

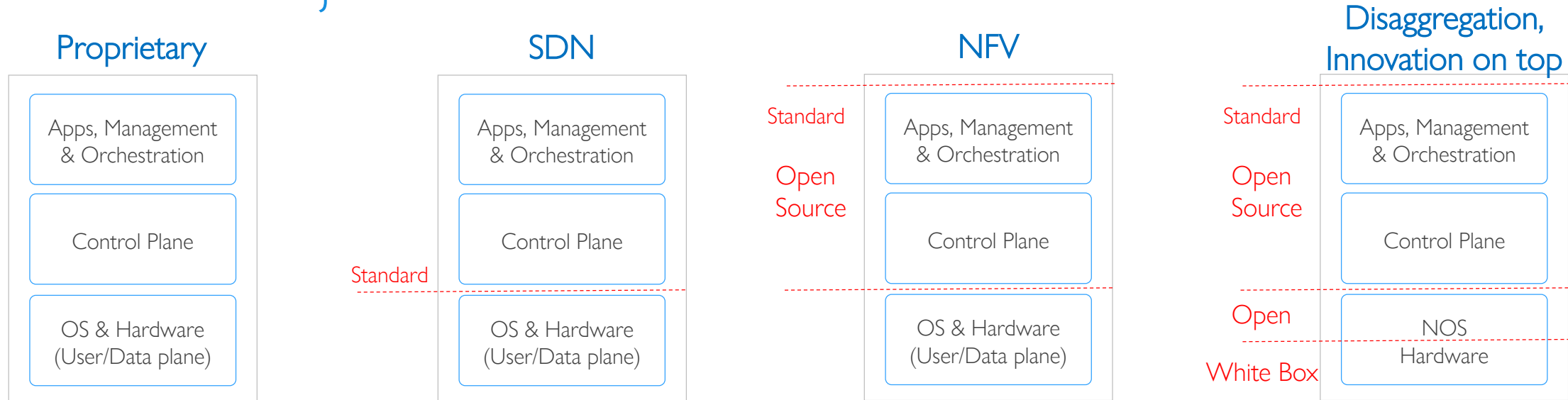
# O-RAN

## How Open Source Software and Standards Will Transform Radio Access

Phil Robb – V.P. Operations - Networking & Orchestration

May 6<sup>th</sup>, 2019

# RAN market is following Network Switch disruption but... with one major difference



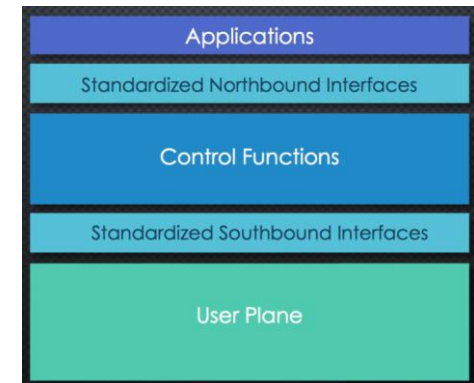
RAN Market is here but .....

Open RAN Requires

- Open API / open specification or standards
- Open Source Software

AND

Vendor innovation (proprietary development)  
which can be leveraged by an Open RAN  
architecture



# O-RAN announced at MWC

The key principles of the O-RAN Alliance include:

- › Lead the industry towards open, interoperable interfaces, RAN virtualization, and big data enabled RAN intelligence.
- › Specify APIs and interfaces, driving standards to adopt them as appropriate, and exploring open source where appropriate.
- › Maximize the use of common-off-the-shelf hardware and merchant silicon and minimizing proprietary hardware.

## Industry Leaders Launch ORAN Alliance

COMMUNICATIONS / Feb 27, 2018

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Today, AT&T, China Mobile, Deutsche Telekom, NTT DOCOMO, and Orange jointly announced the creation of the ORAN Alliance.

