



Bem vindo/a

O webinar começara em poucos minutos





ONF Overview

LATAM Webinar

josecastillolema@ambassadors.opennetworking.org

ricardo.tombi@ambassadors.opennetworking.org

amanda.espindola@ambassadors.opennetworking.org

eric@opennetworking.org



Speakers



- Jose Castillo Lema
Telco Cloud Consultant @ONF Ambassador



- Amanda Espíndola Raymundi
Virtualization Consultant @ONF Ambassador



- Ricardo Tombi
Engineer, Professor & Researcher @ONF Ambassador



- Eric Murrell
 - Director of Ecosystem Development @ ONF

The ONF CALA Team



Andres Madero
ONF CALA Cluster Lead & Ambassador
Infinera - CTO CALA



Freddy Turriaf
ONF Ambassador
Sales Director - zequenze



Hugo Nava
ONF Ambassador
Everis – Head of Telecom Network Services LATAM



Virgilio Fiorese
ONF Ambassador



Amanda Espindola
ONF Ambassador



José Lema
ONF Ambassador

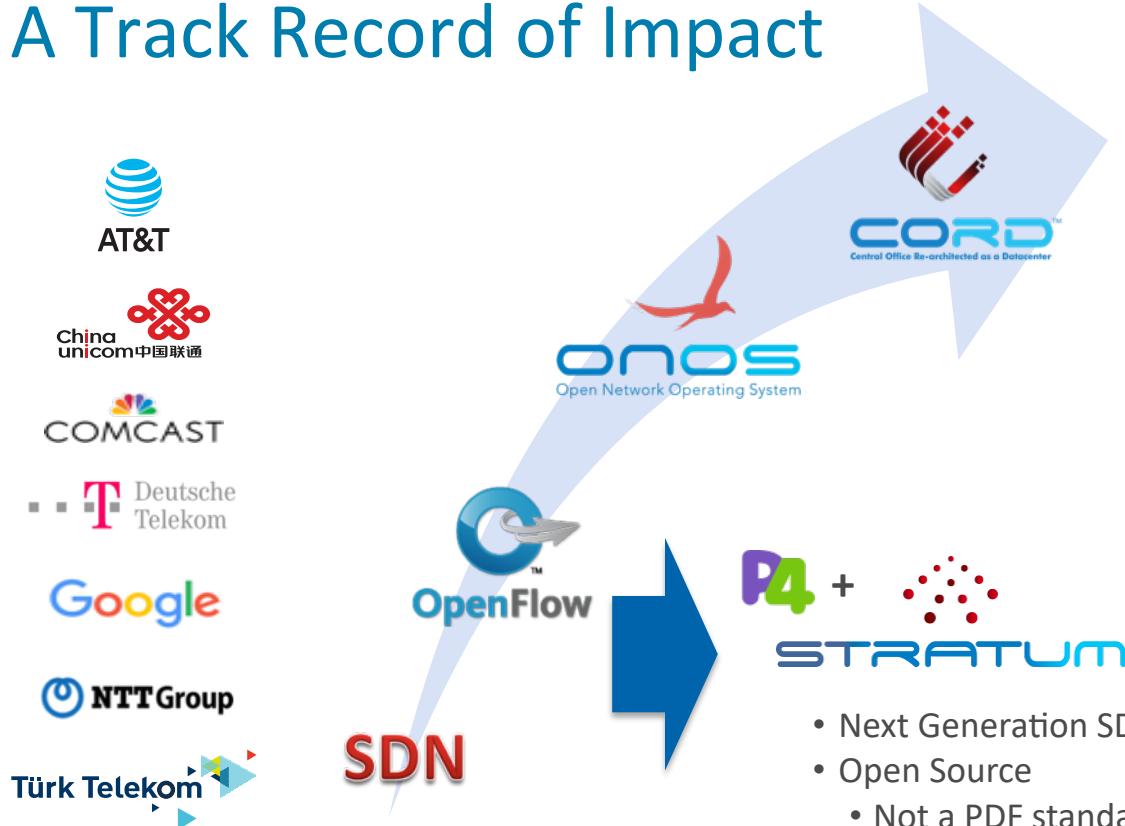
Ricardo Tombi
ONF Ambassador

ONF

Agenda

- ONF overview
- Mobile access
 - OMEC overview
 - SD-RAN overview
 - Aether overview
- Fixed access
 - SEBA overview
 - ODTN overview
 - Trellis overview

ONF – An Operator Led Consortium with A Track Record of Impact



"Nearly 40% of all end-customers will have service provided by ... CORD by mid-2021"

Roz Roseboro
Heavy Reading

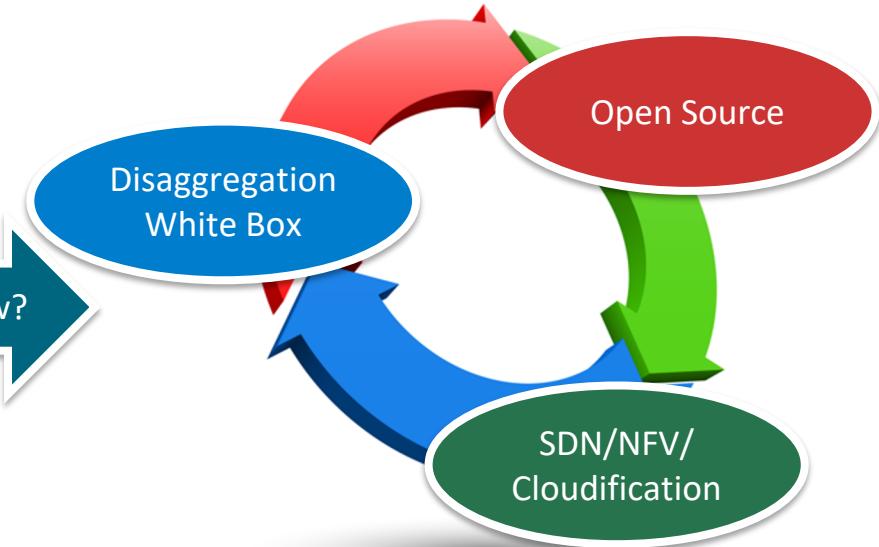
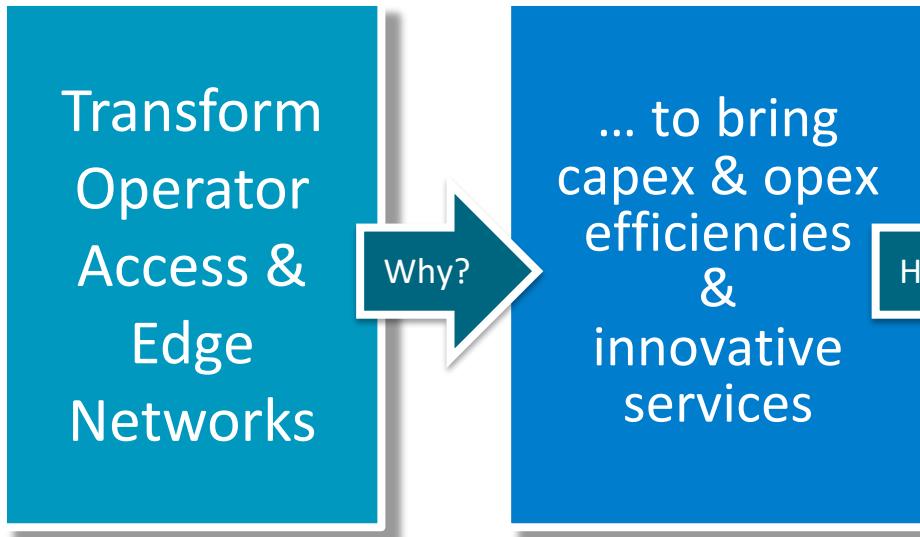
"70% of operators worldwide are planning to deploy CORD"

Michael Howard
IHS Markit

- Next Generation SDN
- Open Source
- Not a PDF standard

ONF's Operator Led Mission

by leveraging



... with
curated open source model

Benefits of Cloudfication



Network Benefits

- Allow hardware to be replaced independently
- Enable quick operator-based enhancements
- Support accelerated verification
- Support component upgrades at will



Operator Benefits

- Eliminate single vendor lock-in
- Support operator autonomy
- Interwork with a wide array of vendors without penalty

Independent Analysis



A D Little studied ONF's impact
on AT&T, DT and Telefonica

40% reduction on CAPEX

25% reduction on OPEX

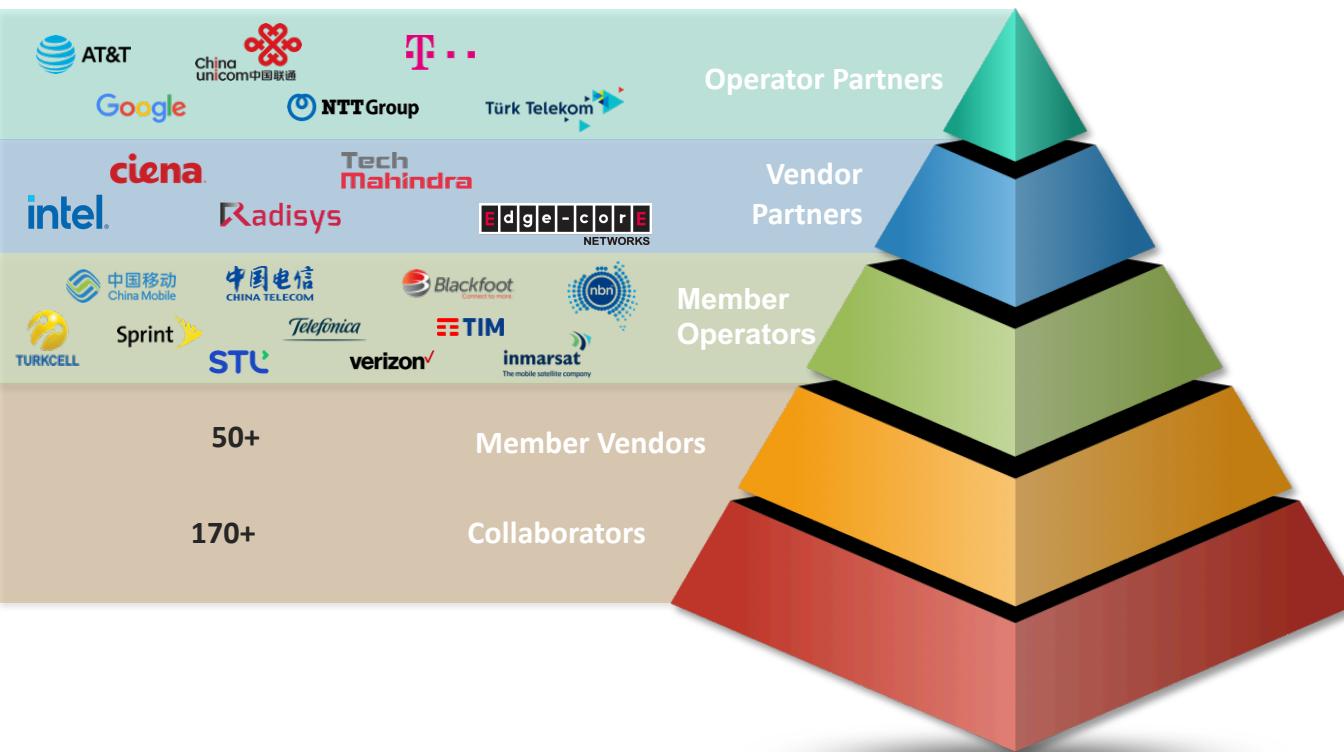
Up to 11% increase in incremental revenue



