



# COMAC and OMEC at DT

**Presenter: Manuel Paul  
Deutsche Telekom AG**

# COMAC AND OMEC - OVERVIEW

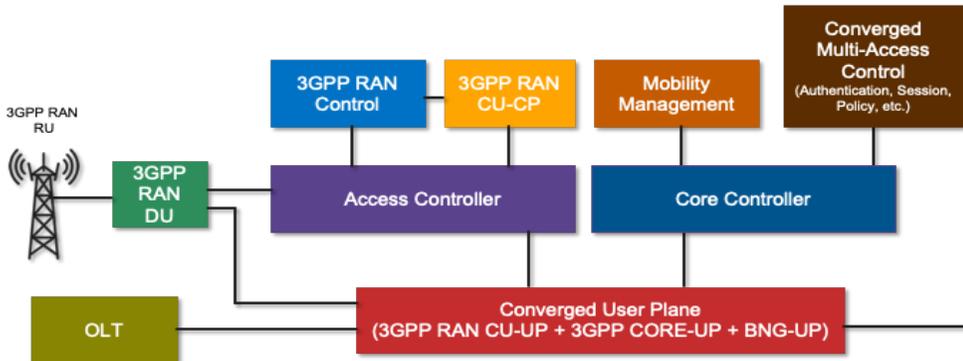
## COMAC Reference Design (work in progress)

Leverages SDN and cloud principles to create both converged access and converged core capabilities as part of a holistic platform

Builds on: CUPS Disaggregation and RAN Disaggregation

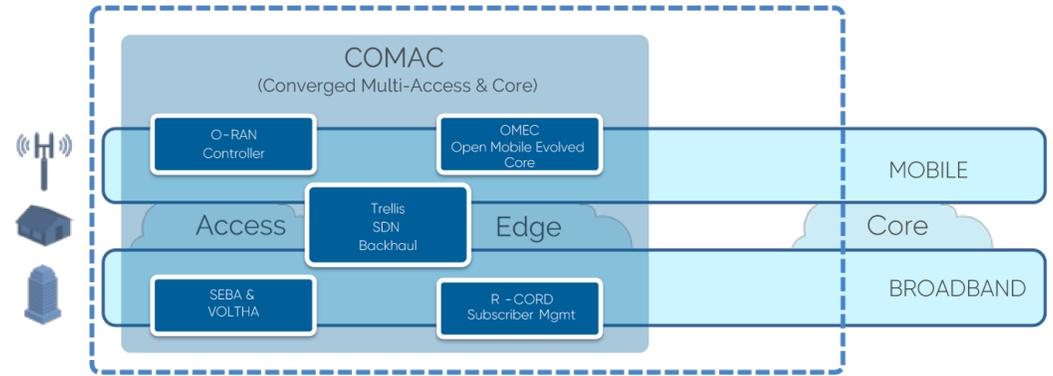
Aggregates a unified access layer with an SDN control plane and P4 user plane each containing elements of the RAN CU, Packet Core and BNG.

Design drives exemplar implementations, but allows different implementation choices



Source: ONF, <https://www.opennetworking.org/reference-designs/comac>

## COMAC Open Source Exemplar Platform Implementation (WiP)

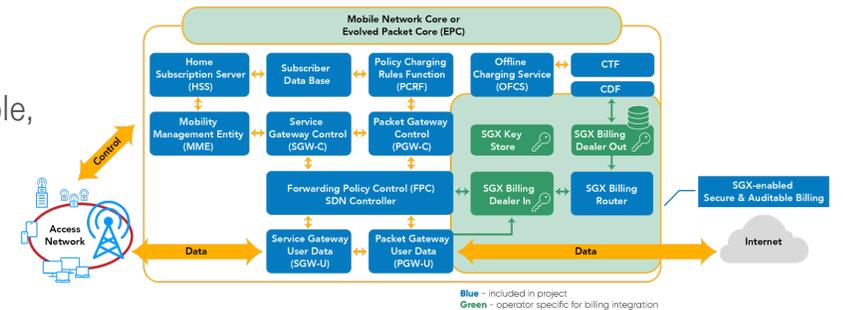


Source: ONF, <https://www.opennetworking.org/comac>

## Leveraging OMEC

Full-featured, scalable, high performance, stand-alone open source EPC.