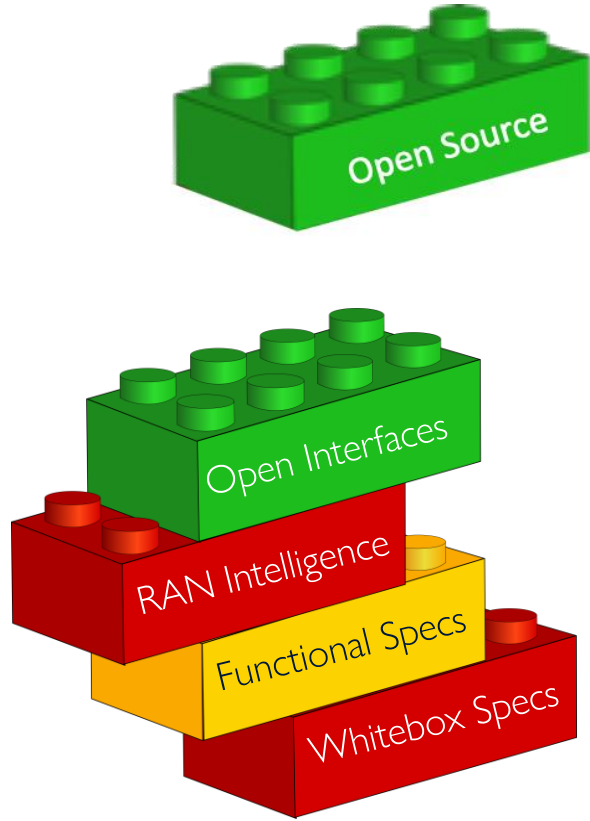
The ORAN Alliance is a world-wide, carrier-led effort to drive new levels of openness in the radio access network of next generation wireless systems. ORAN will combine and extend the efforts of the C-RAN Alliance and the xRAN Forum into a single operator led effort.

As mobile traffic increases, mobile networks and the equipment that runs them must become more energy efficient (green), software-driven (soft), virtualized, flexible, and intelligent. The ORAN (Open Radio Access Network) Alliance is committed to evolving radio access networks— making them more open and smarter than previous generations. Real-time analytics that drive embedded machine learning systems and artificial intelligence back end modules will empower network intelligence. Additional virtualized network elements with open, standardized interfaces will be key aspects of the reference designs developed by the ORAN Alliance. Technologies from open source and open whitebox network elements will be important software and hardware components of these reference designs.

