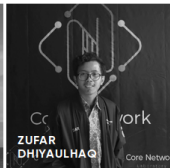
E-SAB

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LAB TEAM

AMBASSADORS

## The Ambassadors



# ONF: Operator Led Consortium



With 13+ additional operators at 'Innovator' level

## Collaborating to Address a Common Problem

Operators need cloud-like economics and agility

Incumbent vendors have not been providing open tools & cloud-like building blocks

# Operator Led - Curated Open Source Community

## ONF Introduction

ONF Solutions

## SDN Introduction

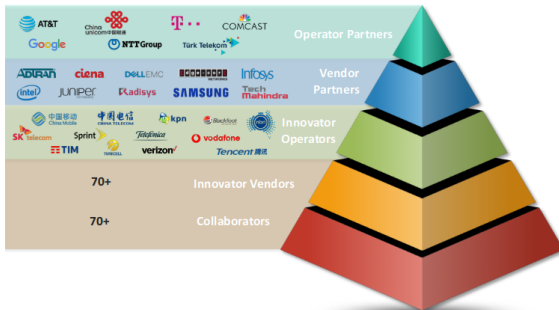
## Introduction to ONOS

Architectural  
principles  
Use Cases

## SONA

feature  
demo

Partners committed to disaggregation, open source and SDN/NFV/Cloudification



### ONF BOARD

	Andre Feutsch – CTO & ONF Chair
	Jochen Appel – VP
	Amin Vahdat – Fellow
	Dai Kashiwa – Director
	Rob Howald – VP
	Shao Guanglu – SVP
	George Tchapanian – CEO
	Yusuf Kirac – CTO
	Nick McKeown – Prof
	Guru Parulkar, Exec Dir

# CORD - Next Generation Edge Cloud Platform

## ONF Introduction

ONF Solutions

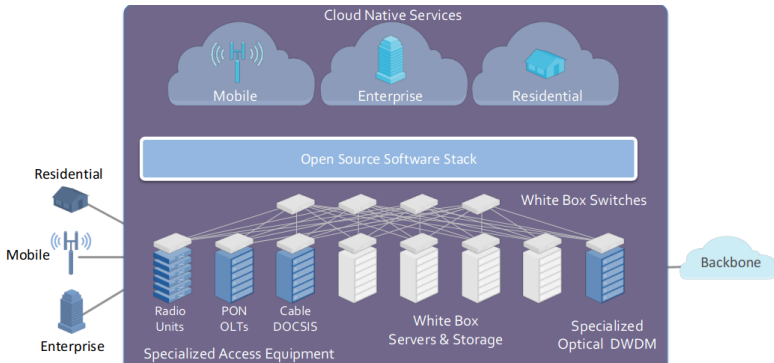
## SDN Introduction

## Introduction to ONOS

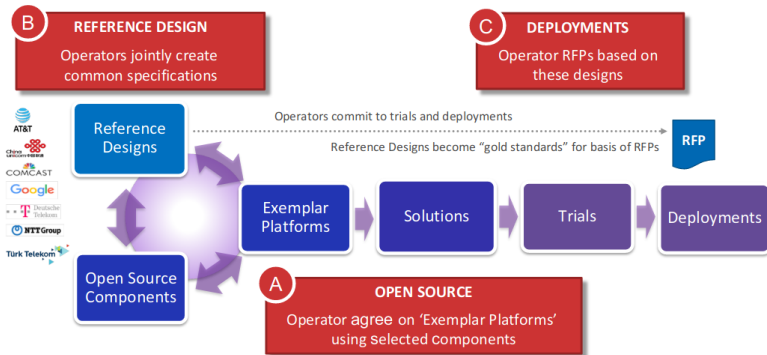
Architectural  
principles  
Use Cases

## SONA

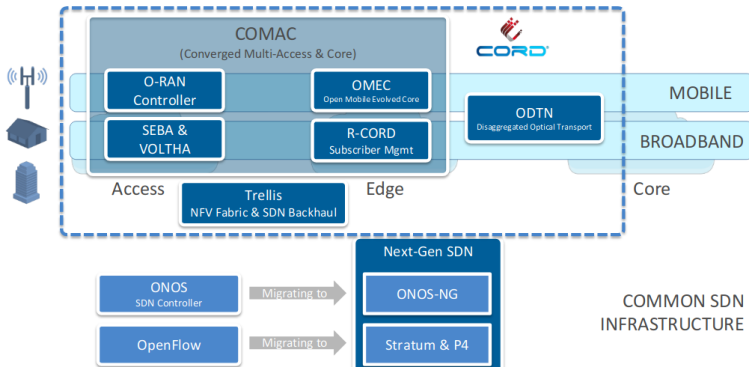
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# Reference Design Strategy