Used as upstream project for COMAC



Source: ONF, <https://www.opennetworking.org/comac>

# COMAC IS PROGRESSING AT ONF IN A PHASED APPROACH

## **COMAC is driven by operators requirements as basis for open source exemplar implementations**

Reference Design (team led by operators) and Exemplar Platform (open source project) – progressing in sync

## **COMAC's 1<sup>st</sup> phase addresses use cases operators take to trials and production in 2019/2020**

1<sup>st</sup> release of Reference Design (currently in progress) planned to be released in January 2020

Covered use cases: lightweight EPC for Fixed Mobile Substitution and FWA, EPC for Local Breakouts at the Edge

1st phase exemplar implementation is building on OMEC

## **Subsequent phases to tackle 5G/convergent architecture implementations**

Design and Implementation to build on and leverage 3GPP and BBF specifications (once ready and as applicable)

Synergies with SEBA exemplar implementation will be leveraged, COMAC exemplar platform extended

**Further areas and use cases (dRAN, EdgeCloud) are of high interest and currently under study**



# RECAP: OPTIMIZING U-PLANE HANDLING - SDN'IZATION & EMBEDDED VNFs

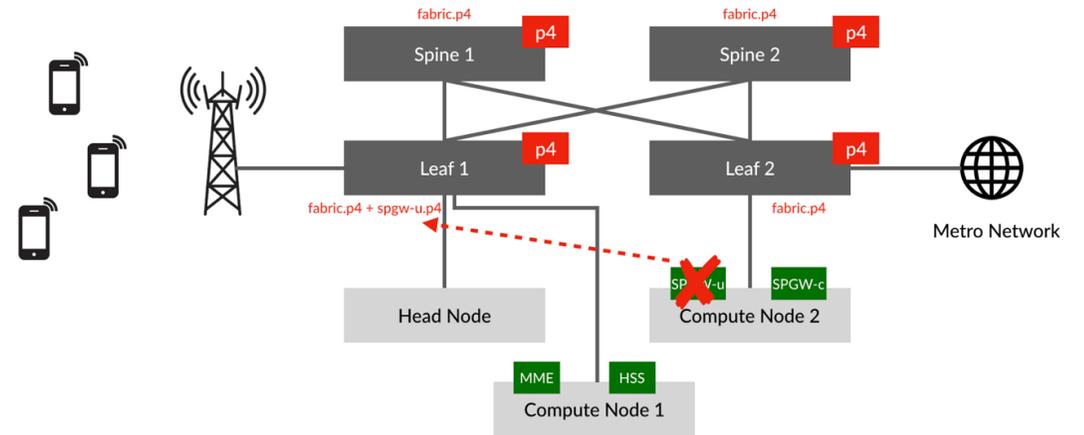
## Realization of Control-User-Plane-Separation (CUPS) for fixed and mobile network functions (BNG/SE, S/P-GW):

- Network functions that process and forward user traffic using domain-specific control are realized on high-performance programmable switching hardware with a control plane realized as SDN application
- All other network functions (slow path) continue to be realized on servers running on VMs or containers as VNFs.

### Phases: 1) SPGW 2) SE/BNG 3) SPGW+SE/BNG

Use Case addressed within COMAC and SEBA

- Future phases to potentially include disaggregated RAN components



- Working PoC implementations for P4-based SPGW and BNG functions have been publicly demonstrated by ONF