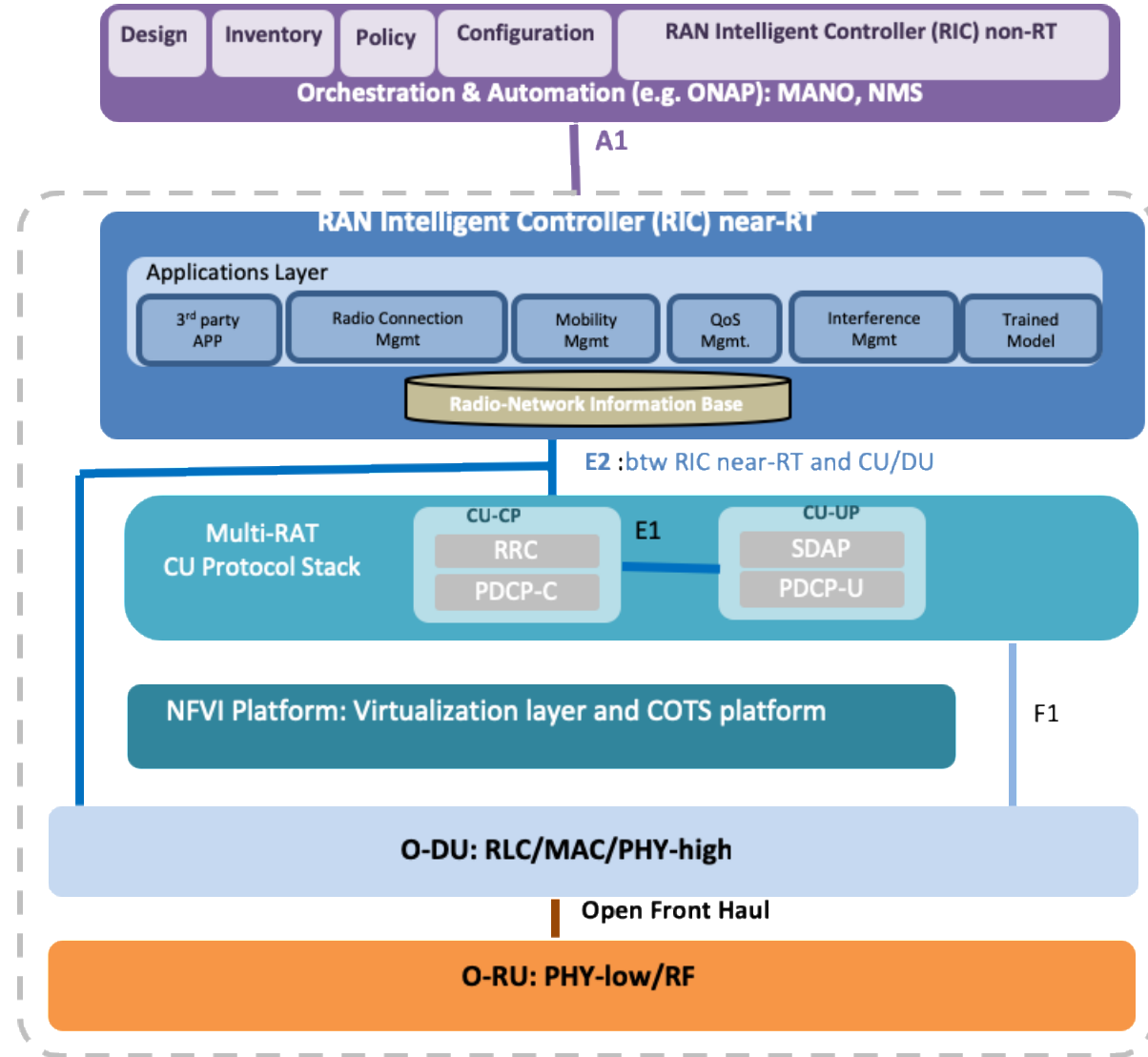
By combining and extending the objectives of the C-RAN Alliance and the xRAN Forum, the key principles of the ORAN Alliance include:

- Leading the industry towards open, interoperable interfaces, RAN virtualization, and big data enabled RAN intelligence.
- Maximizing the use of common-off-the-shelf hardware and merchant silicon and minimizing proprietary hardware.
- Specifying APIs and interfaces, driving standards to adopt them as appropriate, and exploring open source where appropriate.