# ONF Solutions



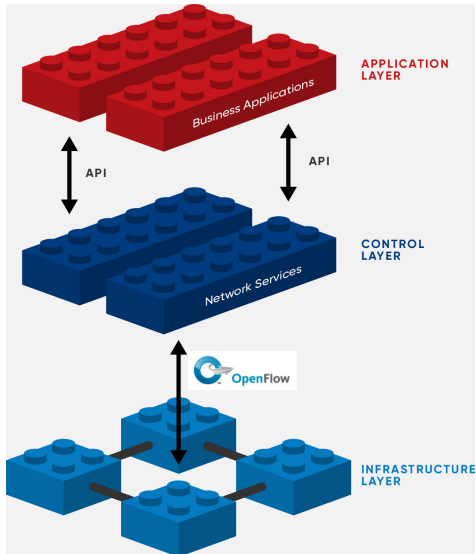
# Software-Defined Networking

The physical separation of the network control plane from the forwarding plane, and where a control plane controls several devices.

- Directly Programmable
- Agile
- Centrally Managed
- Programmatically Configured
- Open Standards-Based and Vendor-Neutral



# Software-Defined Networking



# Introduction to ONOS

ONF  
Introduction  
ONF Solutions

SDN  
Introduction

Introduction  
to ONOS

Architectural  
principles  
Use Cases

SONA

feature  
demo

Open Network Operating System (ONOS) is an open source SDN network operating system. Our mission is to enable Service Providers to build real SDN/NFV Solutions.

# Architectural principles

- High-availability, scalability and performance
- Strong abstractions and simplicity to develop apps and solutions
- Protocol and device behaviour independence
- Separation of concerns and modularity

# ONOS Distributed Architecture

- Distributed
  - Set up as a cluster of instances
- Symmetric
  - Each instance runs identical software and configuration
- Fault-tolerant
  - Cluster remains operational in the face of node failures
- Location Transparent
  - A client can interact with any instance. The cluster presents the abstraction of a single logical instance
- Dynamic
  - The cluster can be scaled up/down to meet usage demands

# ONOS Architecture

## ONF Introduction

ONF Solutions

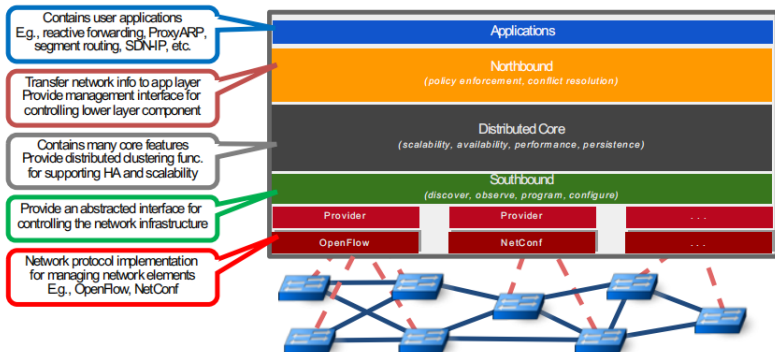
## SDN Introduction

## Introduction to ONOS

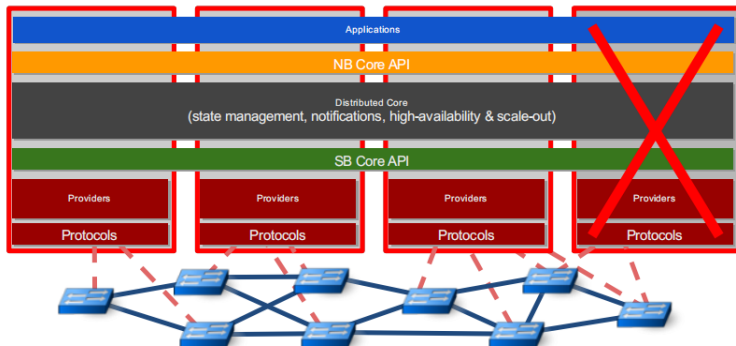
Architectural  
principles  
Use Cases

## SONA

feature  
demo



# ONOS Architecture



# Use Cases

ONF  
Introduction

ONF Solutions

SDN  
Introduction

Introduction  
to ONOS

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principles

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SONA

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demo

- Interconnecting SDN network with traditional network using SDN-IP
- SONA: DC Network Virtualization
- CORD: Central Office re-architected as a Datacenter
- Virtual Private LAN Service (VPLS)
- more use cases in [wiki.onosproject.org](http://wiki.onosproject.org)
- or you can create your use cases!