650 Group says Open Source will impact telecom TAM by \$73B
over the next 5 years

Operator Led - Curated Open Source Community

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



ONF BOARD



Andre Fuetsch – CTO & ONF Chair



Jochen Appel - VP



Amin Vahdat - Fellow



Dai Kashiwa - VP



Tang Xiongyan - CS



George Tchaparian - CEO



Yusuf Kiraç - CTO



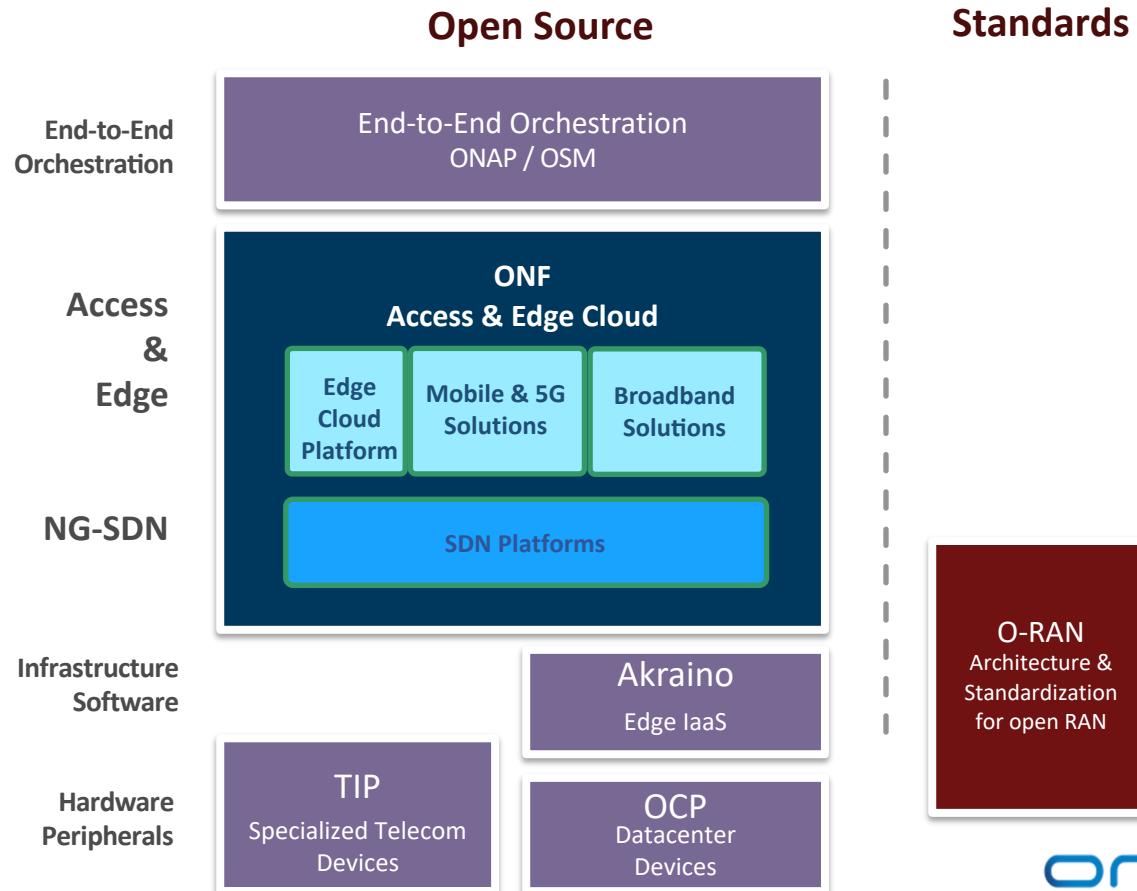
Nick McKeown - Prof



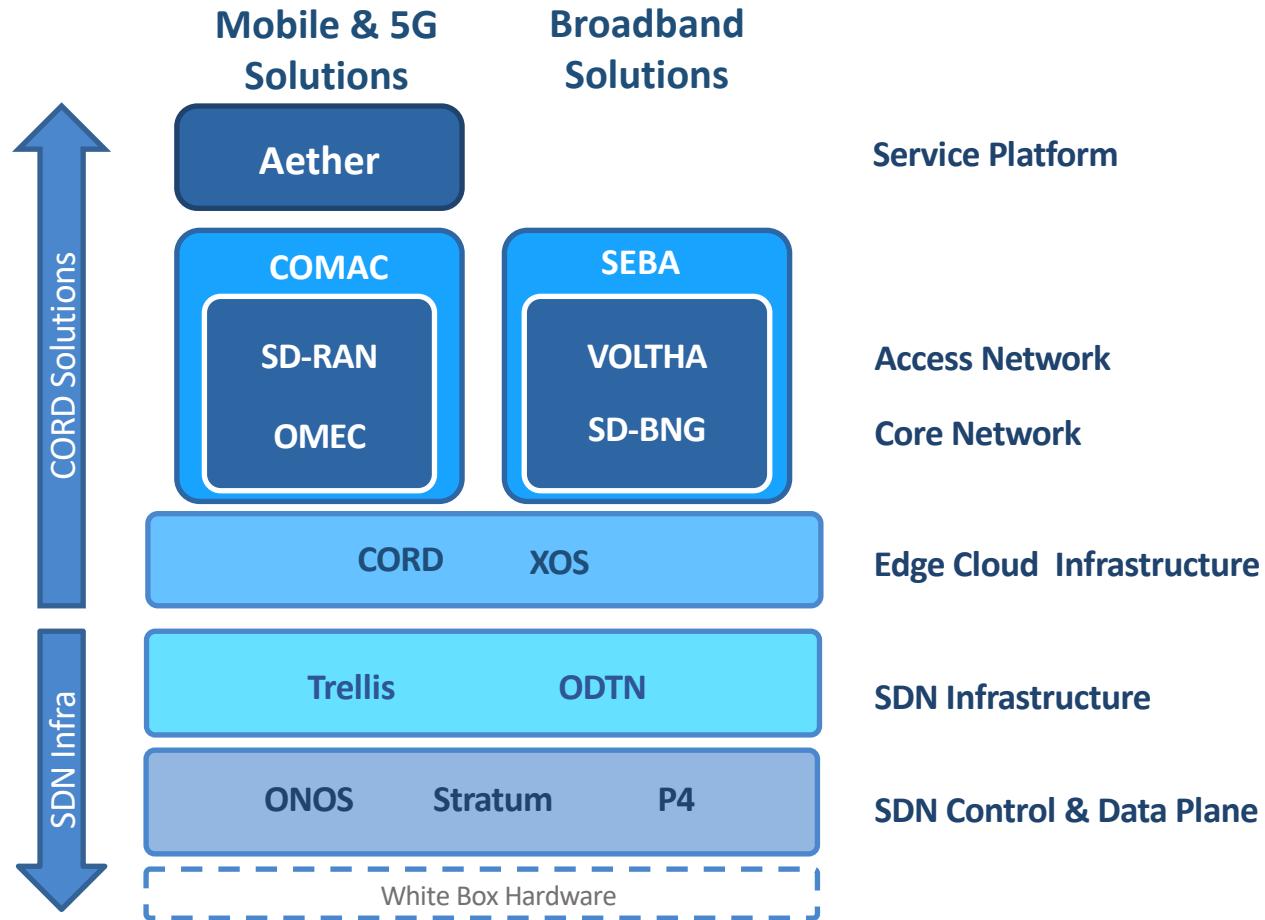
Guru Parulkar, Exec Dir

ONF in Context of Open Source Ecosystem

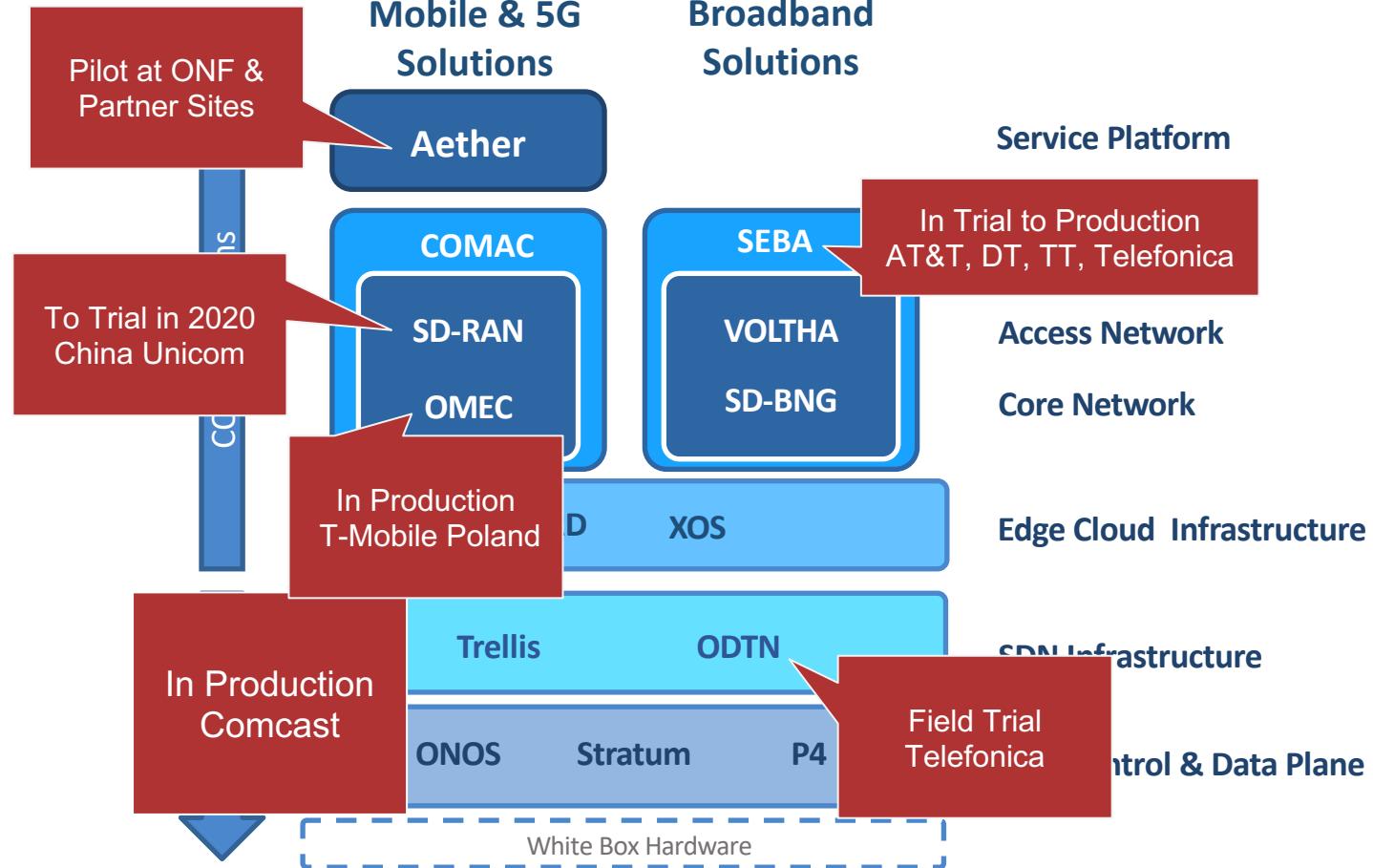
Open Source ecosystem is creating a comprehensive stack that is poised to deliver robust solutions over time, from white box peripherals to end-to-end solutions



