LATAM Webinar

Introduction to Open Networking Foundation (ONF.org)

Silicon Valley based industry non-profit.
Spun-out from Stanford & Berkeley in 2011

Mission to transform networking with:
SDN
Disaggregation
Open Source

Successfully created several platforms and solutions now in production with operators

50+ people
80% engineering

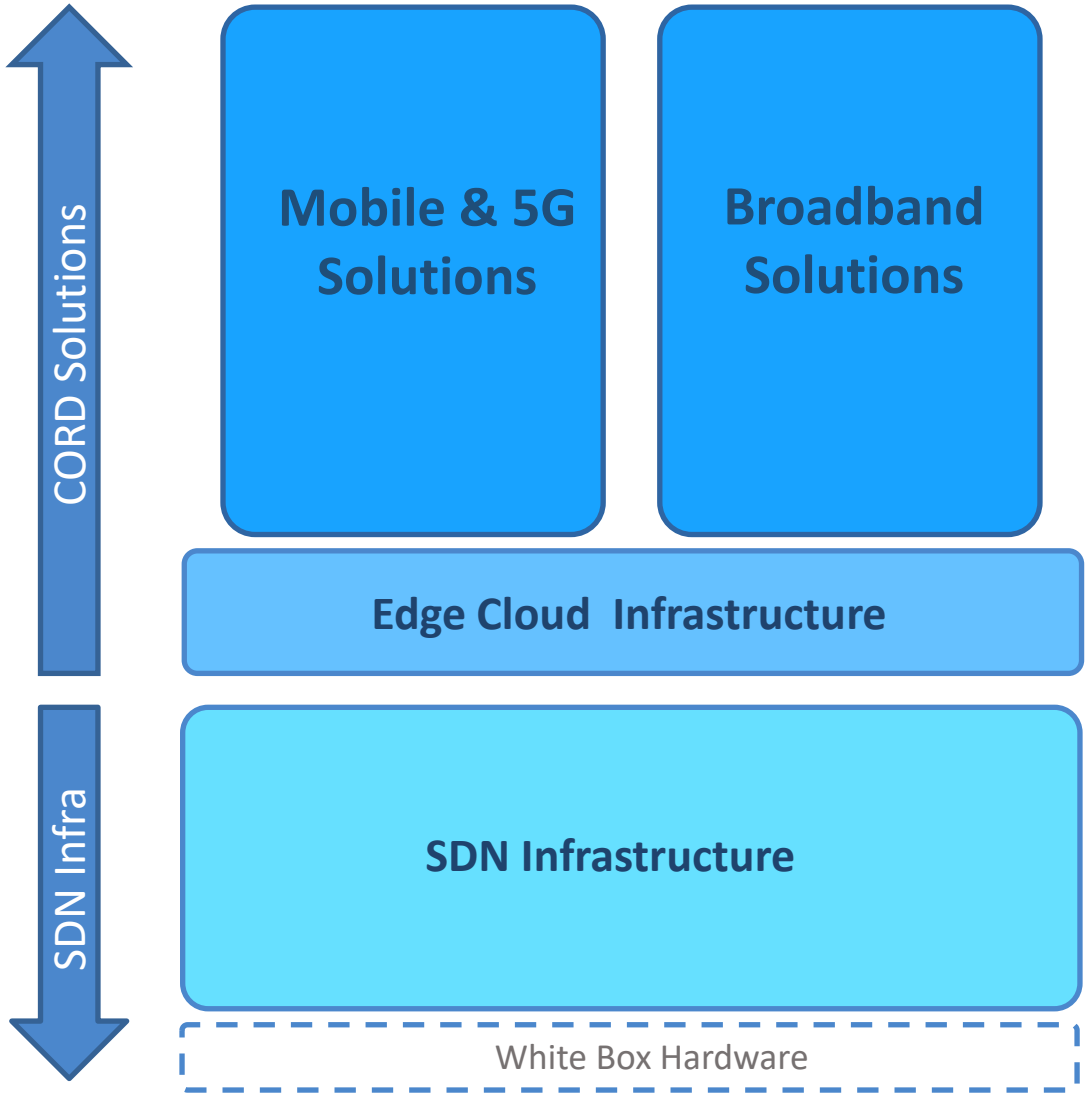
Should not be considered a 'standards organization'

All operator board

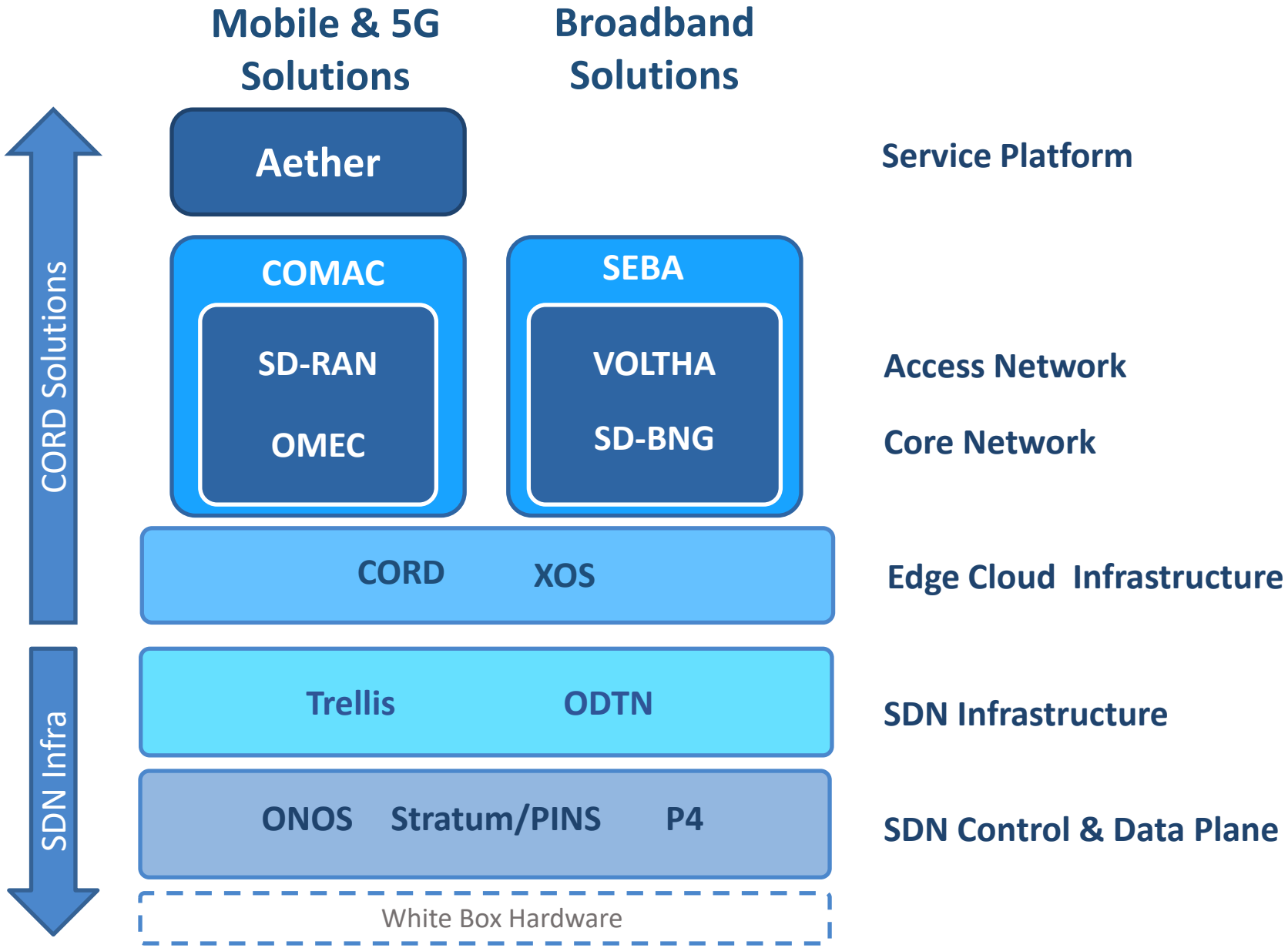
Large eco-system of operators, cloud players and vendors