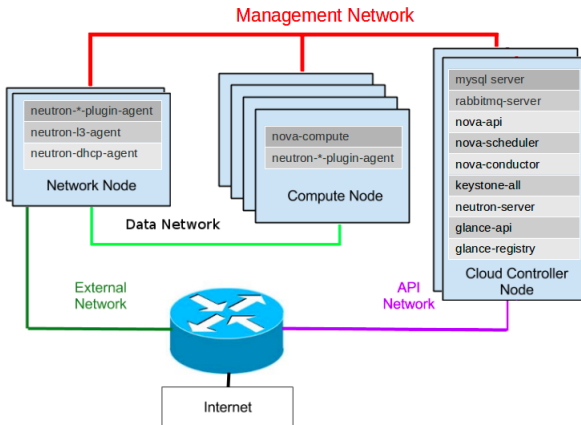
# SONA

## DC Network Virtualization



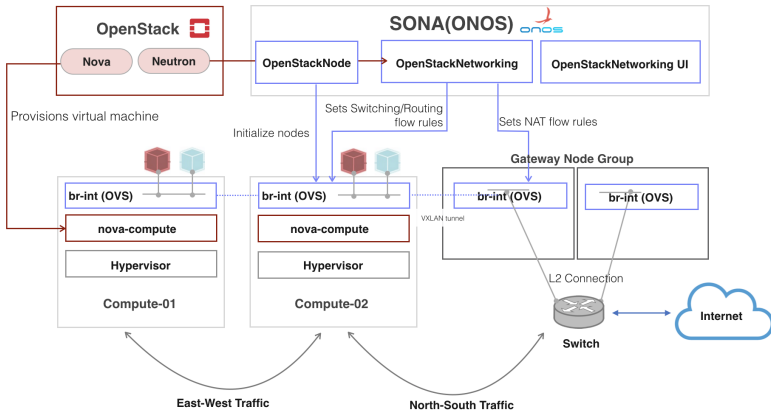
# Why SONA

- Limitation of Neutron Network
- Limited visibility of VM traffic
- Limited scalability of network node

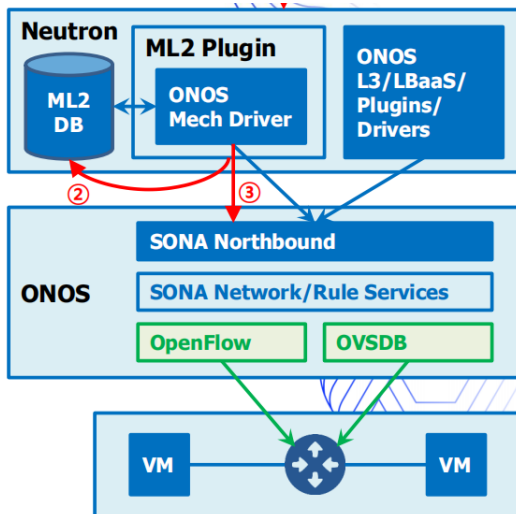


# SONA (Simplified Overlay Networking Architecture)

- ONOS based Virtual Network Management solution (support VxLAN, VLAN, FLAT)
- Empowered by SDN controller, a better replacement of neutron, scalable gateway
- Fully compatible with OpenStack (ocata, pike, queens, rocky)



# SONA Integration with OpenStack



- OpenStack Neutron
  - Using Modular Layer 2 Plugin
  - Using ONOS Mechanism driver (networking-onos)
  - networking-onos interact with ONOS
- ONOS
  - Northbound interface interact with networking-onos
  - OpenFlow and OVSDB as Southbound Protocol
  - OpenFlow for install and uninstalling flow rules in Open vSwitch
  - OVSDB for configuring Open vSwitch, create and delete bridges (br-int, etc)

# SONA Features

- **Optimized and distributed logical switching:** SONA implements multicast free VXLAN/GRE/GENEVE implementation where each OpenvSwitch in the compute node act as a part of big switch.
- **Optimized and distributed logical routing:** Each OpenvSwitch in the compute node act as a router and takes care of all East-West routed traffic for the VMs connected to itself.

# SONA Features

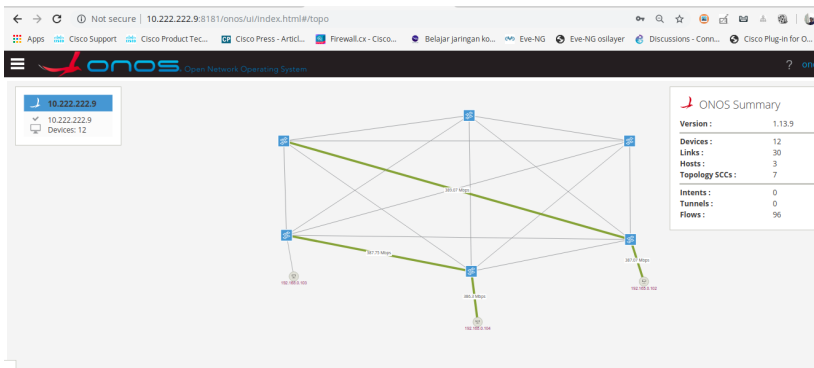
- **Agent-less:** No need to run any Neutron agents on compute node, network node and gateway node. Note that the agents include OpenvSwitch agent, L3 agent, metadata agent, DHCP agent.
- **Scalable:** SONA provides horizontal scalability of gateway nodes which plays a role of connecting point virtual networks to the outside of the world.
- **Data Plane Acceleration:** SONA supports the integration with various types of data plane acceleration technologies including OVS-DPDK, SR-IOV, PCI-PT and OVS hardware offloading (e.g., SmartNIC).