ONF's Projects



ONF's Projects

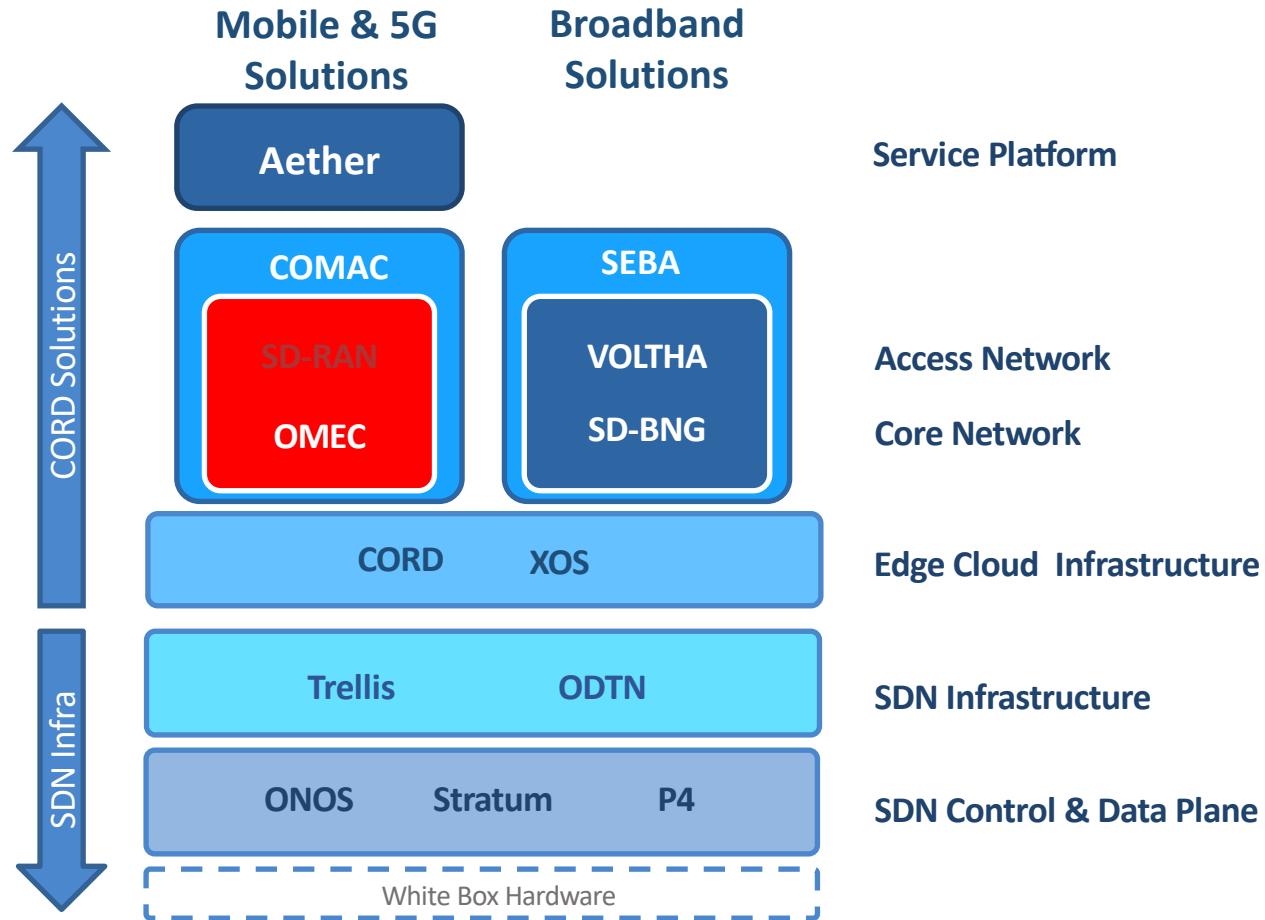




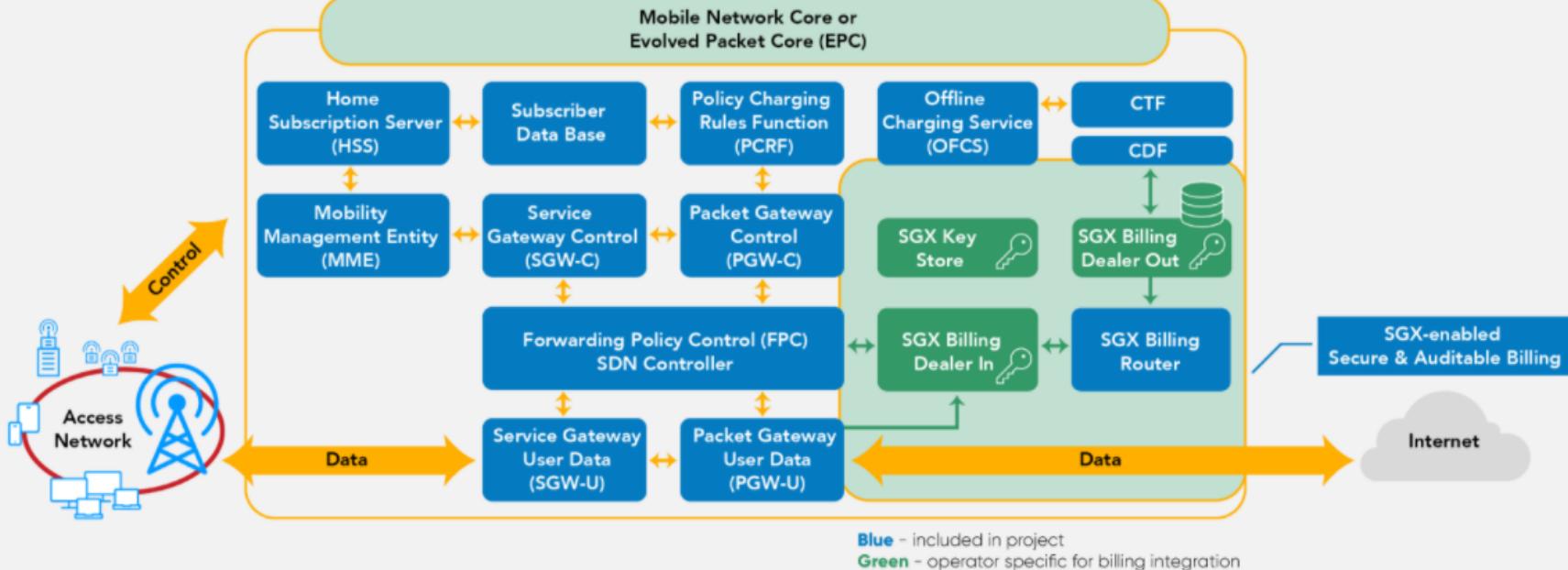
OMEC Overview



OMEC Overview



OMEC Architecture

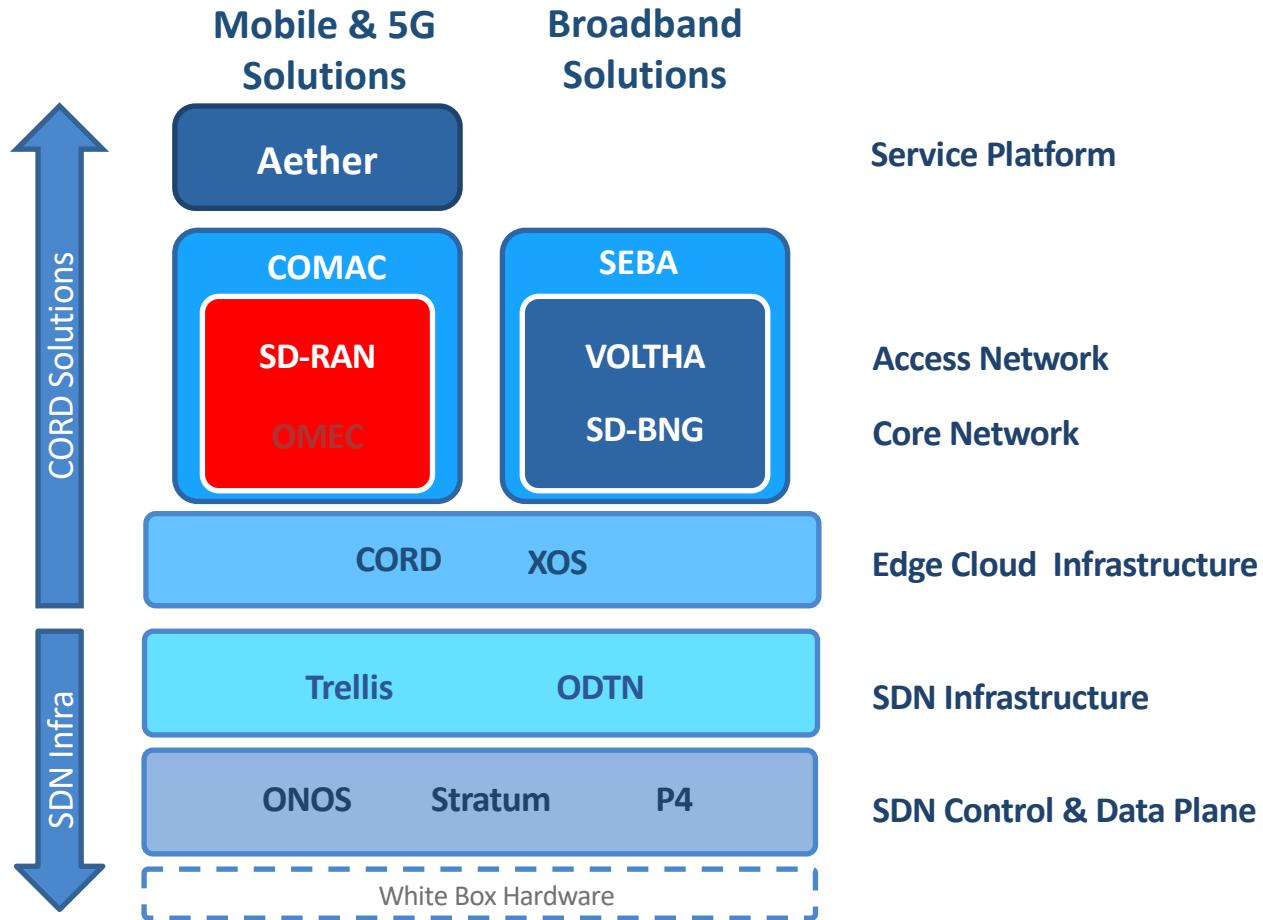




SD-RAN Overview

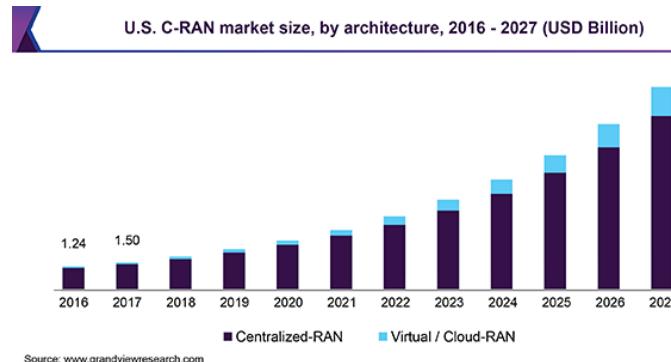


SD-RAN Overview



RAN Market

- Size: Dell'Oro Predictions for 2024:
 - RAN revenue to reach \$200B
 - 5G NR RAN investments to surpass \$100B
 - 5G NR small cells will be 10-20% of overall 5G NR market
- Dynamics
 - 3 incumbents dominate market with closed solutions
 - Operators are pushing to open the market for innovation and competition
- Forces likely to help shake up the RAN market
 - Opportunity for small cells – opens opportunities for smaller players
 - Enterprise markets – lots of untapped potential



ONF Has History of Successfully Driving Disaggregation and SDN Control

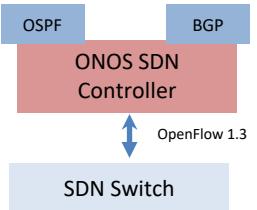
Packet Switch



Integrated control and data plane



ONOS & OpenFlow



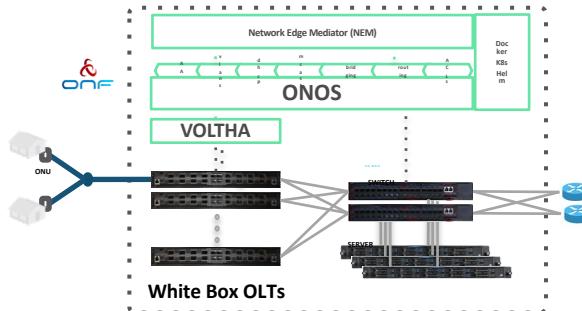
Broadband / PON



Integrated control and data plane



SEBA



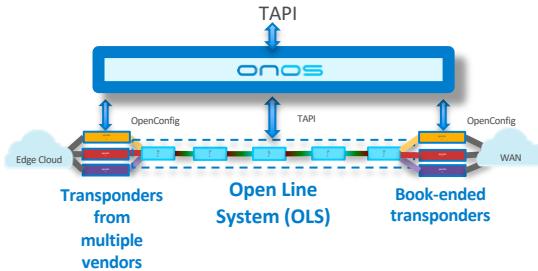
Optical Transport



Integrated chassis, backplane and line-cards