ONF Portfolio

ONF's Projects



ONF's Projects



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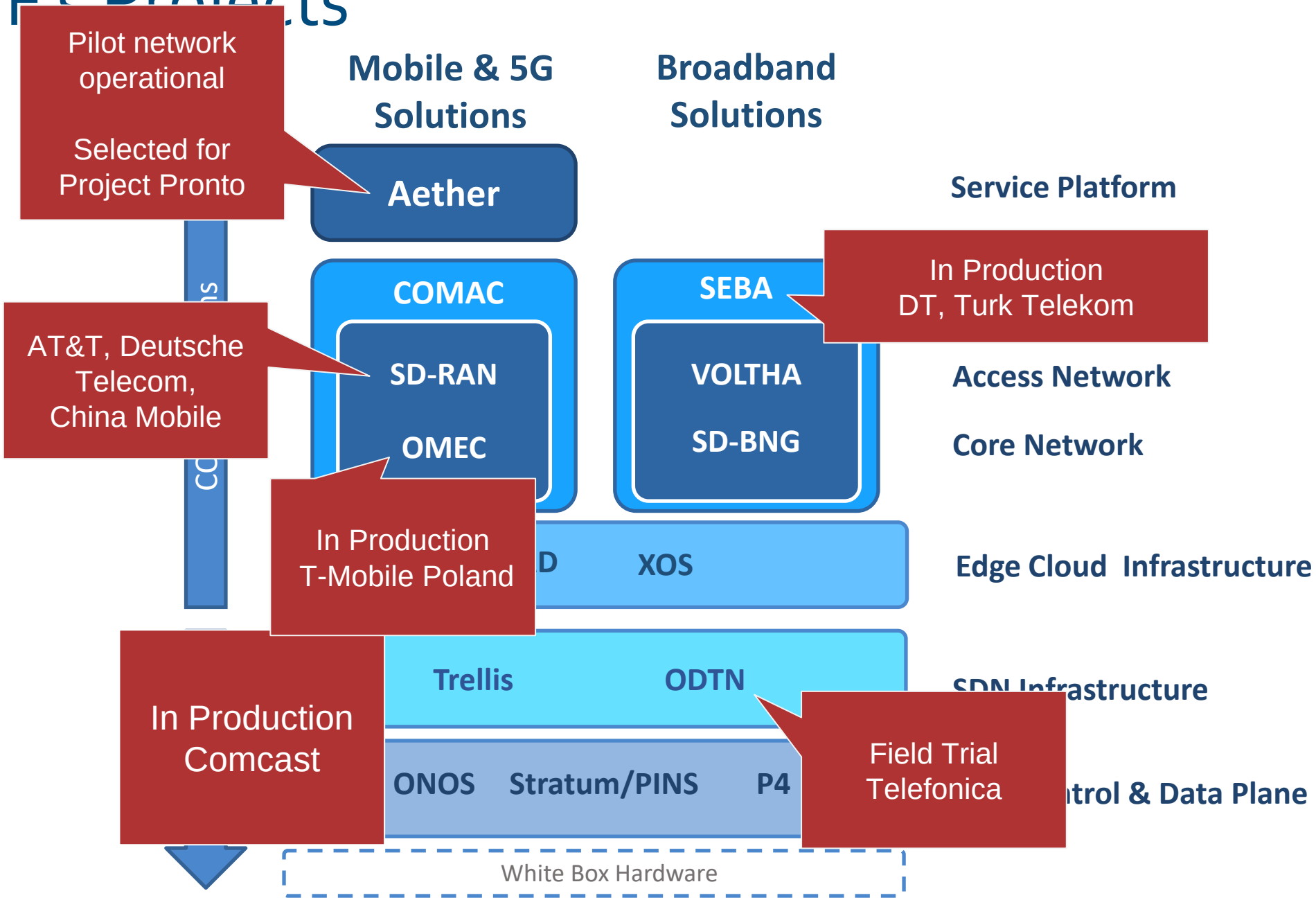


