

# Toward a Smart and Open Radio Access Network (O-RAN) platform

Workshop on Orchestration of 5G Networks and Beyond

Paris, France

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*Technology & Global Innovation (TGI) Division*

*OLN/SAS*



# The O-RAN Alliance stands for Open RAN Alliance




238 companies joined O-RAN

Operators Defined Next Generation RAN Architecture and Interfaces



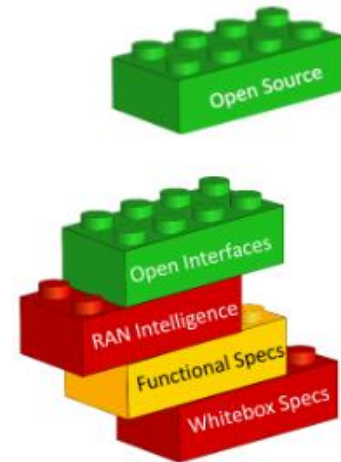
## Creation

Announced at MWC in Feb 2018

 + C-RAN Alliance

## Software Community:

Announced at Open Networking Summit North America, 2019



# 5

Founder operators

# 27

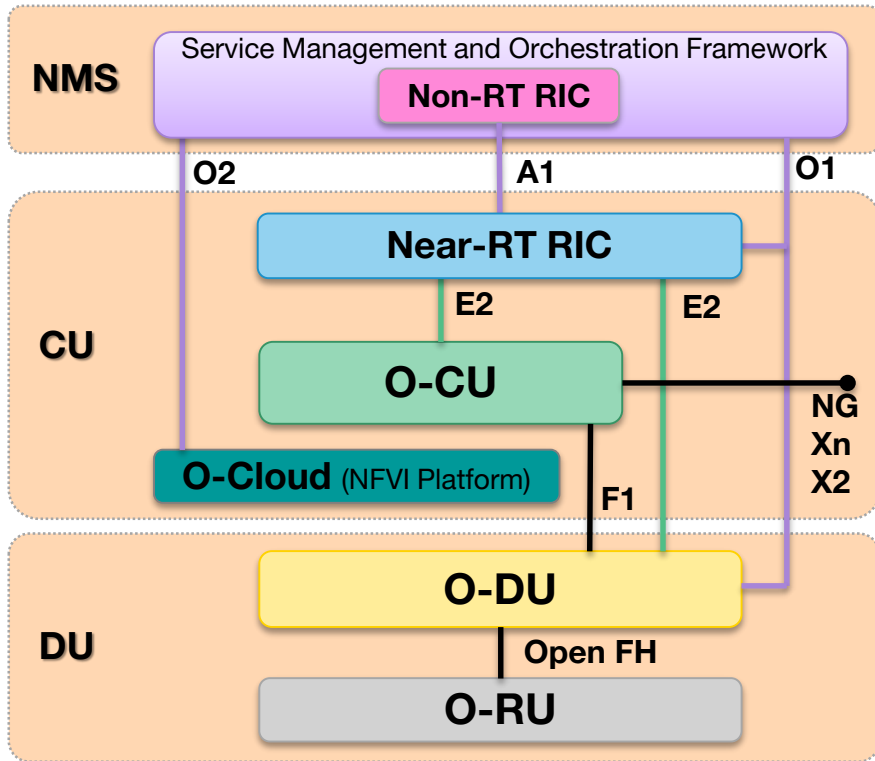
Operators members

# 211

Contributors

Carrier-led effort to drive new levels of openness in the RAN of next generation wireless systems

# O-RAN & 3GPP Architectures



## 3GPP Network Elements

NMS: Network Management System

CU: Centralized Unit

DU: Distributed Unit

## O-RAN global architecture

**2** enablers to lower the barriers for RAN innovation

1. Open interfaces / API
2. Open source modules & reference designs

“**O-RAN** architecture is based on well-defined, standardized interfaces to enable an open, interoperable supply chain ecosystem in **full support of and complimentary to standards** promoted by 3GPP and other industry standards organizations”

## Last deliverables published so far

### WG1: Use Cases and Overall Architecture Workgroup

O-RAN Architecture Description 2.0 - July 2020 (O-RAN.WG1.O-RAN-Architecture-Description-v02.00)  
O-RAN Operations and Maintenance Architecture 3.0 - April 2020 (O-RAN.WG1.OAM-Architecture-v03.00)  
O-RAN Operations and Maintenance Interface 3.0 - April 2020 (O-RAN.WG1.O1-Interface-v03.00)  
O-RAN Use Cases Detailed Specification 3.0 - July 2020 (O-RAN.WG1.Use-Cases-Detailed-Specification-v03.00)  
O-RAN Use Cases Analysis Report 3.0 - July 2020 (O-RAN.WG1.Use-Cases-Analysis-Report-v03.00)  
O-RAN Slicing Architecture 2.0 - July 2020 (O-RAN.WG1.Slicing-Architecture-v02.00)  
O-RAN Study on O-RAN Slicing 2.0 - April 2020 (O-RAN.WG1.Study-on-O-RAN-Slicing-v02.00)

### WG2: The Non-real-time RAN Intelligent Controller and A1 Interface Workgroup

O-RAN AI/ML Workflow Description and Requirements 01.01 - April 2020 (O-RAN.WG2.AI/ML-v01.01)  
O-RAN A1 interface: General Aspects and Principles 2.0 - July 2020 (O-RAN.WG2.A1GAP-v02.00)  
O-RAN A1 interface: Application Protocol 2.0 - July 2020 (O-RAN.WG2.A1AP-v02.00)  
O-RAN A1 interface: Transport Protocol 1.0 - October 2019 (O-RAN.WG2.A1.TP-v01.00)  
O-RAN Non-RT RIC & A1 Interface: Use Cases and Requirements 2.0 - April 2020 (O-RAN.WG2.Use-Case-Requirements-v02.00)