ODTN

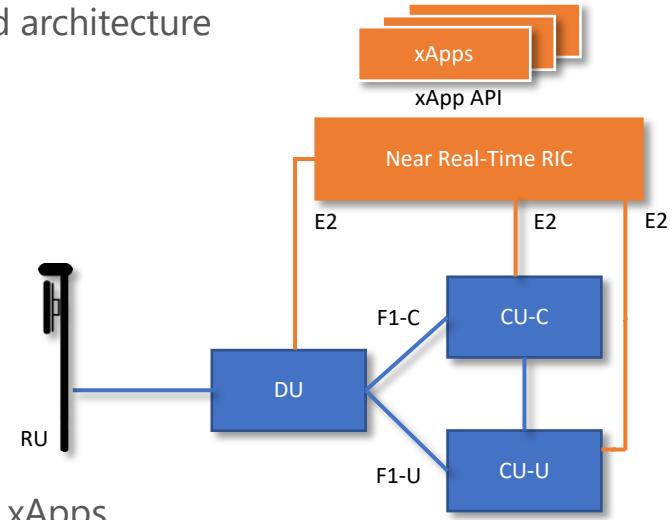


RAN Market is Poised for Disaggregation

- O-RAN Alliance is defining a disaggregated and virtualized architecture



O-RAN Alliance is disaggregating
the RAN architecture



- But - Vendors are reluctant to cede any control to RIC and xApps
- Operators are pushing for RIC-based solutions via partnership with ONF
 - Operators want powerful RIC, xApps and multi-vendor interoperability
 - History has shown that an implementation is necessary in order to help the market transform
 - SD-RAN project is filling this void with a cloud-native open source implementation
 - Operators ready NOW to take this into trials (pent up demand exists TODAY)

SD-RAN Ecosystem

Operators

Pushing for open
transparent RAN solutions



**Ecosystem of
Organizations**
Pushing for open RAN



Technology Providers



RAN Vendors

RAN remains a very closed
market.

SD-RAN Project is open
to working with additional RAN
Vendors

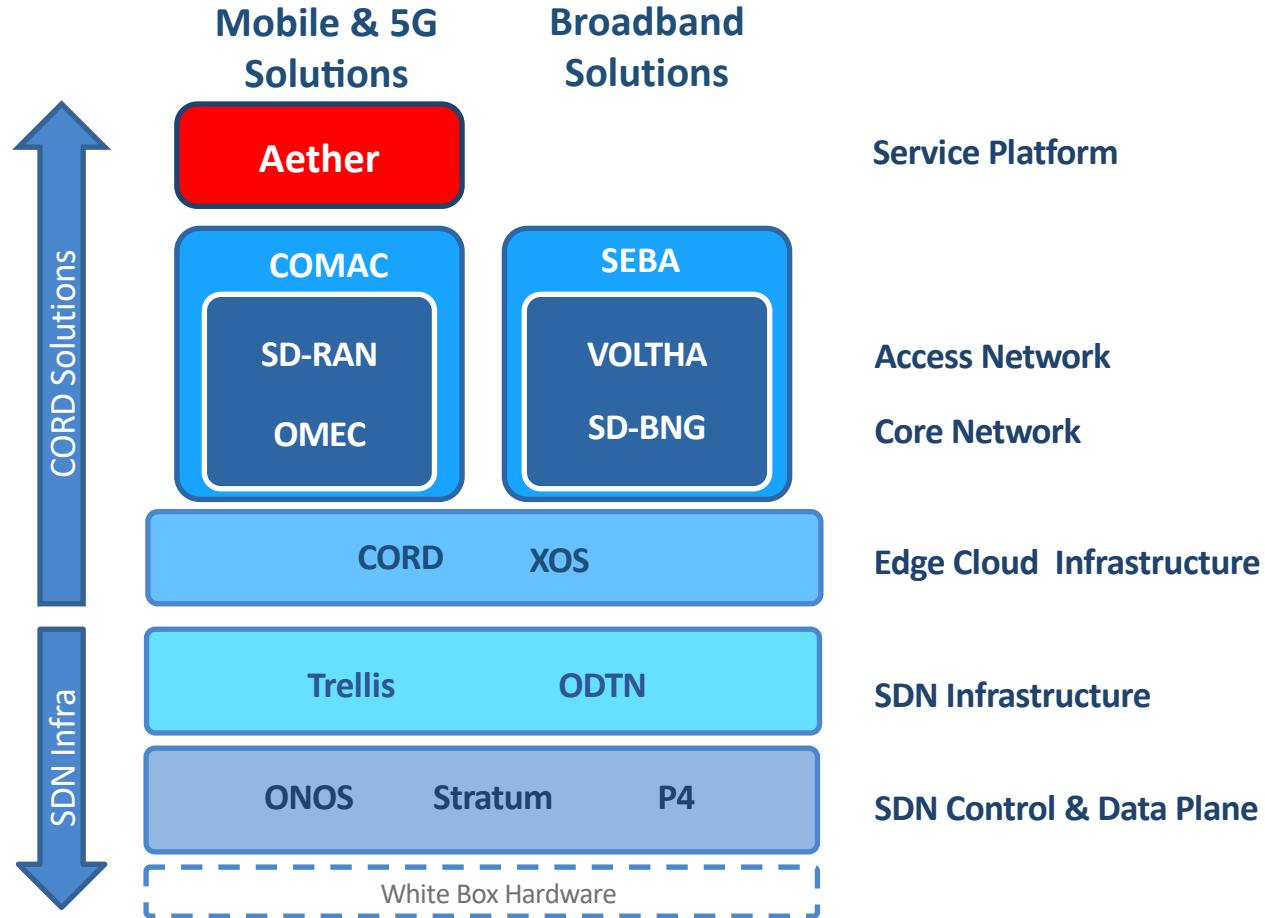




Aether Overview

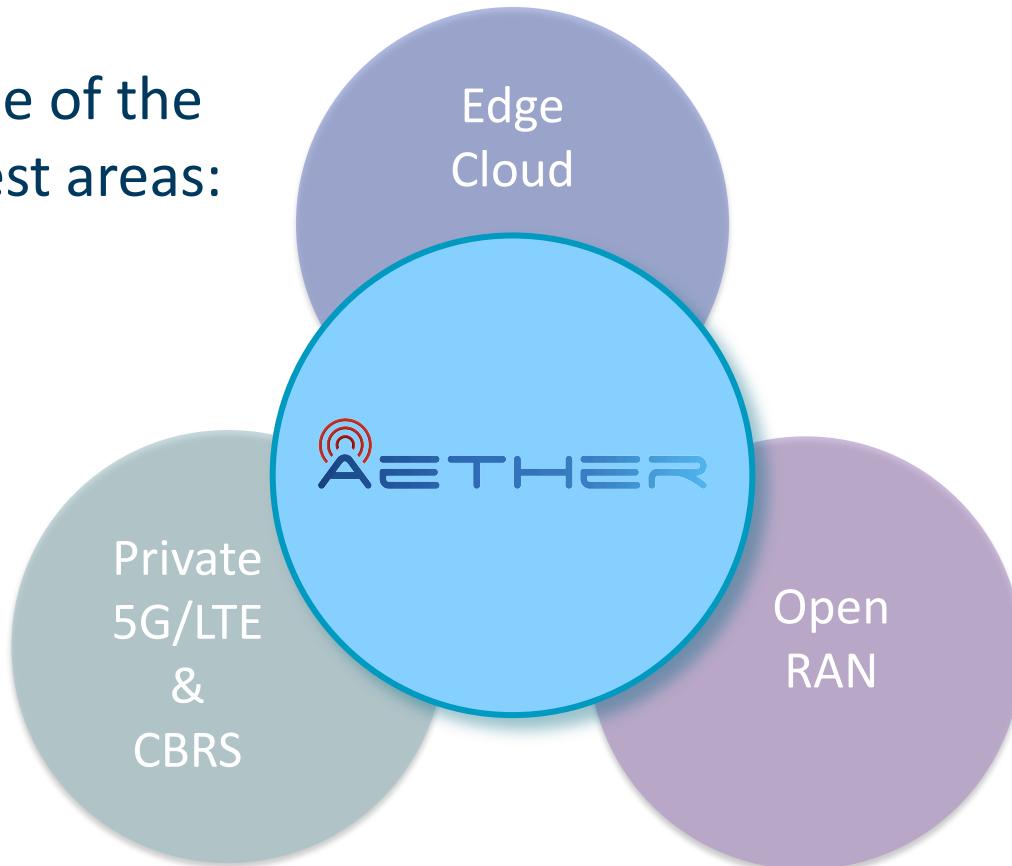


Aether Overview



Aether™ – Only Platform Bringing Edge Cloud & RAN Together

Three of the hottest areas:



ONF has been a leading innovator in all 3 of these areas:
Edge Cloud, Mobile Edge, Open RAN

Aether uniquely blends all three of these important technologies

Combining all three creates unique platform enabling Enterprise Digital Transformation

As open source, Aether enables unique forms of collaboration and new business models

Aether Market Opportunity

- Enterprise Private Networks Opportunity *

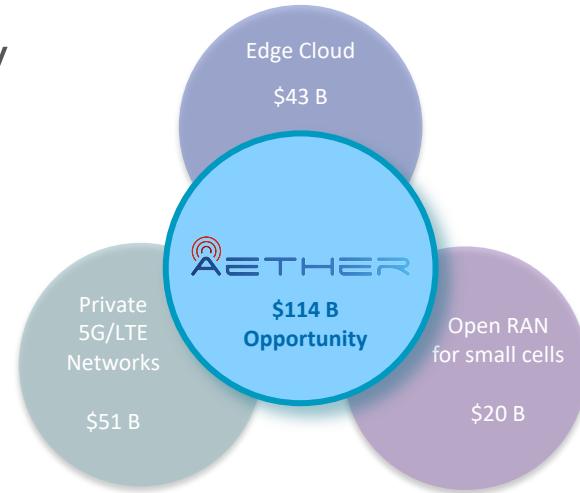
- Edge Computing Market: \$43B by 2027
- Enterprise 5G Market: \$32B by 2026
- Private LTE Market: \$19B by 2026
- Open RAN for small cells : \$20B by 2024

- Dynamics

- Intersection of Connectivity, Edge Cloud, AI/ML and SDN enabling Industry 4.0 Transformation
- Land grab is shaping up, but no dominant players have been established

- Forces likely to help shape the market

- CBRS and unlicensed spectrum make private networks affordable
- Release of additional spectrum make mass proliferation of private networks feasible
- New players will be building these networks: cloud, enterprise, integrators along with traditional telco
- Interplay between of cloud and telco operators likely to transform the landscape



<https://www.grandviewresearch.com/press-release/global-edge-computing-market>

<https://www.prnewswire.com/news-releases/5g-enterprise-market-worth-31-7-billion-by-2026-exclusive-report-by-marketsandmarkets-300820936.html>

<https://www.gminsights.com/industry-analysis/private-lte-market>

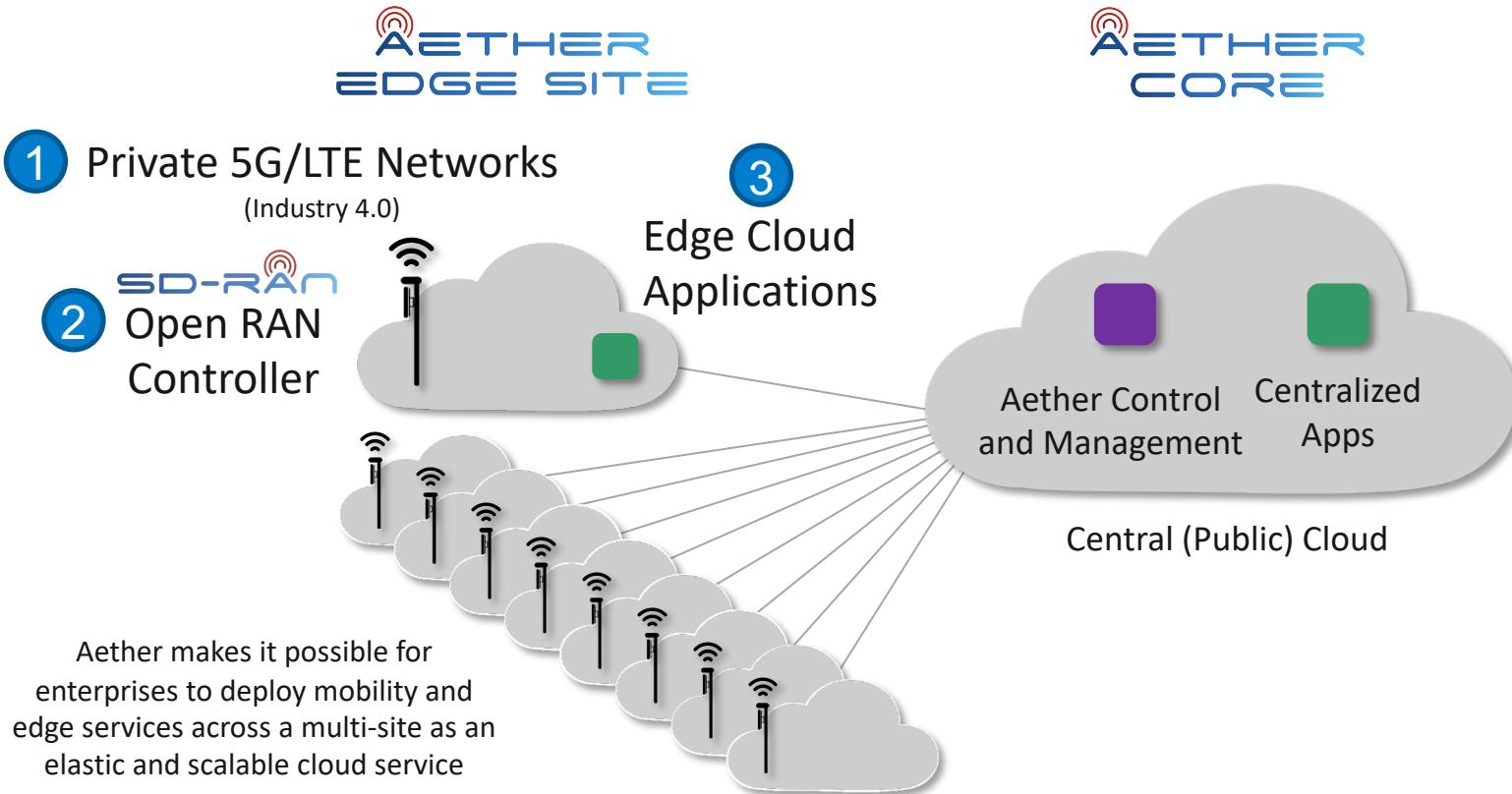
<https://www.delloro.com/news/worldwide-ran-revenues-expected-to-reach-0-2-trillion-through-2024/>



26



Aether – Multiple Edges Orchestrated from Central Cloud





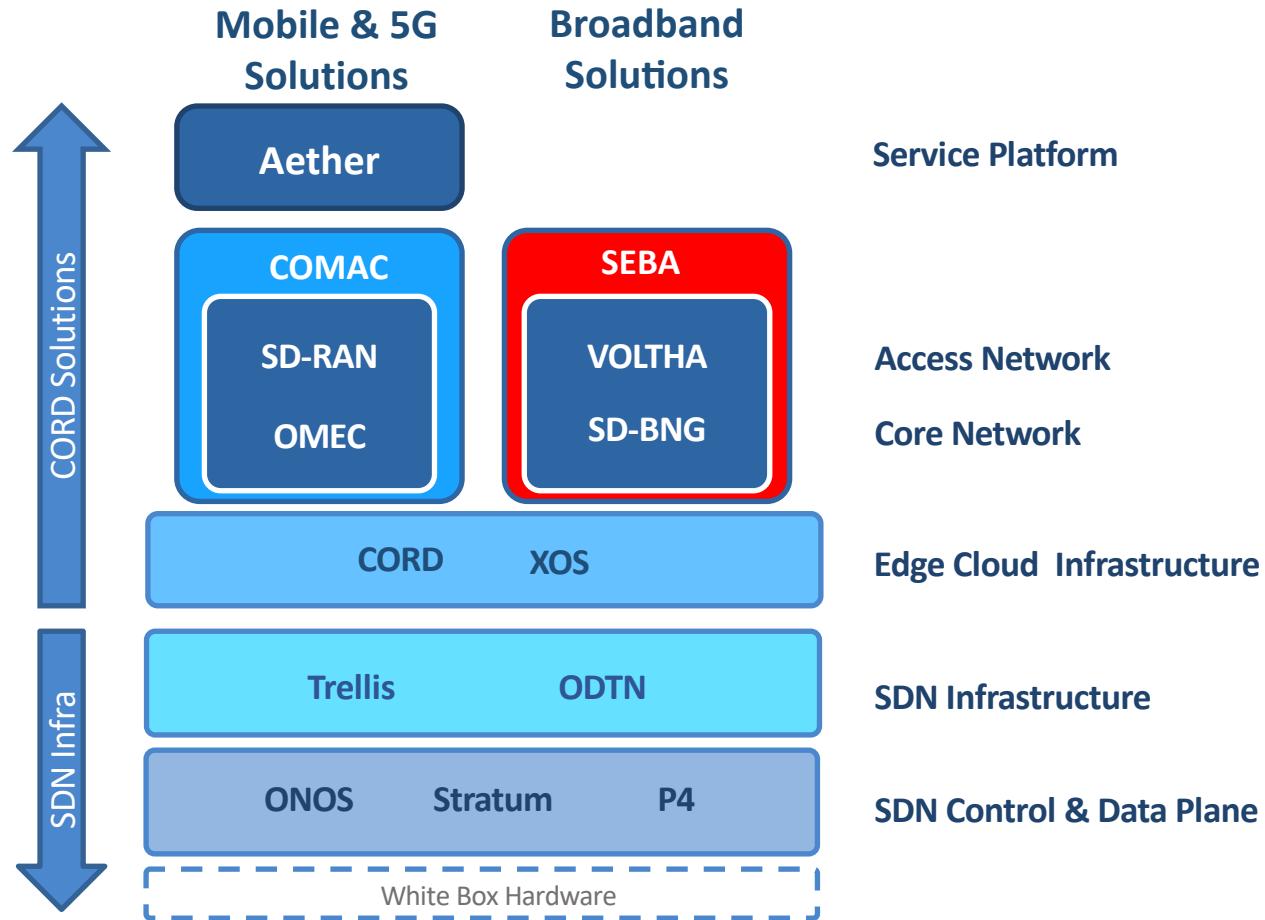
- First open source platform for Enterprise-5G/LTE-Edge-Cloud-as-a-Service
- Only platform blending edge & mobile
 - Edge Cloud Services - Runs apps from public cloud providers (AWS, Azure, Google Cloud) on the edge
 - Private 5G/LTE – uses diverse spectrum: licensed (LTE/5G), lightly licensed (CBRS), unlicensed (WiFi)
 - Integrates ONF's SD-RAN Open RAN Controller - enabling spectrum optimization and improved QoE
- Hybrid Cloud Architecture
 - Runs what's necessary at the edge (latency sensitive, bandwidth conserving and policy constrained functions) and everything else in the public cloud
- Enabling New Business Models
 - Democratizing the edge cloud
 - Traditional Providers, Cloud Operators, Integrators & Enterprises can now easily build private networks
- Enabler for enterprise digital transformation: IoT + automation + AI/ML



SEBA Overview



SEBA Review



State of Broadband Access Networks

- Multiple forces are driving a massive upgrade of PON infrastructure
 - Industry is entering a 10Gig PON upgrade cycle
 - Operators are expanding footprint and reach
 - Governments are investing in broadband as critical infrastructure



\$100B

Broadband infrastructure investment in discussion by US federal government



>\$100B

Private investment by tier-1 operators in Australia, India, Japan, Germany, Turkey, UK, US and many more.