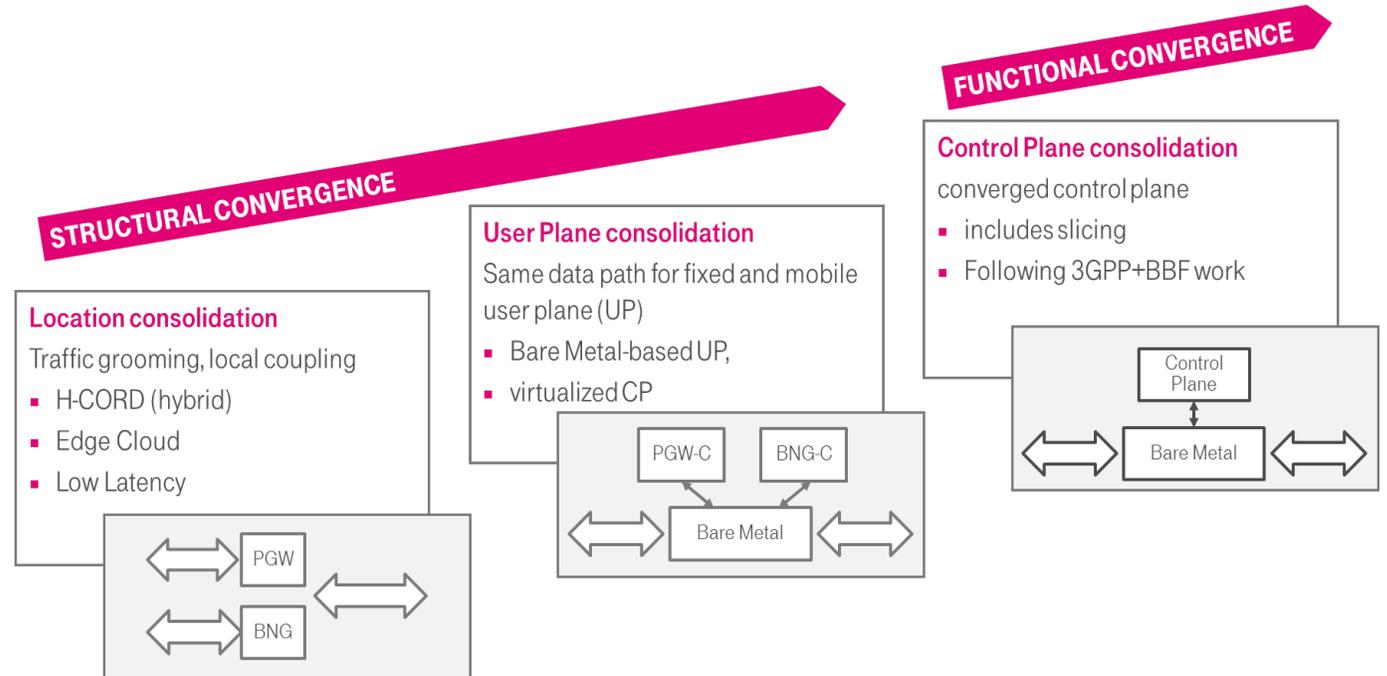
Source of figure: ONF/Use Case „SDN'ization and Convergence of the 3GPP and BBF User Plane with Programmable Switching Fabric“

LIFE IS FOR SHARING.

# 5G AND THE ROAD CONVERGENCE

## Relevant standards work in progress at 3GPP, BBF, IETF

- Service-Based Cloud-Native Architecture
- 5G Fixed Mobile Convergence
- CUPS Concept, Interfaces and Protocols
- Enhanced User Plane Protocols



# 5G-CONVERGENCE AS ADDRESSED BY 3GPP AND BBF

## Operators' Motivation and Goals for Fixed-Mobile Convergence (FMC)

Seamless service experience for customers across all their devices on any access

Converged architecture and interfaces for converged service approaches and operational efficiency

Collaboration of relevant industry-/standards bodies



### 5G Wireless-Wireline Convergence / FMC at 3GPP

- Enablers defined in base 5G system specifications  
TS 23.501, TS 23.502 and TS 23.503 incl.:
  - Access-agnostic and common 5G core network architecture
  - Seamless user and service mobility between 3GPP and non-3GPP access networks
- Cooperation with BBF to integrate 5G fixed access – Rel.16 work:
  - TR23.716 (FS\_5WWC) Study on the Wireless and Wireline Convergence for the 5G system architecture
  - TS23.316 (5WWC) Wireless and Wireline Convergence for the 5G system architecture



