Mobile & 5G Tutorial

ONF Mobile Edge Cloud Ecosystem
Tutorial Outline: COMAC

Morning

- 9:00am - 9:45am - COMAC RD and EP Overview
- 9:45am - 10:30am - COMAC EP Platform Deep-Dive
- 10:30am - 11:00am - Break
- 11:00am - 11:45am - Installing and Setting Up the COMAC EP Release
- 11:45am - 12:30pm - Hands-On with COMAC-in-a-box on CloudLab
- 12:30pm - 1:30pm - Lunch
Tutorial Outline: OMEC

Afternoon

- 1:30pm - 2:30pm - OMEC Project Overview
- 2:30pm - 3:00pm - Submitting code/fixes to OMEC and OMEC CI/CD
- 3:00pm - 3:30pm – Break
- 3:30pm - 4:15pm - Hands-On with OMEC on CloudLab
- 4:15pm - 4:40pm - Evolving OMEC - Next Step: Production Grade MME
- 4:40pm - 5:00pm - Closing Remarks
PANEL on September 11, 2019 @ 11:45am
Join me at ONF Connect to learn about:

Multi-cloud Access & Core Networks
Oguz Sunay
Chief Architect for Mobile Networking, ONF

September 10 – 13
Santa Clara Marriott
Silicon Valley

TALK on September 11, 2019 @ 2:00pm
A Very Brief Introduction to ONF

Oğuz Sunay, Chief Architect, ONF
ONF’s Operator Led Mission

Transform Operator Networks... to bring capex & opex efficiencies & innovative services

with the focus on Access and Edge

by leveraging

Disaggregation White Box

Open Source

SDN/NFV/Cloudification
ONF’s Unique Approach

Operator Led Curated Open Source

- Operators first agree on common Use Cases to jointly pursue
- Operators commit to deployment

- Curated supply chain engages to embrace opportunity
- Well aligned vendors each contribute value to overall solution
- Operator commitment to deployment ensures ROI

Operator partnerships 7+ Years
Lab & Engineering Staff @ ONF
Keiretsu Ecosystem Develops
Strategy of Reference Design + Exemplar Platform

**A. OPEN SOURCE**
Operator agree on ‘Exemplar Platforms’ using selected components

**B. REFERENCE DESIGN**
Operators jointly create common specifications

**C. DEPLOYMENTS**
Operator RFPs based on these designs

Reference Designs become “gold standards” for basis of RFPs
ONF Reference Designs and Exemplar Platforms

**REFERENCE DESIGNS**
Operators jointly create common specifications

Reference Designs

- SEBA – Virtualized Broadband
- Trellis – NFV Fabric & SDN Backhaul
- ODTN – Disaggregated Optical Transport
- NG-SDN – Next Gen SDN
- COMAC – Unified Mobile & Broadband

**EXEMPLARY PLATFORMS**

- ONOS – SDN Controller
- OMEC – Mobile Core
- Stratum - NG-SDN Thin Switch
- VOLTHA – Virtualized OLT
- XOS/NEM – Service construction & OSS Mediation
- P4 – Forwarding Plane Programming Language

**OPEN SOURCE COMPONENTS**

**DEPLOYMENTS**
Operator RFPs based on these designs

Deployments to trials and deployments

Operator RFPs become “gold standards” for basis of RFPs
Mobile Projects at ONF

COMAC
Open source platform enabling user plane and control plane convergence for multiple access technologies at the edge

OMEC
Open source, disaggregated, CUPS compliant 3GPP core

M-CORD
Mobile edge cloud platform enabling software-defined controlled RAN, hosting all or some of core network VNFs, OTT apps and enabling multi-cloud connectivity

CORD
Open source edge cloud platform for disaggregated, software-defined controlled access using commodity hardware
COMAC
Converged Multi Access & Core

Oğuz Sunay, Chief Architect, ONF
COMAC

Scope

- Develop a modular, cost-efficient platform and components with well-defined interfaces to enable access and core networks, including
  - A streamlined, simple and cost-efficient implementation of 3GPP cellular core,
  - A converged user plane function (CUPF) that unifies user plane components of fixed broadband network gateway, 3GPP cellular core and virtualized 3GPP cellular radio access that would be hosted at the multi-access edge cloud,
  - A suite of control plane functions/applications that would intelligently be engaged to ensure proper, and standards compliant and programmatic control of CUPF,
  - Access and Core Controllers that intelligently and programatically map CUPF with the corresponding suite of control plane applications.
Supporting Operators

AT&T  T
China Unicom
Google  Türk Telekom  Sprint
Big Picture: Edge Cloud
Why Multi Access? Why Convergence?
Evolution Towards the Edge

Telco Network
Evolution Towards the Edge
Evolution Towards the Edge

ONU
OLT
eNB/gNB

ONU
eNB/gNB

3GPP RAN
3GPP CORE VNFS
BNG
APPS
CU
DU
3GPP RAN

SDN CONTROL

UEs

DISAGGREGATED, CUPS
3GPP CORE VNFS

OTT APPS

Telco Cloud

UEs
Public Cloud

OTT APPS

OTF CONNECT
COMAC Project
Pillars, Components, and Evolution
COMAC Pillars

Why is Convergence Relevant Now?

- Virtualization
- Functional Disaggregation
- CUPS
- Cloudification at the Edge
COMAC Pillars

Why is Convergence Relevant Now?

Builds on RAN Disaggregation
RU and DU are distributed, CU is centralized, further CUPS disaggregated

Builds on CORE CUPS Disaggregation
UPF and disaggregated core control plane VNFS

Builds on BNG CUPS Disaggregation
BNG UP and disaggregated core control plane VNFS

3GPP CORE

3GPP RAN CU

SEBA BNG

CUPF + CCPFS

Converged User Plane Function & Converged Control Plane Functions
COMAC Evolution

Phased Approach

Multi-Access Co-Existence
3GPP cellular and broadband access sharing the same infrastructure and edge cloud control and orchestration

OMECE
Use-case optimized, disaggregated, open source 3GPP core

User-Plane Convergence
Converging the user planes of 3GPP RAN CU, 3GPP Core and BNG

Control-Plane Convergence
Converging control plane functions of authentication, subscriber management, session management, etc.

COMAC
Platform hosting converged user and control planes with SDN control, FCAPS-capable edge services mediation with global orchestration connectivity
COMAC EP v.1.0 Release
COMAC EP v1.0 Release
Graduating from Demo Quality to Field Trial Quality Towards Production Readiness

China Unicom will use this platform in its field trials for SD-RAN and MAEC

M-CORD has conducted very successful demonstrations
Focus has been on showcasing cutting-edge technology

ONF Mobile Edge Cloud Platform
Official Release Date: September 20, 2019

SD-RAN controller is based on ONOS which has been hardened for Trellis
Further development will be in sync with µONOS processes
RAN Apps development will follow the same processes that other ONF projects use

* Will not be part of v1.0 release, but subsequent releases
THANK YOU