# The O-RAN Architecture

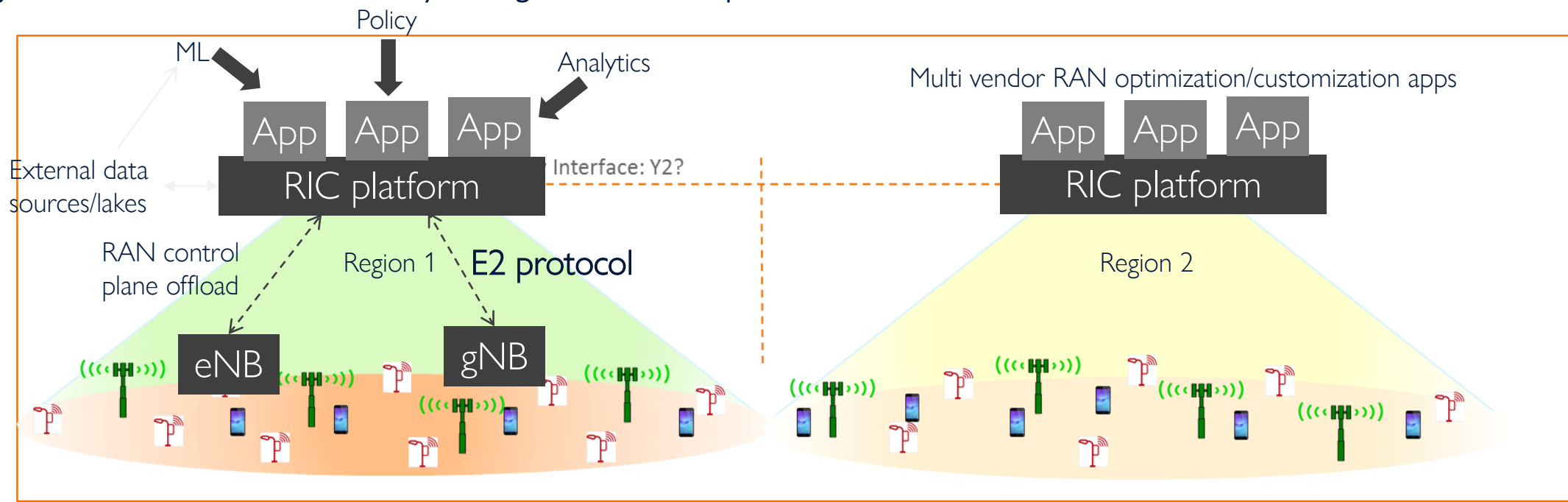


O-RAN Alliance is aiming at building an “Open” and “Smart” Radio Access Network (RAN) for future wireless systems



# What is the RIC?

Objective: customize RAN functionality for regional resource optimization or new services