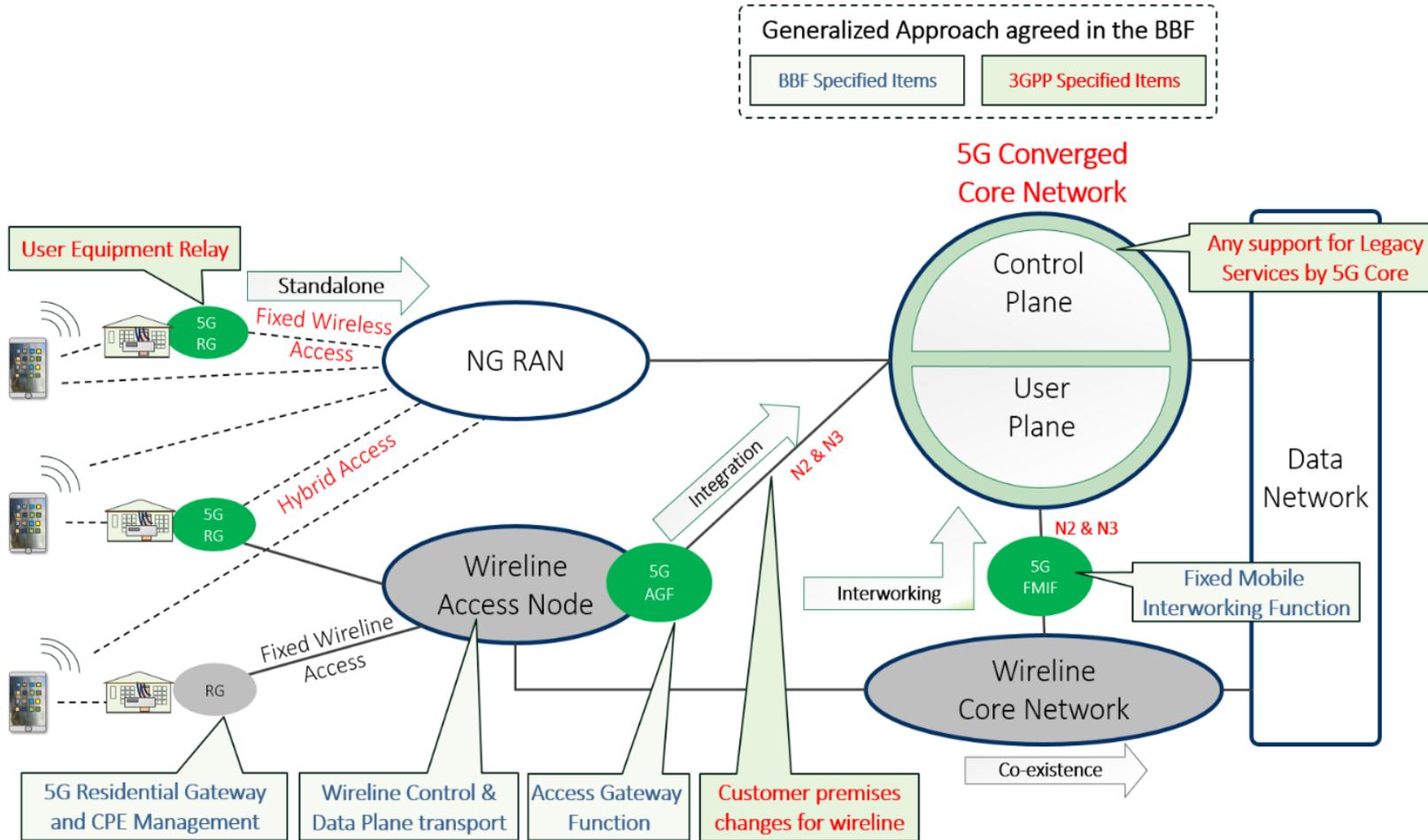
### 5G Wireless-Wireline Convergence at BBF