>\$30B

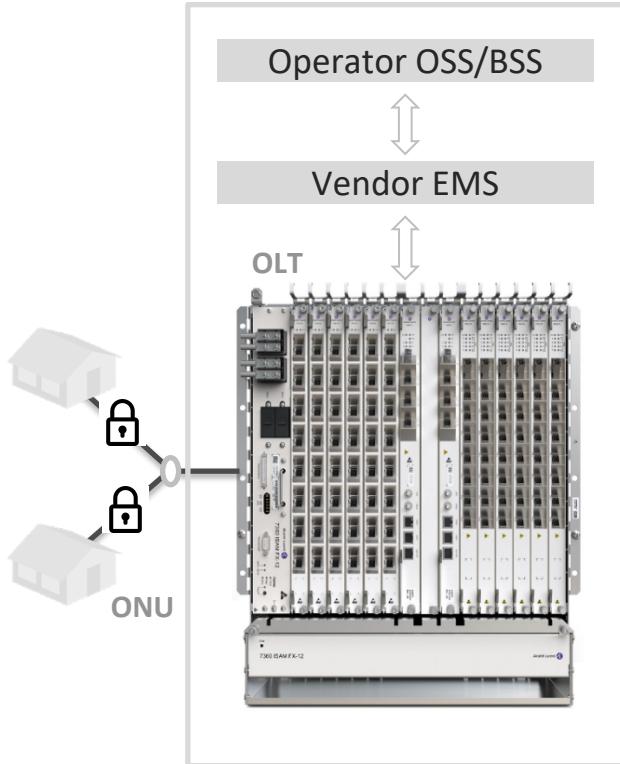
EU funding mechanisms for broadband investment, including the “Connecting Europe Facility”



\$100B

Public investment to provide African continent with reliable access, according to World Bank

Operators Want This Next Deployment to be Future-Proof

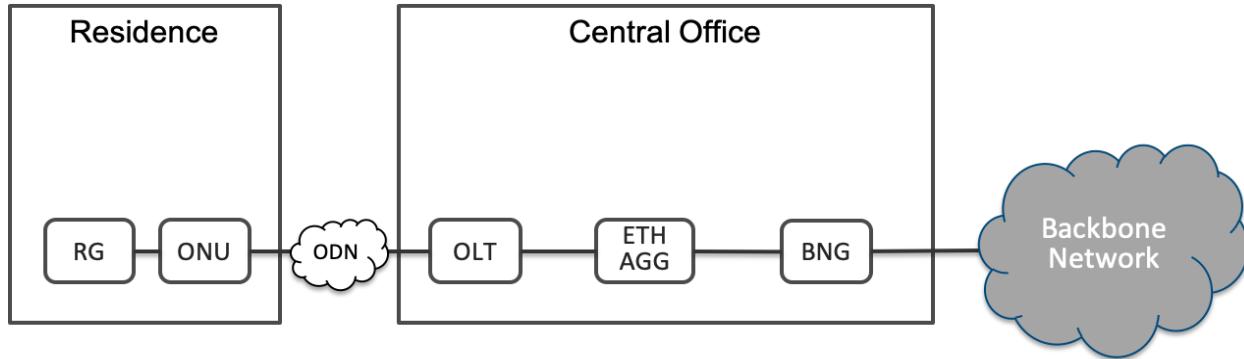


Operators are Looking For

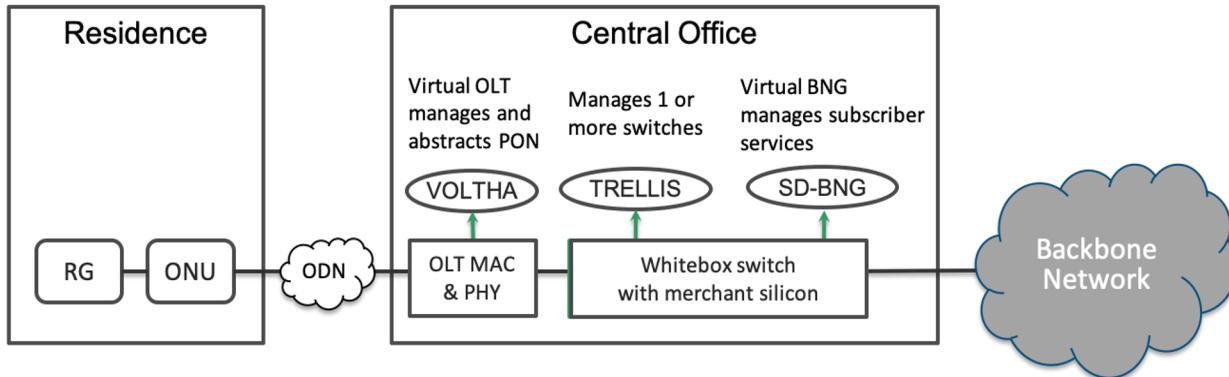
- Break away from monolithic single-vendor systems
 - Chassis system forcing vendor lock-in
 - ONU must come from same vendor
- Embrace cloud-native design principles
- Enable use of multi-vendor white box components
 - With multi-vendor sourcing options
- Leverage open software
- Nimble solutions that can be enhanced over time to deploy new services without rip-and-replace

Virtualizing the Residential Broadband Access Network

- Chassis-Based Systems
- Challenging Scaling
- Vendor Lock-In



- Cloud Architecture
- White Box Hardware
- Functionality moved into the cloud



SEBA is at a Tipping Point

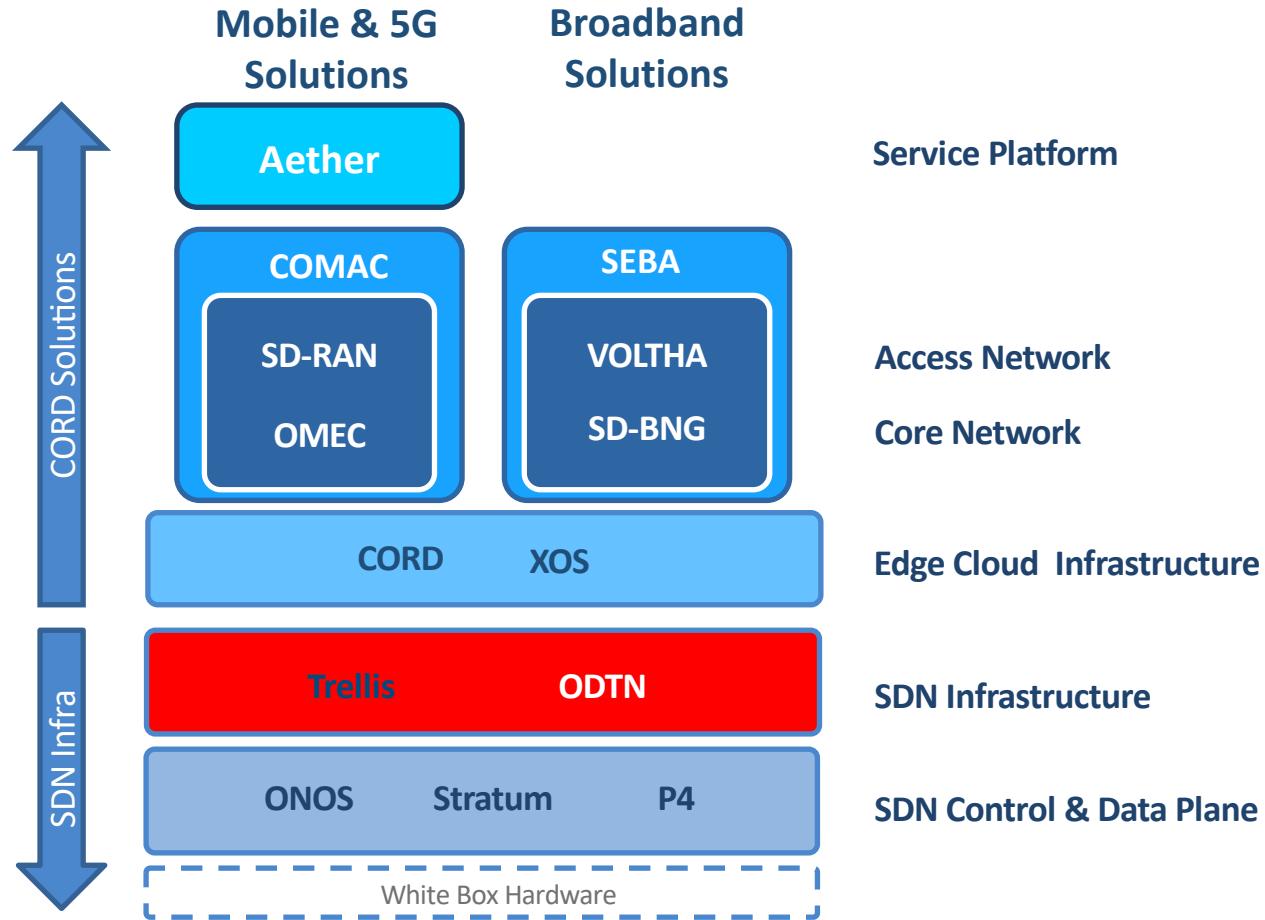
- Operators have made clear moves towards deploying SEBA, but the market is still young
 - Deutsche Telekom is in trials and entering production towards end of 2020
 - Turk Telekom has been in production since December 2019
 - 50+ active opportunities worldwide with Tier1,2,3 and rural operators looking at SEBA
 - AT&T, Telefonica, BT, NBN, TIM, TurkCell, others are in trials and/or RFI/RFP stages
- Small ecosystem of components is now certified and available
 - EdgeCore (OLT, Switches), Sercomm (ONU), Wiwynn (servers)
 - Sufficient for operators to craft solutions
 - Opportunities for vendors to enter and capture share (operators want multi-source options)
- Perfect Time for vendors to position themselves in the market