ODTN

ODTN: SDN & Disaggregation of Optical Transport

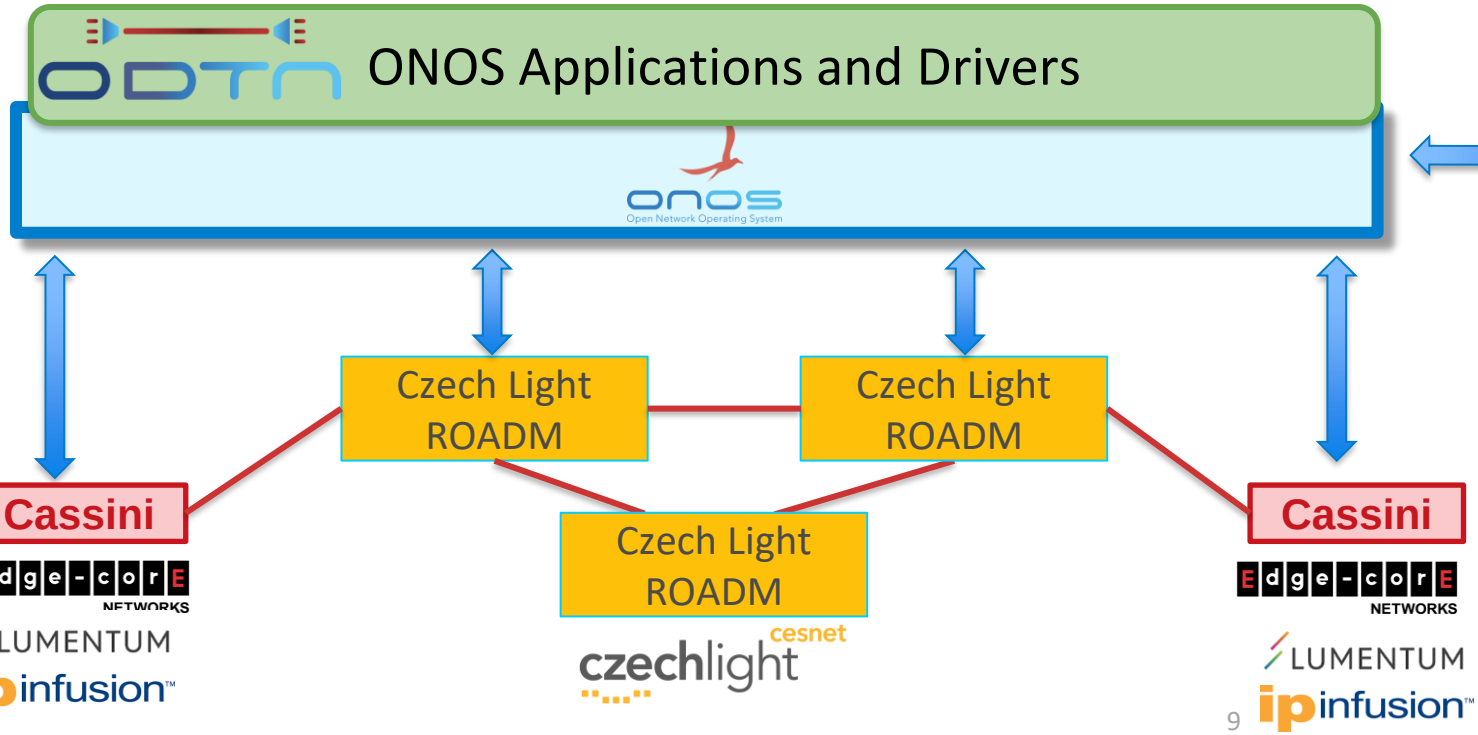
Goals Achieved

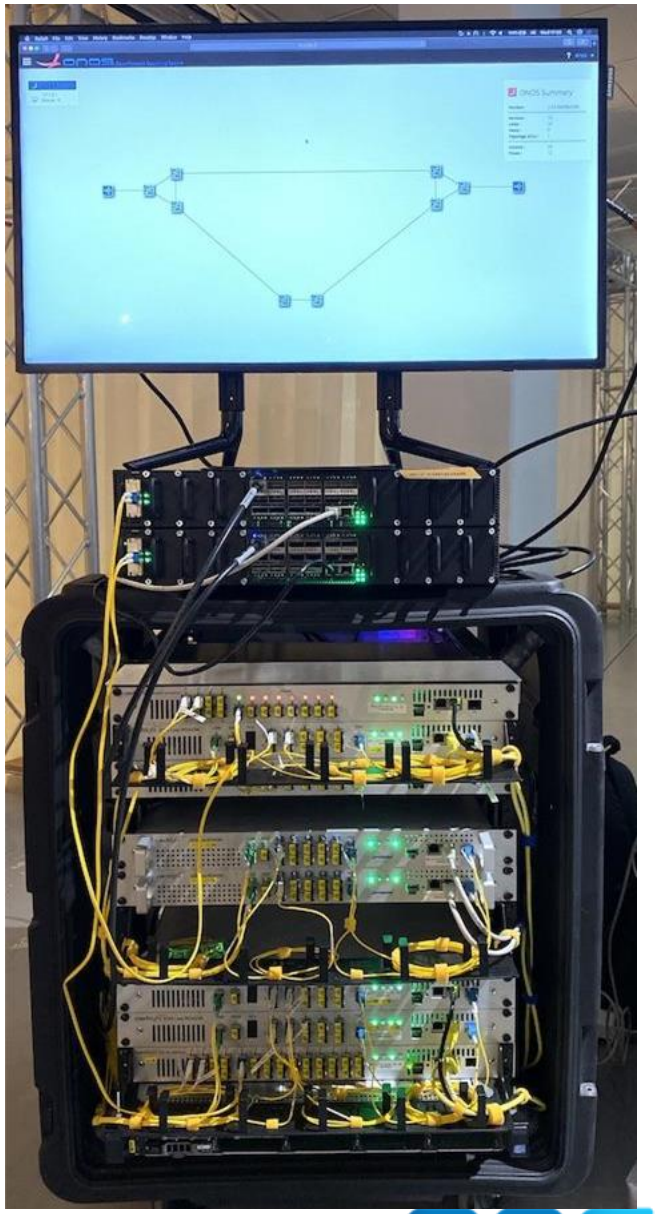
- **gNPY Optical planning tool integration** for optical impairment validation (ONF + TIP)
- **Stratum** Integration on **CASSINI** (PLVision + ONF + Edgecore)
- **ODTN + Trellis Fabric** (ONF)
- OpenConfig Driver consolidation to avoid proliferation (Palc Netwkrs)
- **Bit Error Rate** (BER) retrieval and GUI (Sterlite and ONF)
- Alarm Support (Nokia + ONF)
- CzechLight Roadm Drivers (CESNET)

GNPy + ONOS Integration

Integration of ONOS with GNPy optical simulation software:

- **network optimization according to optical impairments**.
- ONOS + GNPy's achieve **best path from A to B according to GSNR**.
- **Avoided duplication of effort** for optical Path computation Element.
- **Demo at TIP Summit '19 and OFC '20 (hardened)**