- Cooperation with 3GPP on 5G-FMC, to support common interfaces between access and 5G Core (5GC) networks
- Specif. of Access Gateway (AGF/WT-456) & Fixed-Mobile Interworking (FMIF/WT-457) functions, to adapt fixed access onto the 5GC
- Specifications for 5G-capable Residential Gateways (5G-RG, TR-124)
- Supporting operator requirements and deployment scenarios:
  - direct integration via 5G-capable Residential Gateways
  - interworking of existing fixed access subscribers and deployed equipment with the 5G Core
  - co-existence and migration

**3GPP SPECIFICATIONS WILL BE RELEASED IN 3GPP REL16, WITH A COMPLEMENTARY SET OF SPECIFICATIONS RELEASED BY BBF**



# A DEEPER LOOK INTO THE 5G FMC ARCHITECTURE

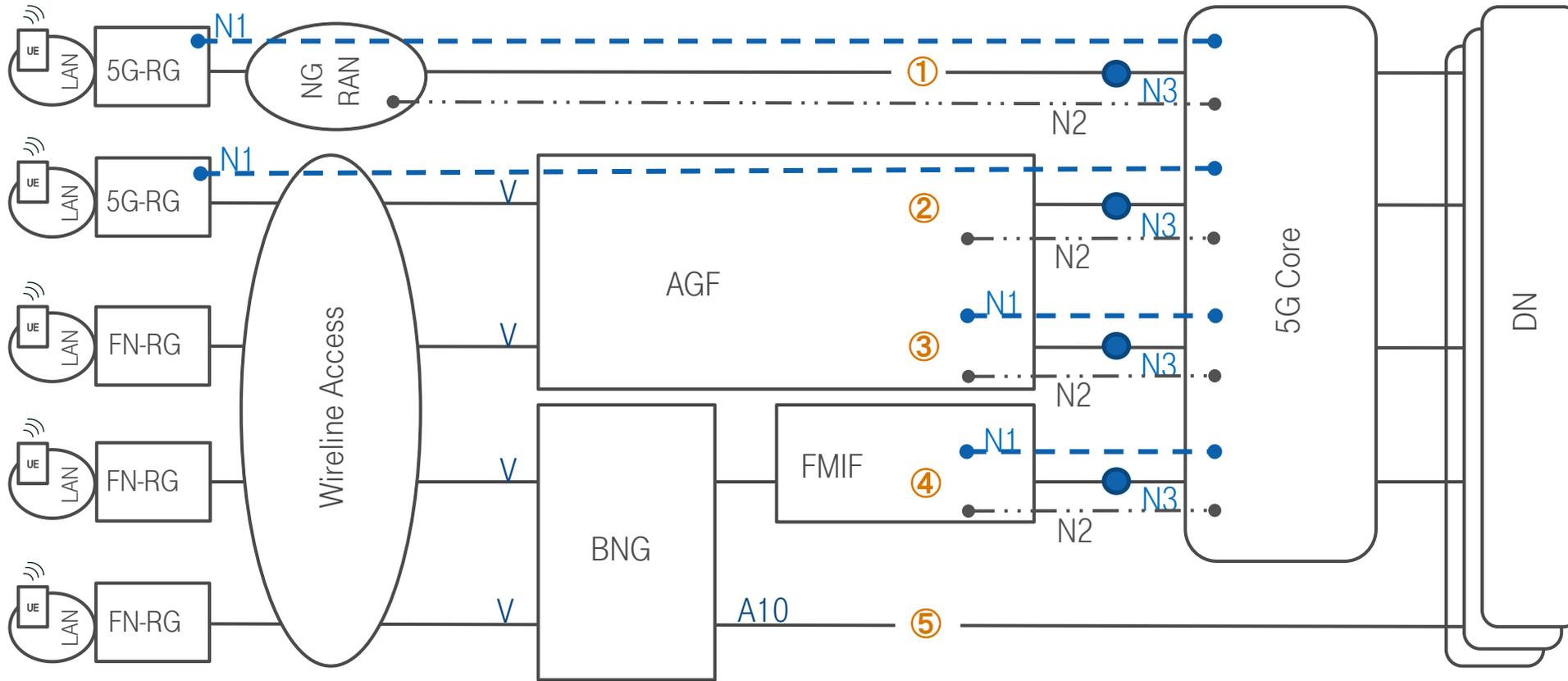


Source: BBF, <https://www.broadband-forum.org/wp-content/uploads/2018/11/MR-427.pdf>



LIFE IS FOR SHARING.