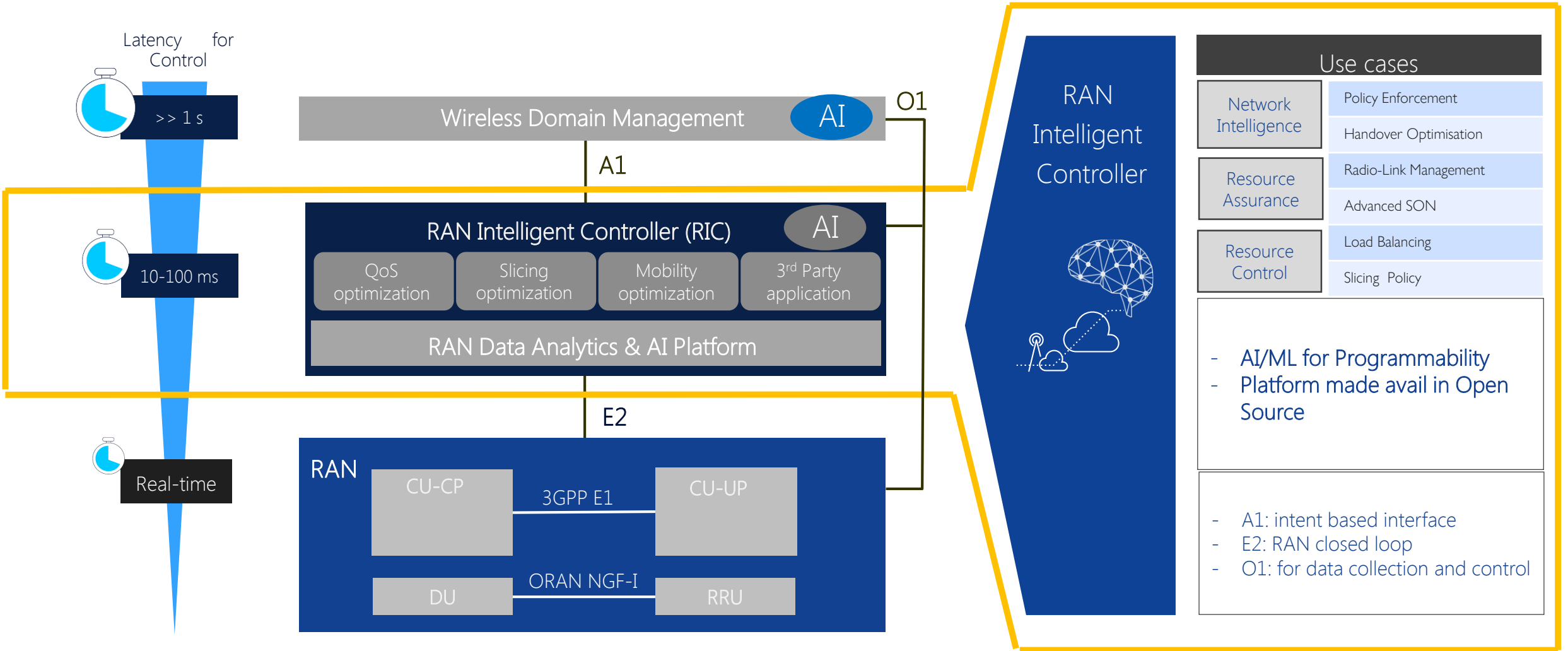
## What? Area-wide data and controls

- ❑ UE/cell/DU/CU level L1/L2/L3 measurements
- ❑ UE locations and predicted trajectory
- ❑ UE context info(video, voice, non-GBR data)
- ❑ Per-UE policy-driven control of band/cell/bearer selection, admission control, handover, scheduler

## Why? Customize RAN with short time-to-market for:

- ❖ **Efficient resource usage** – improve customer experience and optimize spectral efficiency by using policies/ML to tailor RAN for unique spectrum position and geography based on holistic area-wide network view
- ❖ **New RAN services** – customize RAN behavior for the needs of specific verticals. E.g., create RAN slices for drones, connected cars, IoT, etc.