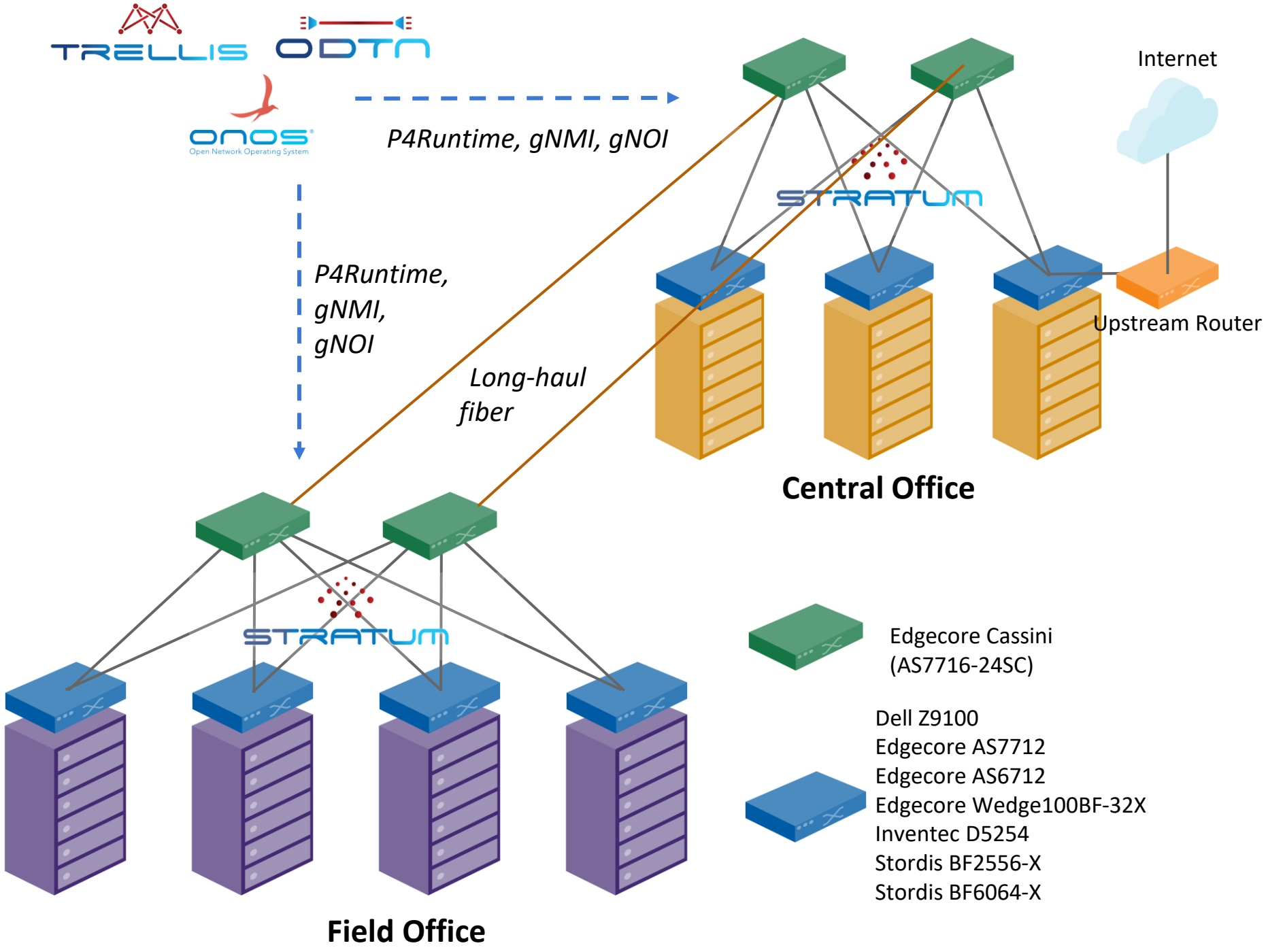


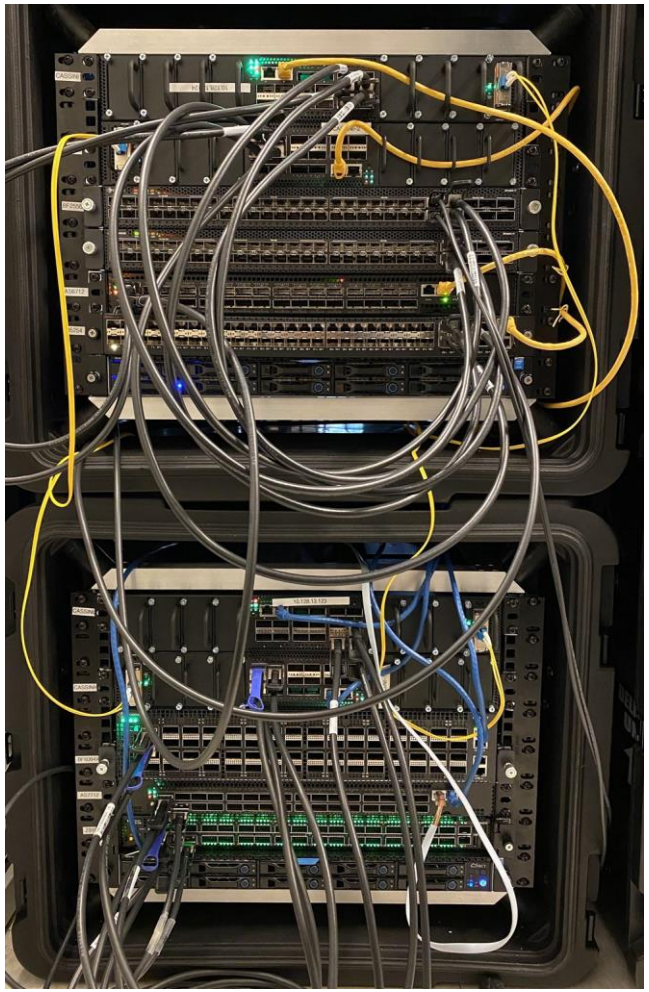
ODTN, Trellis with Stratum on Cassini

- **Stratum is the first open source operating** system for Cassini, a packet optical transponder with merchant silicon switching ASIC
- Optical capabilities managed with **OpenConfig** and **gNMI**
  - **Discovery, Wavelength, Modulation, Power**
- **Support for ACO/DCO optical pluggables through TAI open source API**
- Integrated as a native **Trellis spine** (L2 - L4) using Tomahawk+ ASIC and as **transponder** with ODTN Openconfig Drivers

ODTN + Trellis + Stratum is the first open source complete stack for a packet optical data-centre leaf spine fabric.

TELECOM INFRA PROJECT


TRELLIS
ODTN
ONOS
Open Network Operating System
P4Runtime, gNMI, gNOI
P4Runtime,
gNMI,
gNOI
Long-haul
fiber
STRATUM
Internet
Upstream Router
Central Office
STRATUM
Field Office
Edgecore Cassini
(AS7716-24SC)
Dell Z9100
Edgecore AS7712
Edgecore AS6712
Edgecore Wedge100BF-32X
Inventec D5254
Stordis BF2556-X
Stordis BF6064-X



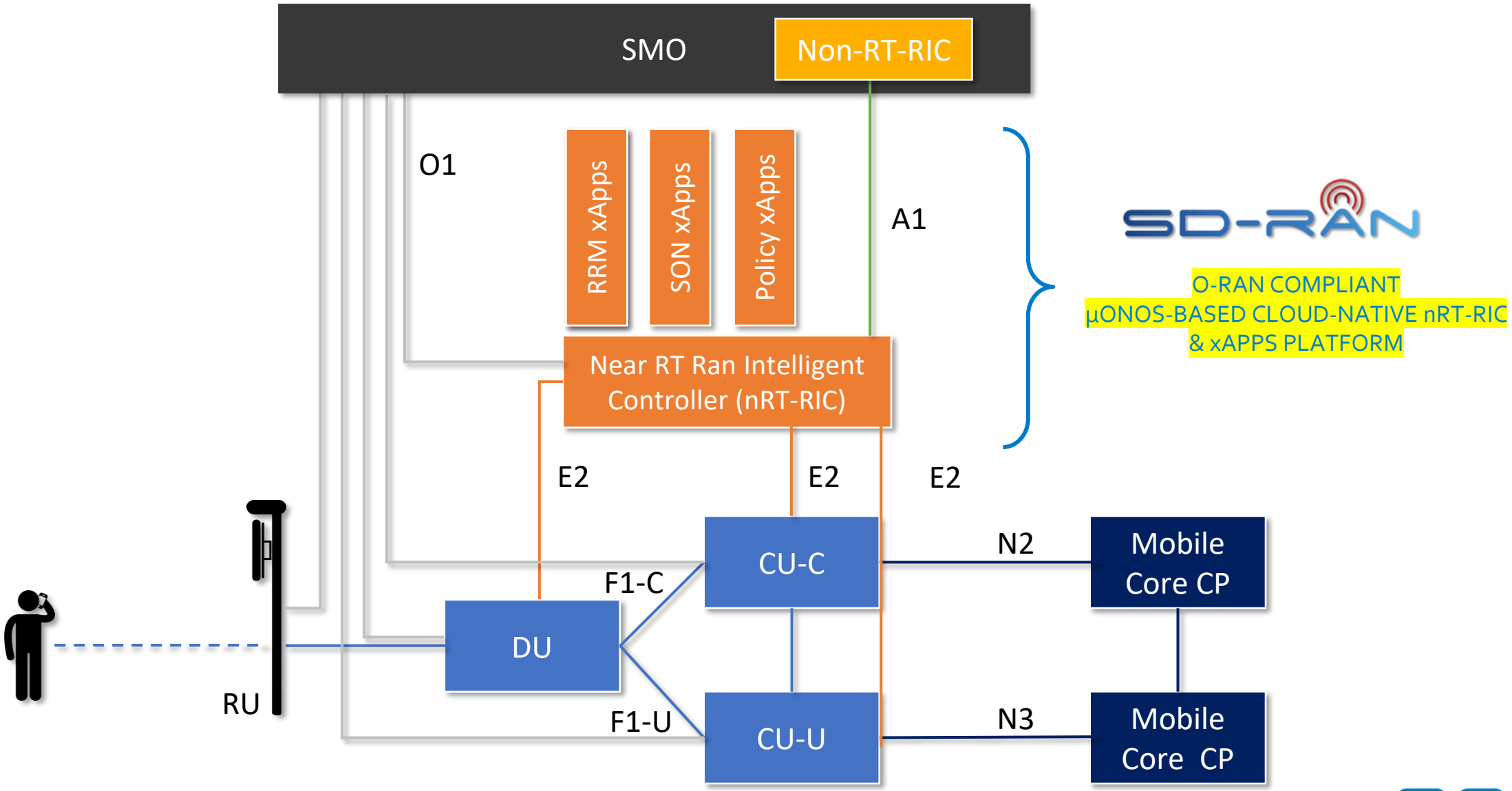
ODTN: SDN & Disaggregation to Optical Transport

Next Steps

- **Extend Stratum Capabilities** with BER, ALARMs and other parameters (ONF + PLVision)
- **Extend GNPy integration** with path selection by user (Czechlight + Tip/PSE)
- **FEC** (Forward error correction) (Sterlite)
- Extension of **GUI with path** selection and visualization
- Integrate µONOS config micro service (ONF and Metrohaul)