# A DEEPER LOOK INTO 5G FMC DEPLOYMENT SCENARIOS



- ① Fixed Wireless Access
- ② Integration in Direct mode
- ③ Integration in Adaptive mode
- ④ Interworking
- ⑤ Coexistence



Source of figure: BBF LIAISE-245 (Liaison to 3GPP)

**LIFE IS FOR SHARING.**

# COMAC OPPORTUNITIES TOWARDS 5G

## **M-CORD has opened up the door for Open Source SDN implementations serving operators' needs**

Not for a faster horse, but for open, efficient, flexible, and extensible implementations according to operators' needs

Developed and proven working prototypes in three innovation areas (Platform, Core, RAN)

## **COMAC doesn't start from scratch**

Exemplar Platform Implementation can build on comprehensive (M-)CORD platform

Opportunity to leverage Software-Defined Broadband (SEBA) work for Convergence

## **OMEC is ready to be used as basis for a lightweight EPC in operators MVP deployments**

## **COMAC (design work currently in progress) will tackle 5G / FMC implementations**

Specifications (3GPP, BBF, ORAN) used as applicable

ONF's focus is on running code and working open source SDN implementations

## **Collaboration within and beyond ONF community is key**

Interested parties (operators, suppliers, integrators,...) are invited to join



# DEUTSCHE TELEKOM @ ONF CONNECT 2019

## DEEP DIVES ON ACCESS4.0, OPEN SOURCE EPC AND MUCH MORE

**THU**

Robert Soukup, **4:30PM**  
**ACCESS4.0 PROGRAM UPDATE**

**FRI**

Jochen Appel, **10:00AM**  
**KEYNOTE: ACCESS NETWORK TRANSFORMATION**

**WED**

Dr. Hans-Joerg Kolbe, **11:00AM**  
**INSIDE VIEW INTO OPERATOR BUSINESS CASES**



**THU**

Dr. Hans-Joerg Kolbe, **2:30PM**  
**IMPLEMENTING THE PROGRAMMABLE SERVICE EDGE**

**WED**

Bjoern Nagel, **2:15PM**  
**VOLTHA ROADMAP**

**WED**

Manuel Paul, **4:30PM**  
**COMAC AND OMEC AT DT**

**FRI**

Manuel Paul, **11:55AM**  
**PANEL: TECHNICAL LEADERSHIP TEAM (TLT)**

**WED**

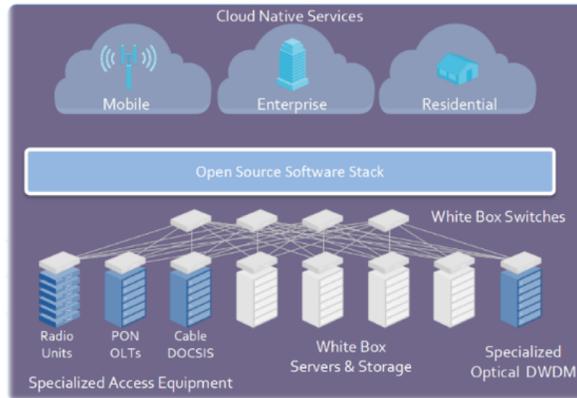
Michal Sewera, **5:30PM**  
**OPEN SOURCE EPC: OPERATORS' JOURNEY TOWARDS THE CLOUD-NATIVE ONF-BASED TELCO CORE**

**WED**

Michal Sewera, **11:45AM**  
**5G AND OPEN SOURCE**

**THU**

Dr. Fabian Schneider, **5:30PM**  
**SEBA REALITY CHECK! HOW TO TAKE THE DESIGN TO THE NEXT LEVEL?**



LIFE IS FOR SHARING.



Thank You