# RAN Intelligent Controller – a new function introduced by O-RAN



# Why RIC?

## The RIC takes customization into the RAN

### Network Optimization

- › Fine grain network optimization customized for each environment

### Smart factory/industrial IoT

- › Carve out private 5G slice/namespaces for business customer on industrial campus
- › Security services

### Connected Car

- › Quality of Service enforcement to provide low latency and/or high bandwidth to vehicle applications

### Shipping, Logistics, Tracking, Asset Management

- › Lowering power of IoT devices to enhance battery life

### Health Care

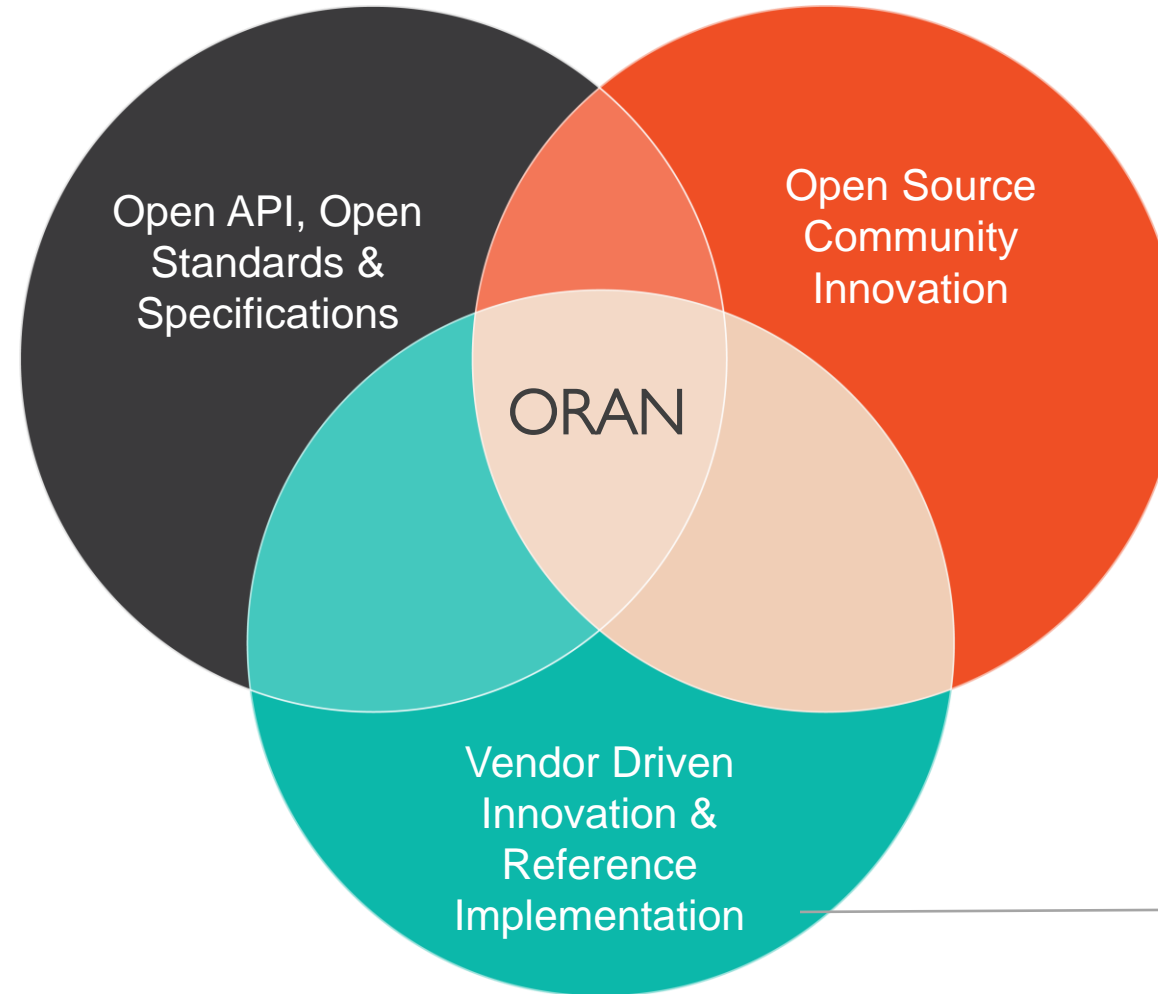
- › Enforce highest level of network security for sensitive medical data