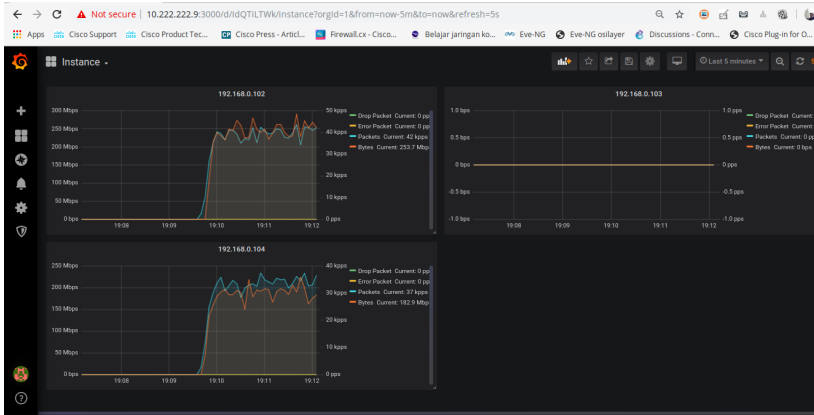
# SONA Features vFlow Statistics

- Collect VM to VM real-time flow statistic.
- Stats collection is realized using OpenFlow standards protocol (no extra overhead!)
- Seamless integration with monitoring systems through various NBIs (REST, Kafka, InfluxDB)
- No additional software installations are required at OpenStack side



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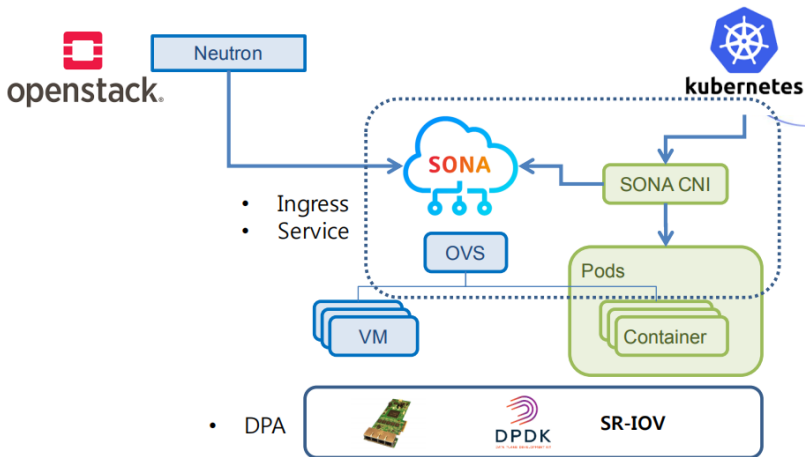




# SONA Updates

- The SONA production service at SKT will be started from December this year. SKT are in the last phase of verifying stability of SONA with operation team.
- SONA can also running in Kubernetes.
- Integration between OpenStack SONA with Kubernetes using kuryr-kubernetes project. Later, SONA can be used to integrate OpenStack and Kubernetes .
- SKT plan to use SONA OpenStack and SONA-CNI (Kubernetes) in Multi-Access Edge Computing next year.

# SONA OpenStack & Kubernetes



# OpenStack SONA Demo

# ONOS SONA commands

- Entering ONOS management  
*ssh onos@127.0.0.1 -p 8101*
- View OpenStack Nodes  
*openstack-nodes*
- View OpenStack Routers  
*openstack-peer-routers*
- View OpenStack Subnets  
*openstack-subnets*
- View OpenStack Floating IP  
*openstack-floatingips*

# ONOS SONA commands

- Entering ONOS management  
*ssh onos@127.0.0.1 -p 8101*
- View All Telemetry Config  
*telemetry-configs*
- Enable InfluxDB Telemetry Config  
*telemetry-enable sona-influxdb-connector-1*
- View InfluxDB Telemetry Config  
*telemetry-config sona-influxdb-connector-1*



**Any Question?**  
**contact me on [zufar@onf-ambassador.org](mailto:zufar@onf-ambassador.org)**  
**linkedin [Zufar Dhiyaulhaq](#)**  
**telegram [@zufardhiyaulhaq](#)**