ODTN Overview



ODTN Overview



SDN and Disaggregation in Optical Transport Network

- Save Capex and Opex in Data Centre Interconnect deployments
- Rapid production adoption of innovations in terminal equipment
 - Enable vendors to innovate: speed, reach, QoT, ...
 - Let operators reap benefits through simple bookending
- Better LCCA (Life Cycle Cost Approach) and optimize equipment life-span
- Future proof your network avoiding vendor lock-in

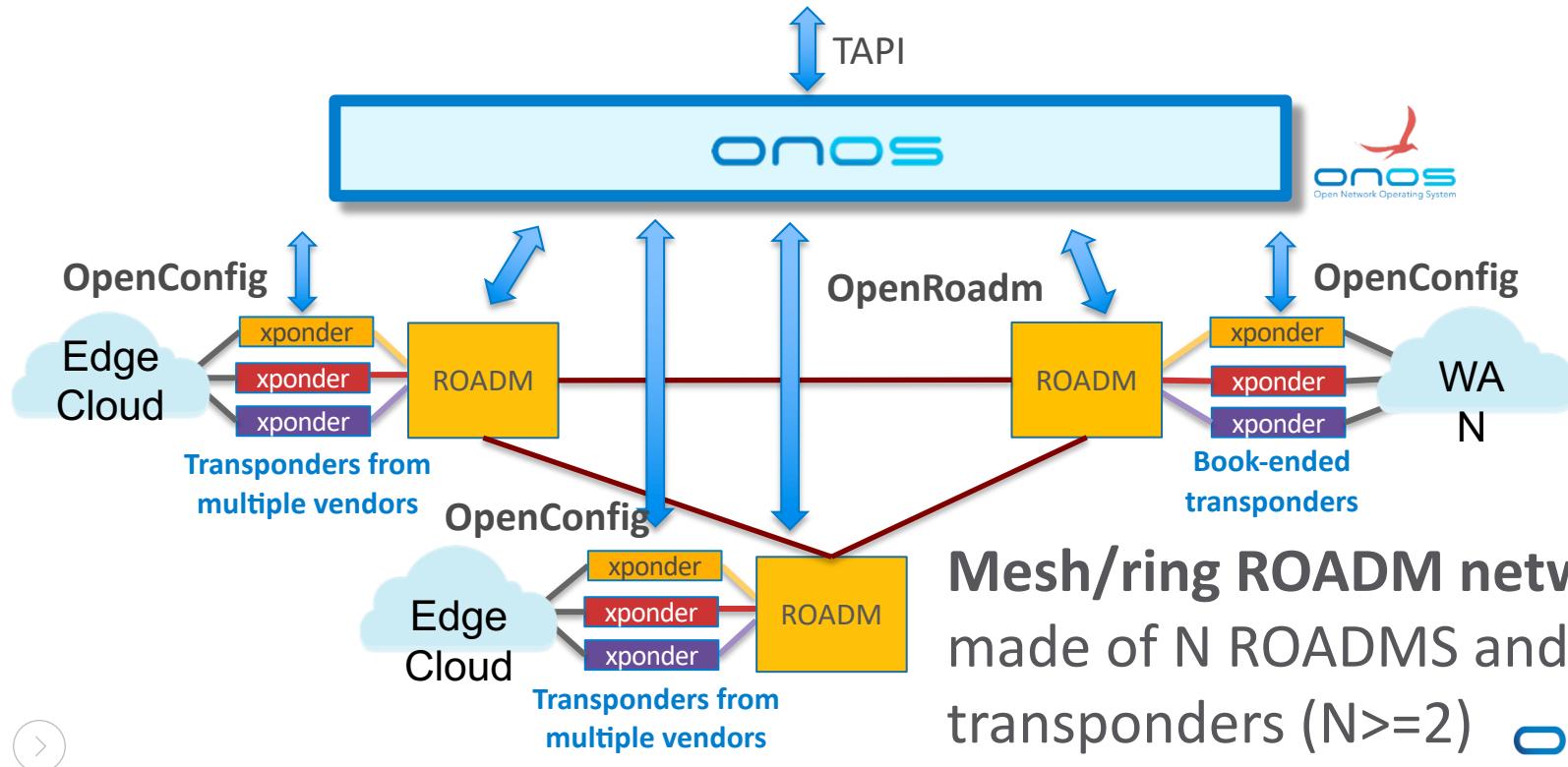


ODTN
Open Disaggregated Transport Network

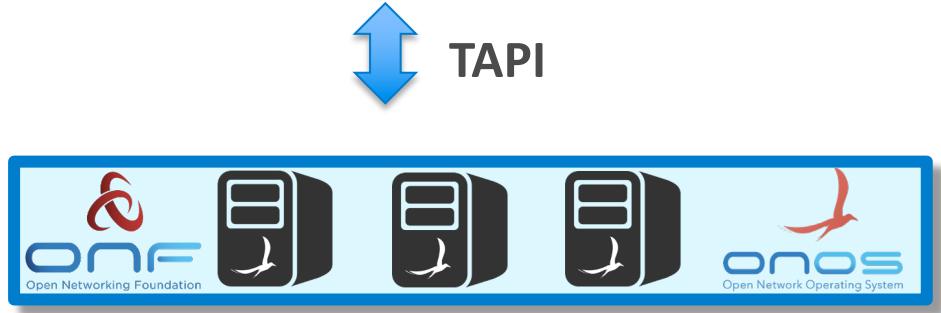


Current ODTN Architecture (ROADMS)

ODTN includes a complete OpenRoadm 2.2 driver



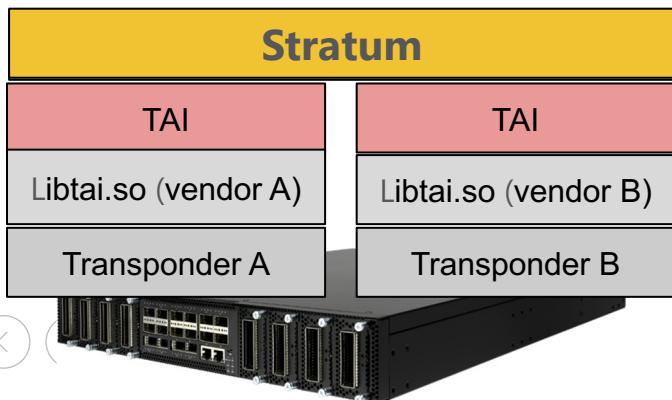
Project synergies



TAPI



OPENCONFIG



STRATUM
Transponder Abstraction Interface



39

effort on NB apps and use cases are complementary



TELECOM INFRA PROJECT

gNPY

ONF Brings network wide controller, SP requirements and API definition (tapi, Openconfig)



TELECOM INFRA PROJECT

TIP brings open hardware, Optical module and component expertise, TAI, and optical network planning tool (gNPY)