# Linux Foundation and O-RAN, bringing it together

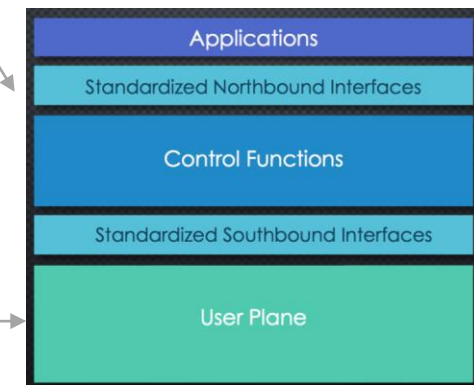
## Open API for Standards

LF helps harmonize with key standards for API or Architecture & Interface Specs



## Apache2.0

LF can create a community to expand integration, interoperability in automation, orchestration





# O-RAN Software Community

## › Mission:

Manage all software development, code storage, tooling and developer integration testing aligned with the architecture specified by O-RAN Alliance

›

## › Project Scope:

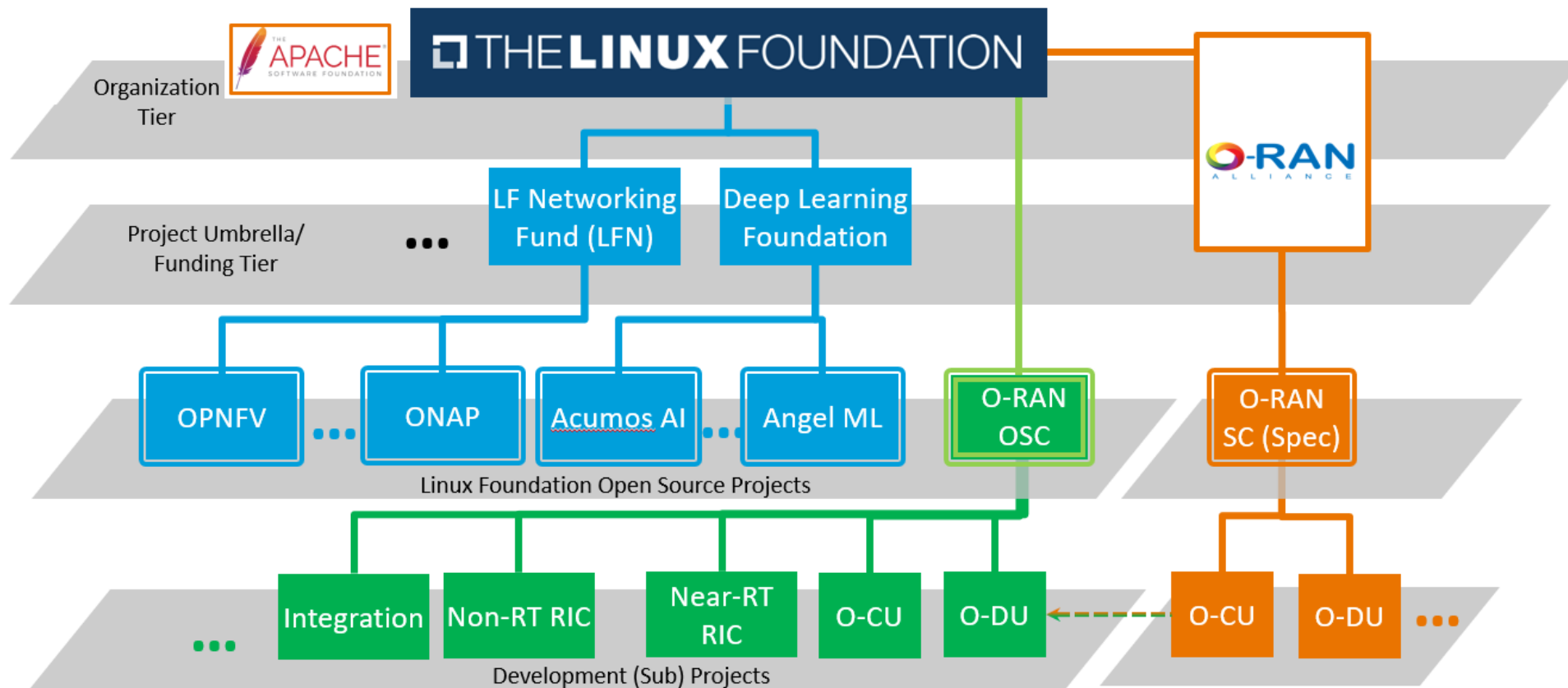
- Software development including documentation, testing and integration of the open source software project
- Coordinate efforts with related open source software projects and standards communities
- Aligned with O-RAN architecture

## › Licensing:

1. *Standard Apache 2 license* for Open Source
2. *O-RAN specification license* that adds protection for 3GPP and O-RAN essential patents for software contribution

# O-RAN Software Community (O-RAN SC) structure

- ...under Linux Foundation (LF)
- ...exclusively sponsored by O-RAN Alliance to develop open source software to realize O-RAN components and systems
- The O-RAN SC Technical Oversight Committee (TOC) will be responsible for all technical oversight of the software community



# O-RAN Alliance + LF Community = New Opportunities

- The foundation of O-RAN Alliance has been one of the most influential events in telecom industry in 2018
- The formation of O-RAN Software Community could become one of the most impactful events in LF



*Join the O-RAN Software Community and Accelerate Access into the future!*

## To Wrap Up....

### › A Big Thanks For Source Material and Slides To:

- › Arpit Joshipura
- › Hank Kafka
- › Oliver Spatscheck

### › For More Information & To Get Involved:

- › O-RAN Alliance Website: <https://www.o-ran.org/>
- › O-RAN Alliance Whitepaper: <https://static1.squarespace.com/static/5ad774cce74940d7115044b0/t/5bc79b371905f4197055e8c6/1539808057078/O-RAN+WP+Final+181017.pdf>
- › O-RAN Software Community: <https://o-ran-sc.org>
- › Akraino Radio Edge Cloud (REC) Project: <https://wiki.akraino.org/pages/viewpage.action?pageId=6128402>

Thank you