SD-RAN

O-RAN Architecture

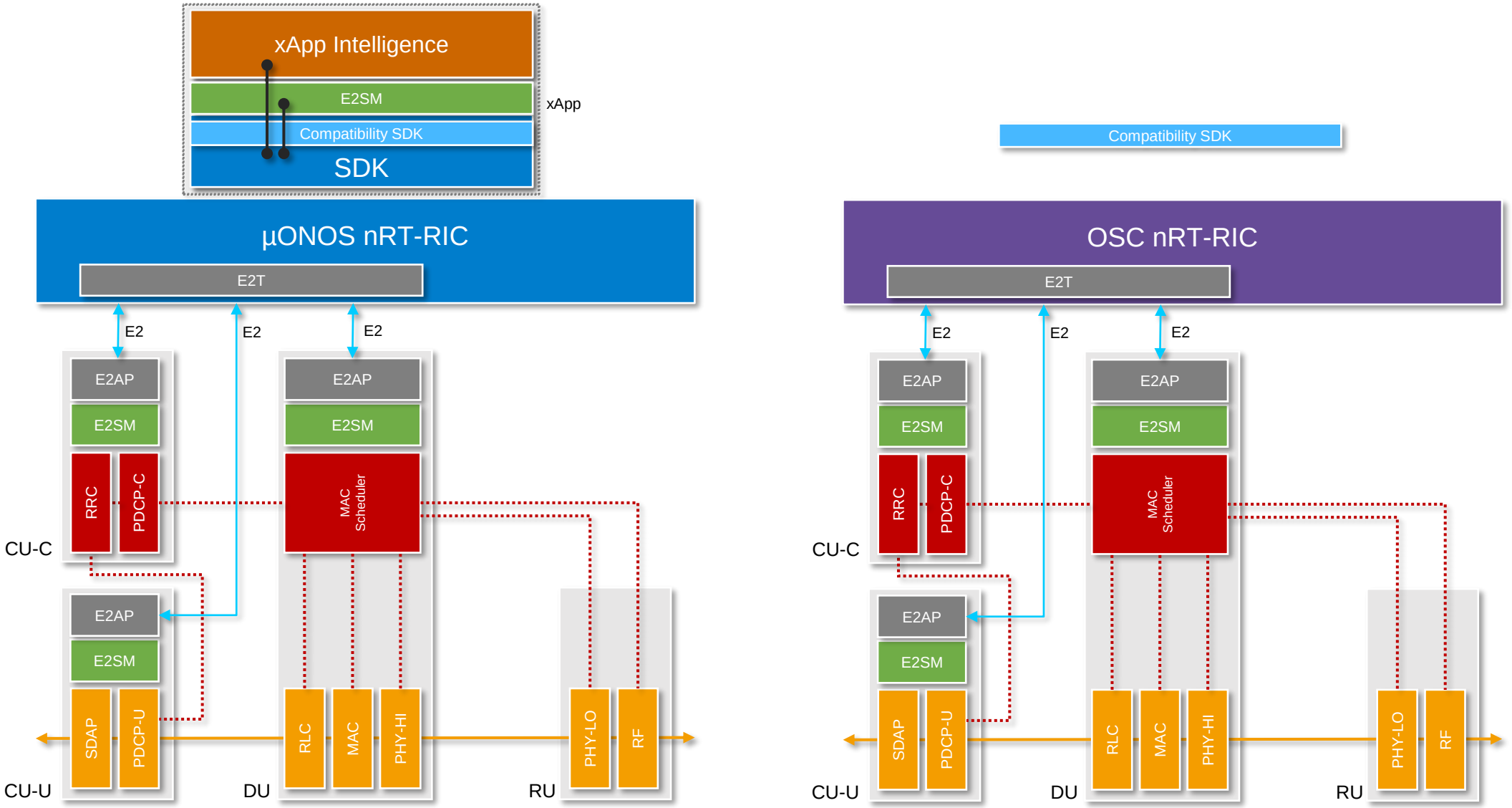


SD-RAN Going Forward ..

- Many past high-quality demos of µONOS-RIC performance and example xApps
  - With clear focus on bringing true SDN-based control to the RAN
  - Lifting CU-C side RRM functions as xApps
- Late Q3, ONF decision to push the O-RAN compliant *µ*ONOS-RIC implementation towards pre-production grade
- Focus Areas
  - O-RAN compliant interfaces E2, O1, A1 and protocols ASN.1, SCTP, NETCONF etc
  - Maintain clustered micro-ONOS architecture for HA and Performance
  - Work beyond the RIC and develop e2e SD-RAN solution
    - Requires integration with 3rd party xApp vendors (FB, Intel, AirHop etc)
    - Develop SDK that makes xApps portable across RIC implementations
    - Requires integration with 3rd party CU/DU vendors (Radisys, Sercomm etc)
    - Develop ONF's own O-RAN compliant RU/CU/DU to serve as exemplar
    - Develop ONF's own O-RAN compliant Ran-Simulator for scale testing
    - Develop SDRAN-in-a-Box, a complete e2e solution for dev/test & reference
  - Contribute learnings of new SMs and app-sdk back to O-RAN and OSC
  - SD-RAN solution releases every quarter / Regression test suites on physical test-pods
  - QA/Interop lab with DT O-RAN Open Test and Integration Center (OTIC) in Berlin
  - Hardening & operationalization towards Lab & Field-trials with DT, Facebook and others