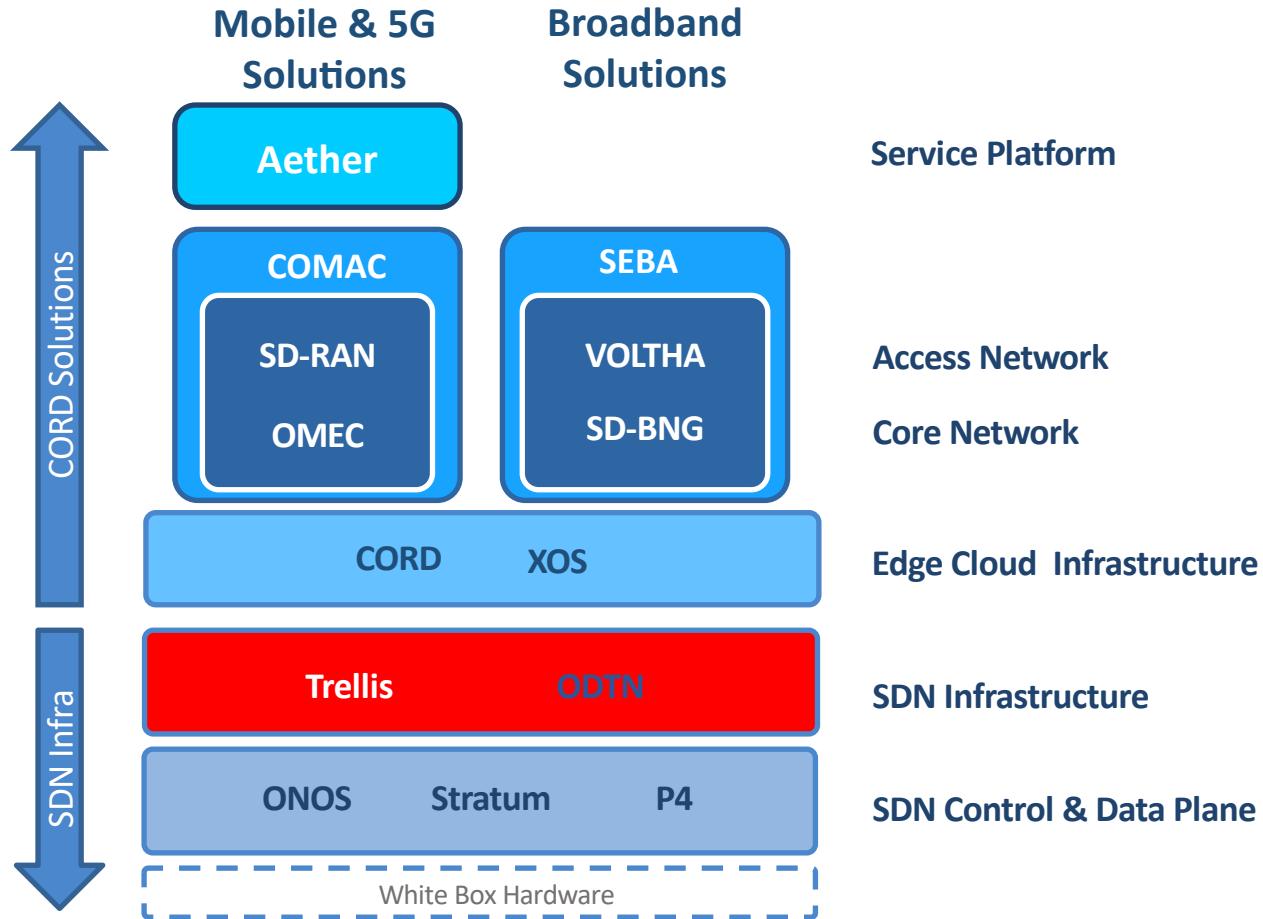




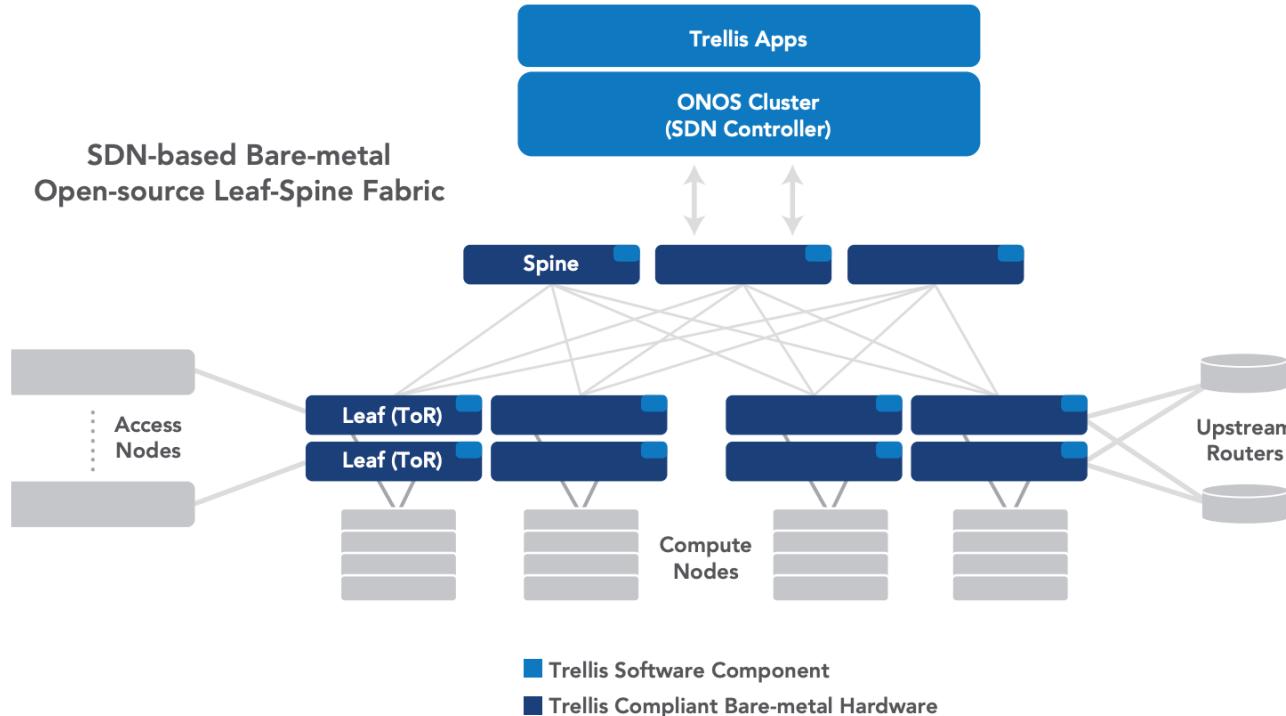
Trellis Overview



Trellis Overview



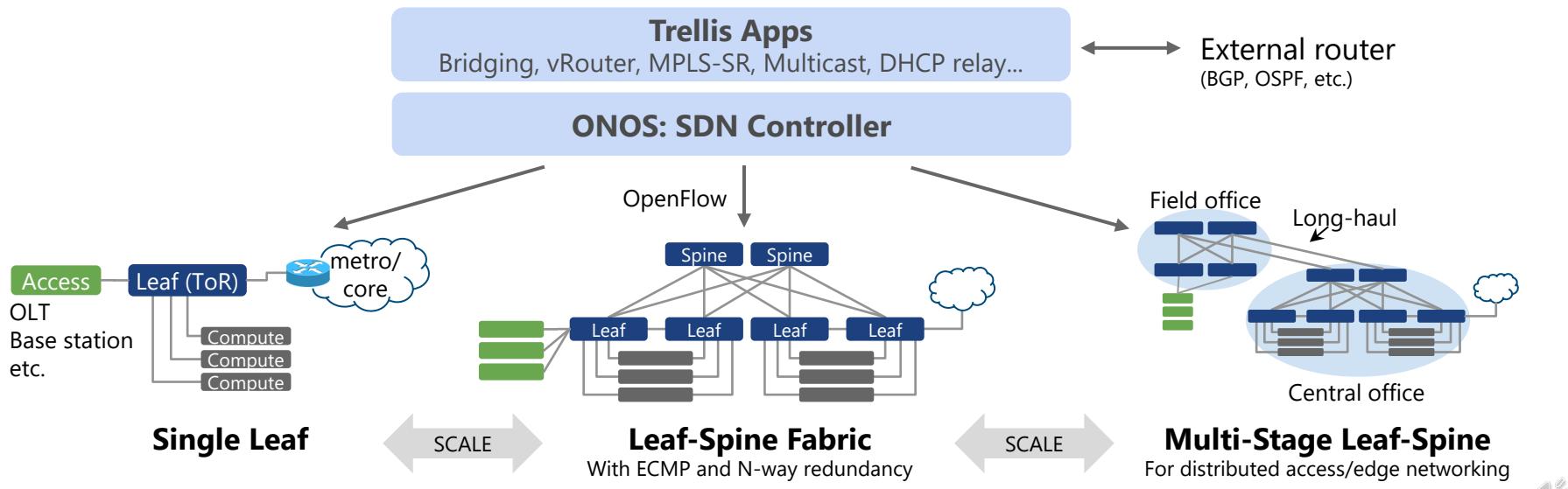
What is Trellis



Background

TOST (Trellis, ONOS, Stratum, Tofino)

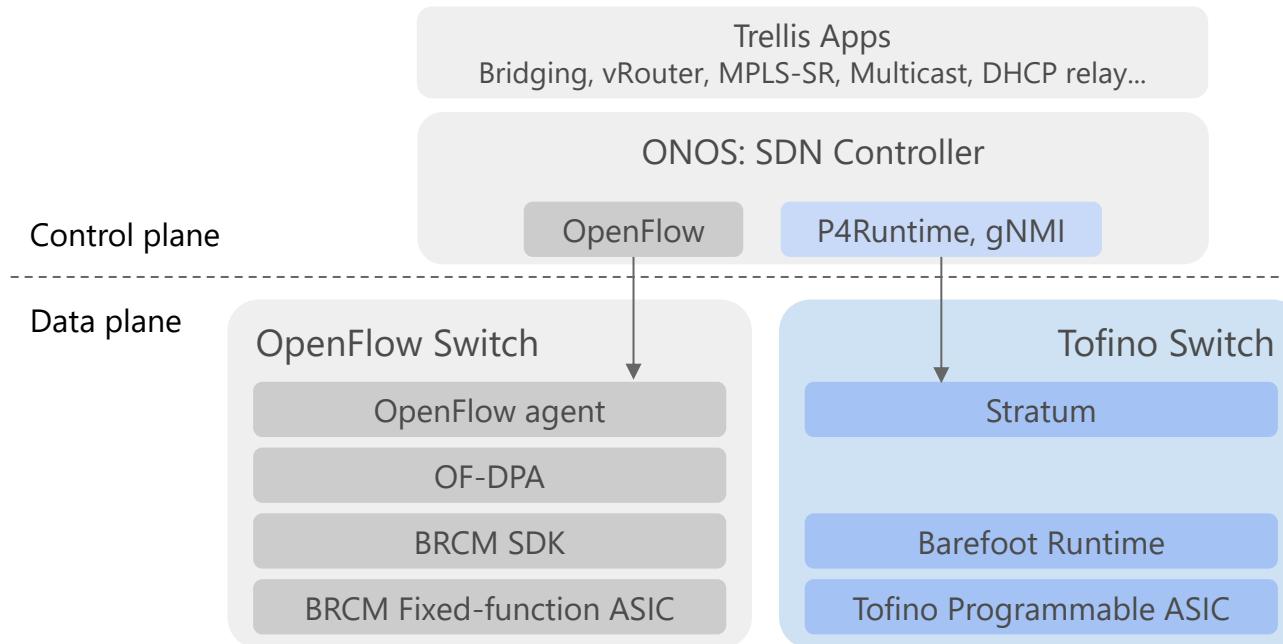
- Carrier-grade SDN fabric for edge / NFV applications
- Based on whitebox switches and merchant silicon
- In production with Comcast



Background

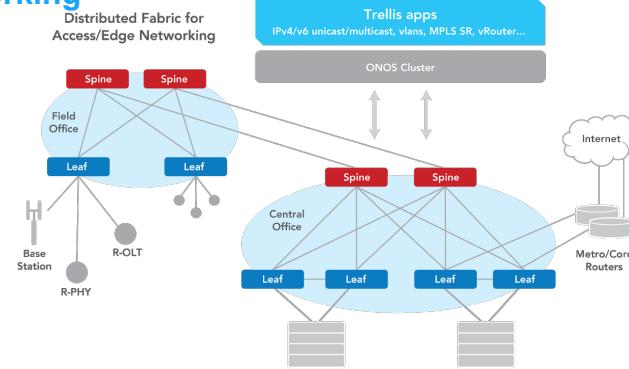
TOST (Trellis, ONOS, Stratum, Tofino)

- Bringing fully programmable, visible data plane into Trellis
- Enabling innovative features such as 5G programmable UPF and INT

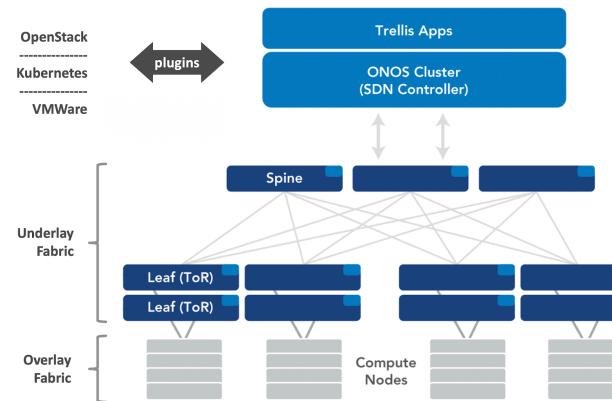


Use Cases

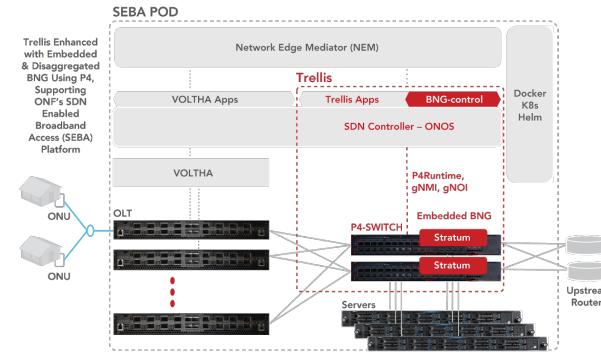
Distributed Fabric for Access/Edge Networking



Enterprise DC Fabric



SEBA with Embedded BNG using P4





Thank You

josecastillolema@ambassadors.opennetworking.org

ricardo.tombi@ambassadors.opennetworking.org

amanda.espindola@ambassadors.opennetworking.org

eric@opennetworking.org