Development of xApp SDKs

Enabling Inter-RIC Platform Portability of xApps

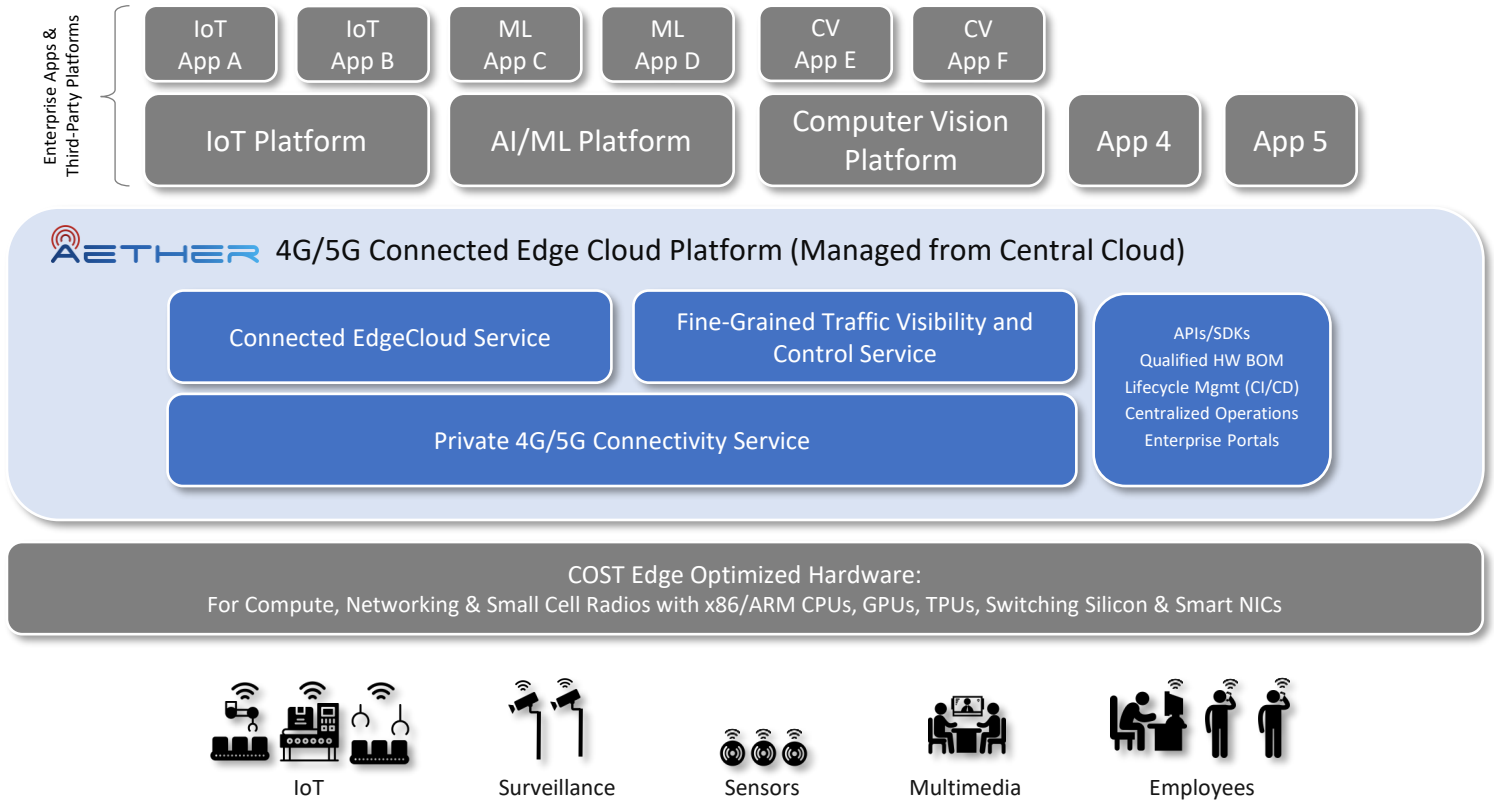


SD-RAN Ecosystem

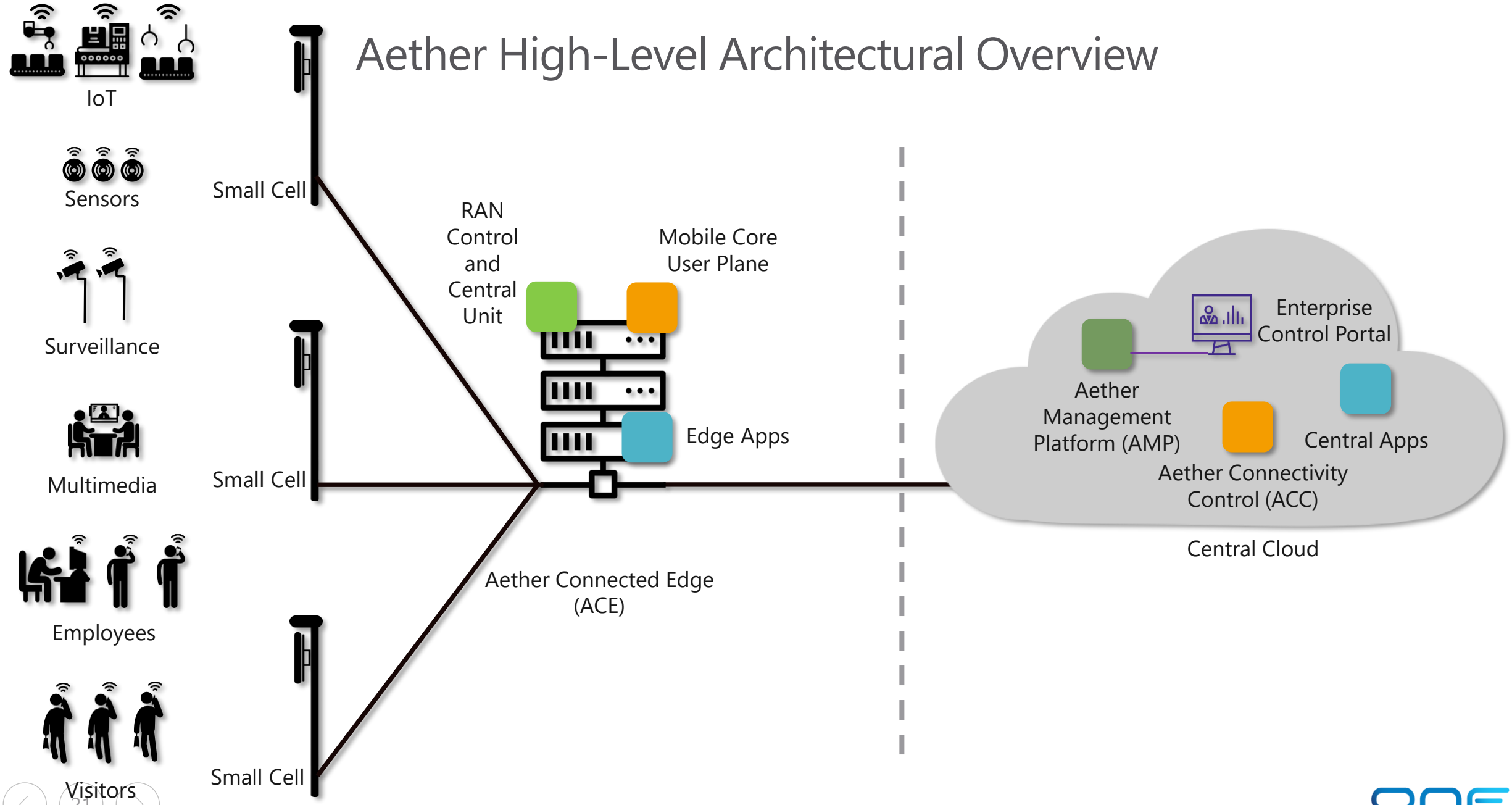
https://opennetworking.org/news-and-events/press-releases/onf-announces-new-5g-sd-ran-project/

Aether

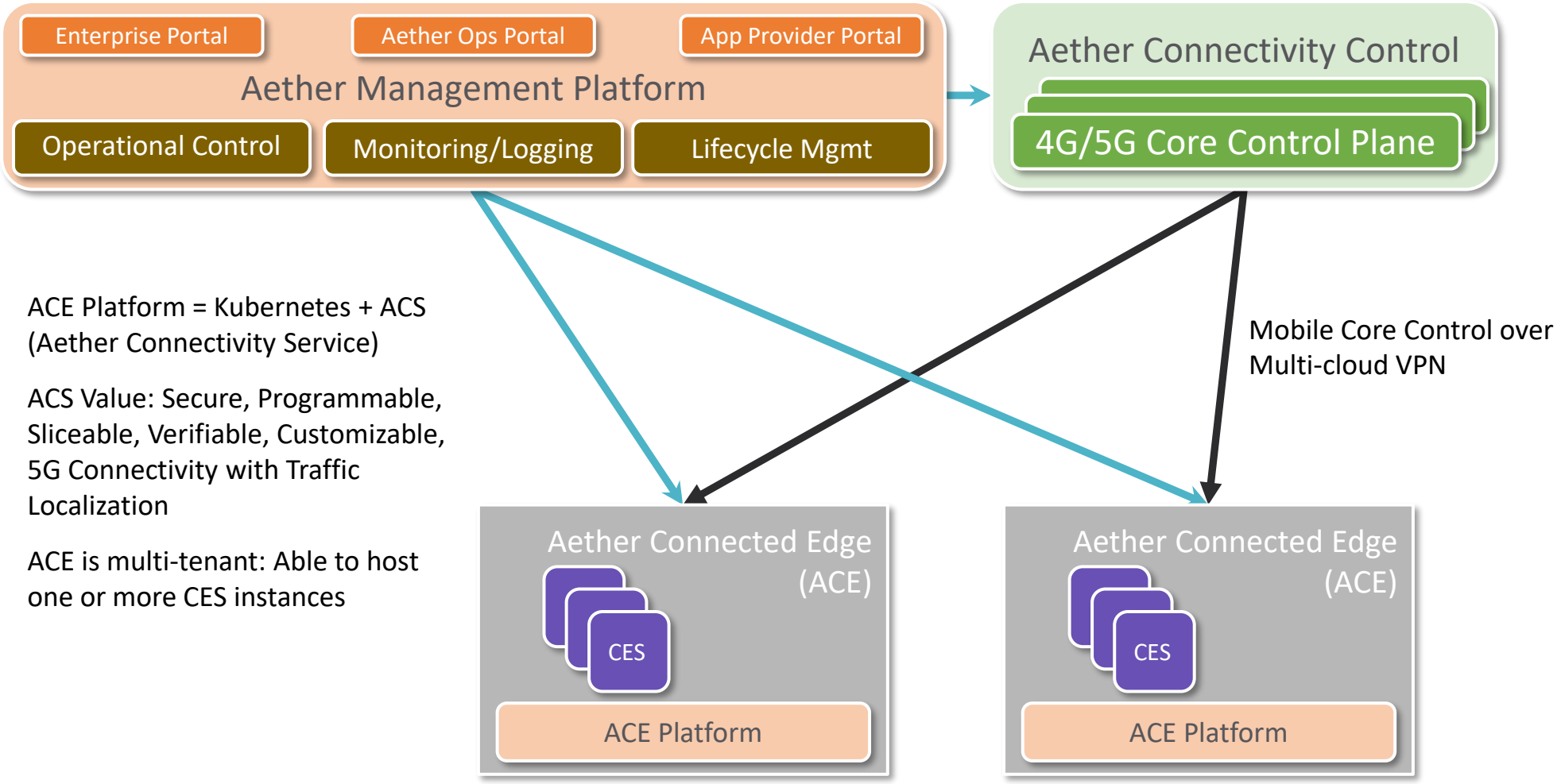
Aether Services



Aether High-Level Architectural Overview



Aether Platform Components



ACE Platform = Kubernetes + ACS (Aether Connectivity Service)

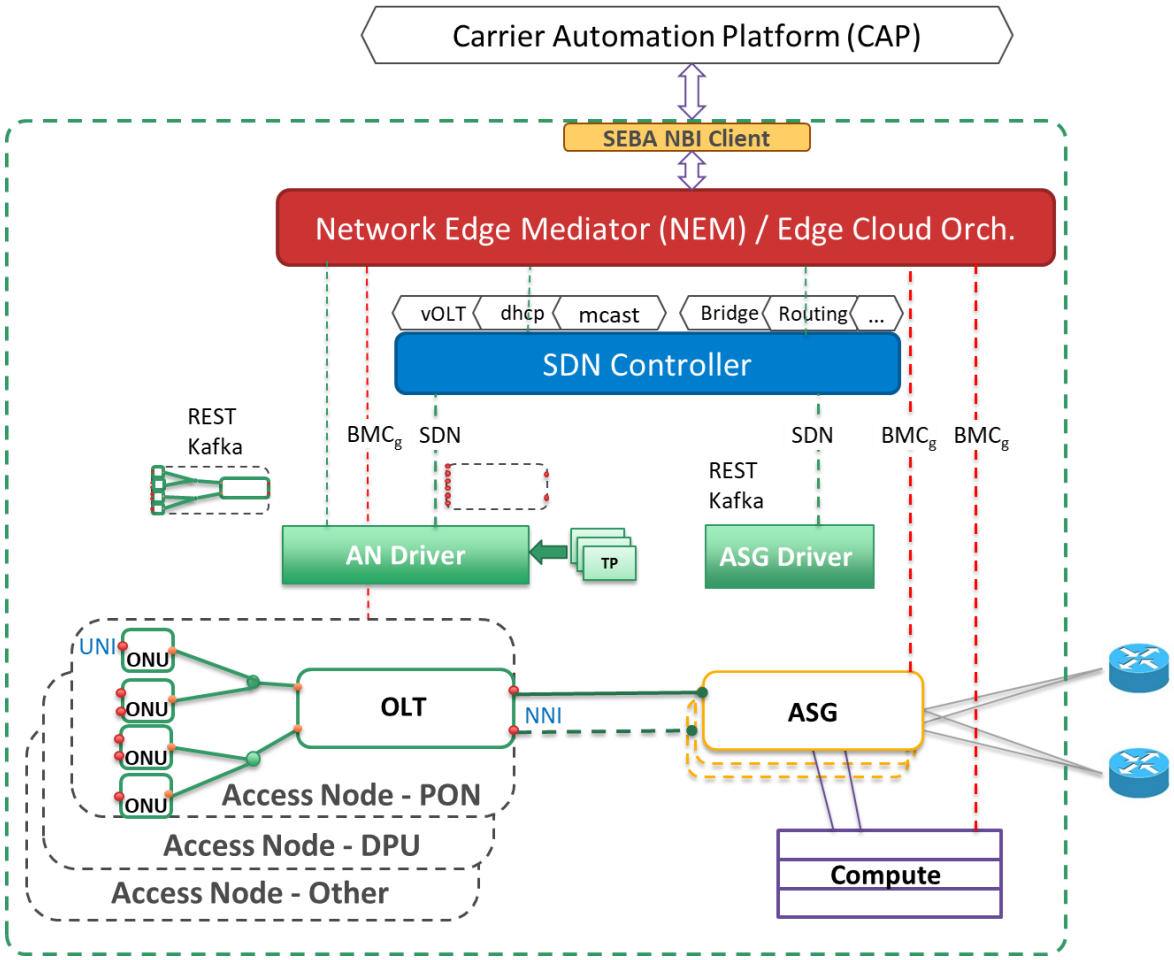
ACS Value: Secure, Programmable, Sliceable, Verifiable, Customizable, 5G Connectivity with Traffic Localization

ACE is multi-tenant: Able to host one or more CES instances

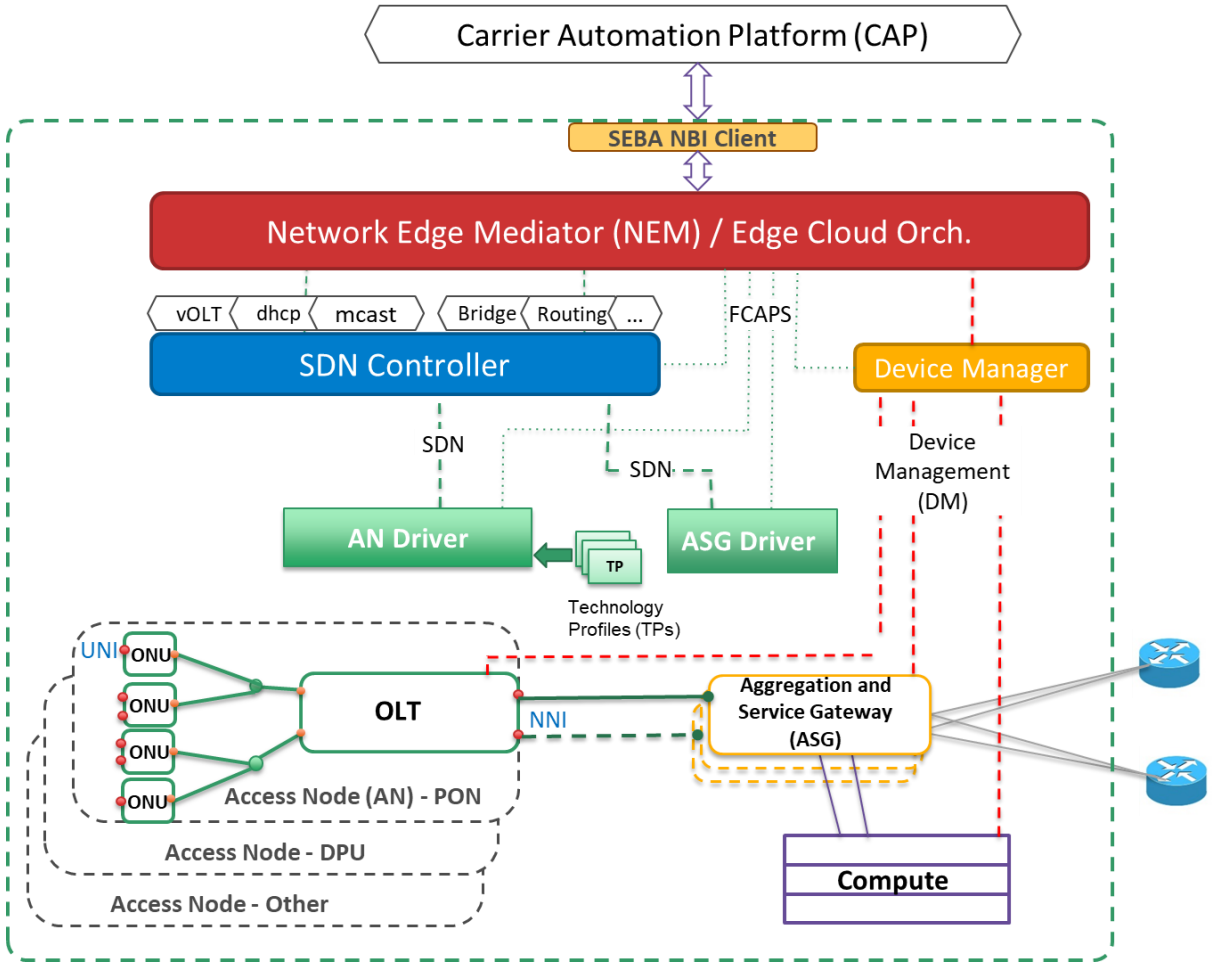
Projected Aether Status by Year End 2021

SEBA

RD1.0 vs. RD2.0 - High Level Target Architecture



RD1.0



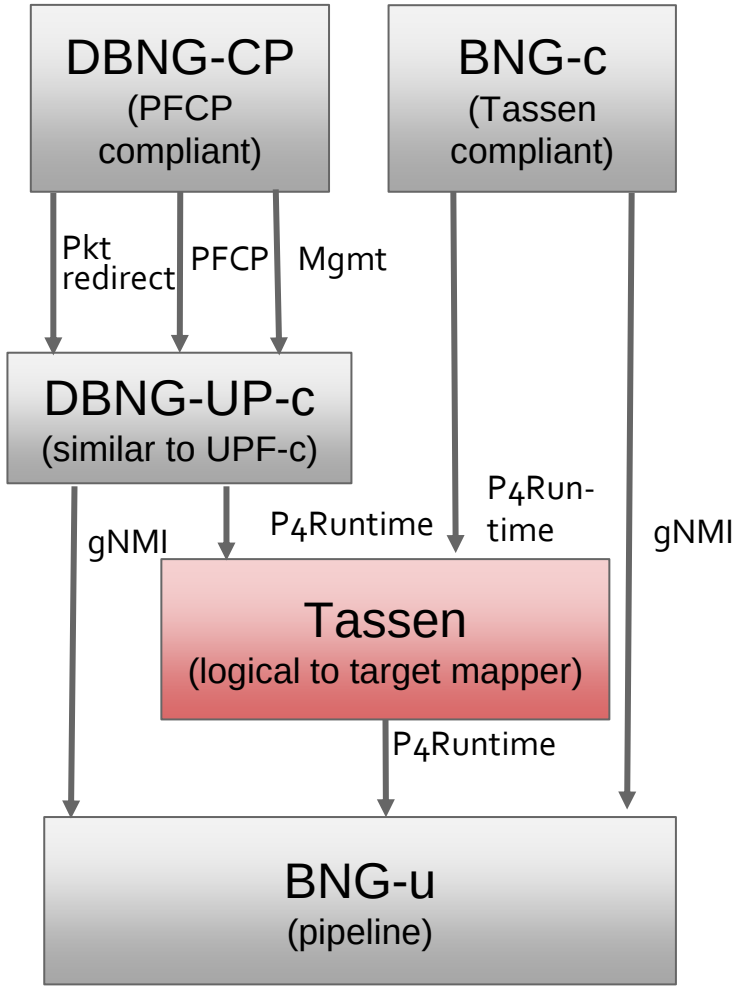
RD2.0

RD 2.0 Additions

- Detailed NBI APIs for POD, OLT, ONT, Service Management
- Broadband Network Gateway (BNG) Updates
- Device Management (DM)
- Per OLT VOLTHA Stack Model for Scaling
- Access Technology – Fixed Wireless Access (FWA) / mmWAVE
- Use Cases for POD Lifecycle Management

TASSEN: Silicon Independence & Programmability

- Learn from the OpenFlow experience
  - Formal specification of the forwarding pipeline is essential
  - Re-use proven cloud native technologies (gRPC) and focus on capabilities for operator use cases (pipeline data models)
  - Complete testing of forwarding pipeline
- Complementary to BBF-based BNGs
  - DBNG-CP communicates with DBNG-UP-c using BBF-specified interfaces (i.e. SCI, Packet redirect & Management)
  - DBNG-UP can then be split into a DBNG-UP-c that will communicate southbound with the BNG-u using the Tassen interfaces (i.e. P4 Runtime & gNMI)... similar to 5G UPF-c and UPF-u split
- Alternatively native Tassen-based BNGs
  - BNG-c components that support Tassen's south bound interfaces (i.e. P4 Runtime and gNMI) talk natively through the mapper to the BNG-u



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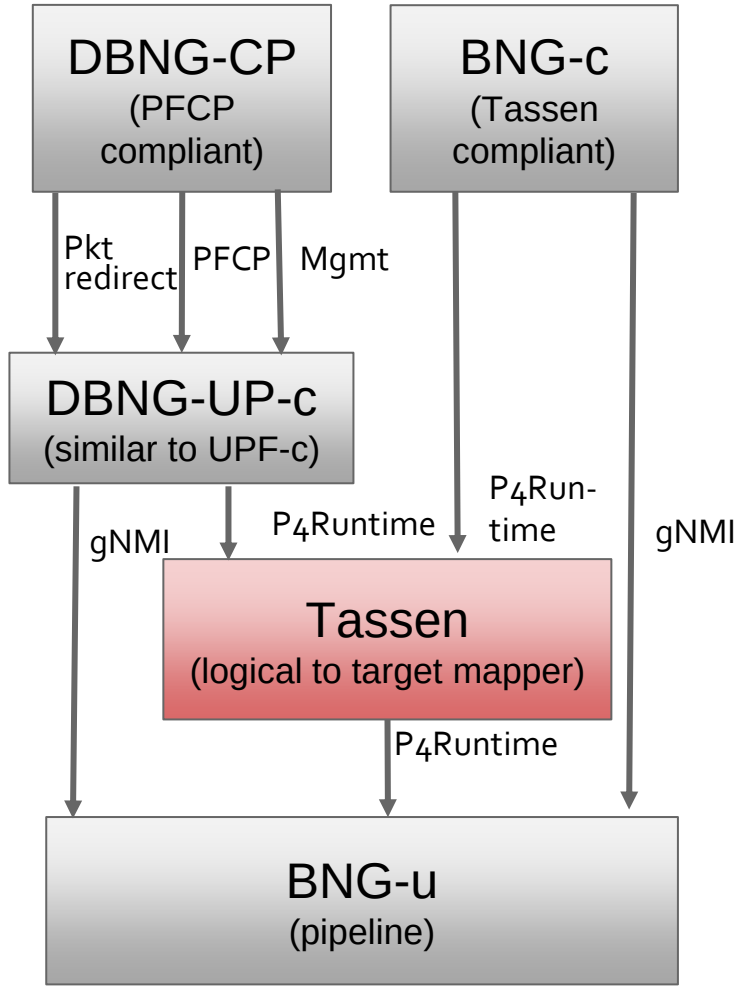

Thank you

Questions: eric@opennetworking.org