### WG3: The Near-real-time RIC and E2 Interface Workgroup

O-RAN Near-RT RAN Intelligent Controller Near-RT RIC Architecture 1.0 - April 2020 (O-RAN.WG3.RICARCH-v01.00)  
O-RAN Near-Real-time RAN Intelligent Controller Architecture & E2 General Aspects and Principles 1.01 - July 2020  
O-RAN Near-Real-time RAN Intelligent Controller, E2 Application Protocol 1.01 - July 2020 (O-RAN.WG3.E2AP-v01.01)  
O-RAN Near-Real-time RAN Intelligent Controller E2 Service Model 1.0 - February 2020 (O-RAN.WG3.E2SM-v01.00.00)  
O-RAN Near-Real-time RAN Intelligent Controller E2 Service Model (E2SM), RAN Function Network Interface (NI) 1.0 - February 2020  
O-RAN Near-Real-time RAN Intelligent Controller E2 Service Model (E2SM) KPM 1.0 - February 2020 (O-RAN.WG3.E2SM-KPM-v01.00.00)

### WG4: The Open Fronthaul Interfaces Workgroup

O-RAN Open Fronthaul Conformance Test Specification 1.0 - July 2020 (O-RAN.WG4.CONF.0-v01.00)  
O-RAN Fronthaul Cooperative Transport Interface Transport Control Plane Specification 1.0 - April 2020 (O-RAN.WG4.CTI-TCP.0-v01.00)  
O-RAN Fronthaul Interoperability Test Specification (IOT) 2.0 - April 2020 (O-RAN.WG4.IOT.0-v02.00)  
O-RAN Fronthaul Control, User and Synchronization Plane Specification 4.0 - July 2020 (O-RAN.WG4.CUS.0-v04.00)  
O-RAN Management Plane Specification 4.0 - July 2020 (O-RAN.WG4.MP.0-v04.00)  
O-RAN Management Plane Specification - YANG Models 4.0 - July 2020 (O-RAN.WG4.MP-YANGS-v04.00)

### WG5: The Open F1/W1/E1/X2/Xn Interface Workgroup

O-RAN Interoperability Test Specification (IOT) 01.00 - July 2020 (O-RAN.WG5.IOT.0-v01.00)  
O-RAN Transport Specification 1.0 - April 2020 (O-RAN.WG5.Transport.0-v01.00)  
O-RAN NR C-plane profile v3.0 - July 2020 (O-RAN.WG5.C.1-v3.00)  
O-RAN NR U-plane profile v3.0 - July 2020 (O-RAN.WG5.U.0-v3.00)

### WG6: The Cloudification and Orchestration Workgroup

O-RAN Orchestration Use Cases and Requirements for O-RAN Virtualized RAN 1.0 - April 2020 (O-RAN.WG6.ORCH-USE-CASES-v01.00)  
O-RAN O2 General Aspects and Principles Specification 1.0 - July 2020 (O-RAN.WG6.O2-GA&P-v01.00)  
O-RAN Cloud Platform Reference Design for Deployment Scenario B 1.01 - July 2020 (O-RAN.WG6.CLOUD-REF-B-v01.01)  
O-RAN Cloud Platform Reference Design for Deployment Scenario B 1.0 - April 2020 (O-RAN.WG6.CLOUD-REF-B-v01.00)  
O-RAN Cloud Architecture and Deployment Scenarios for O-RAN Virtualized RAN 2.01 - July 2020 (O-RAN.WG6.CAD-v02.01)

### WG7: The White-box Hardware Workgroup

O-RAN Hardware Reference Design Specification for Indoor Picocell FR1 with Split Architecture Option 7-2 1.0 - July 2020  
O-RAN Hardware Reference Design Specification for Indoor Picocell FR1 with Split Architecture Option B 1.0 - July 2020  
O-RAN Indoor Picocell Hardware Architecture and Requirement (FR1 Only) Specification 1.0 - April 2020 (O-RAN.WG7.IPC-HAR.0-v01.00)  
O-RAN Deployment Scenarios and Base Station Classes For White Box Hardware 2.0 - July 2020 (O-RAN.WG7.DSC.0-v02.00)

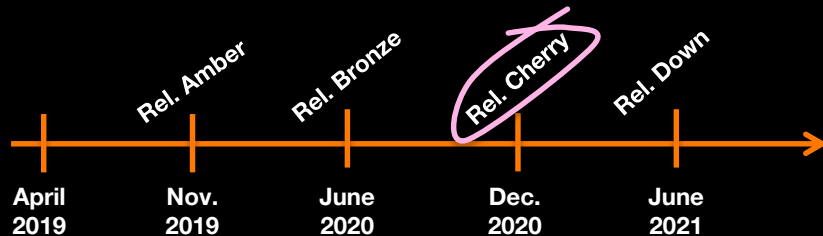
### WG8: Stack Reference Design Workgroup

O-RAN Base Station O-DU and O-CU Software Architecture and APIs 2.0 - April 2020 (O-RAN.WG8.AAD.0-v02.00)

### TIFG: Test & Integration Focus Group

O-RAN End-to-End System Testing Framework Specification 1.0 - July 2020 (O-RAN.TIFG.E2ETSTFWK.0-v01.00)  
O-RAN Criteria and Guidelines of Open Testing and Integration Centre 1.0 - July 2020 (O-RAN.TIFG.CGoFOTIC.0-v01.00)

## Open Source Releases



In collaboration with:

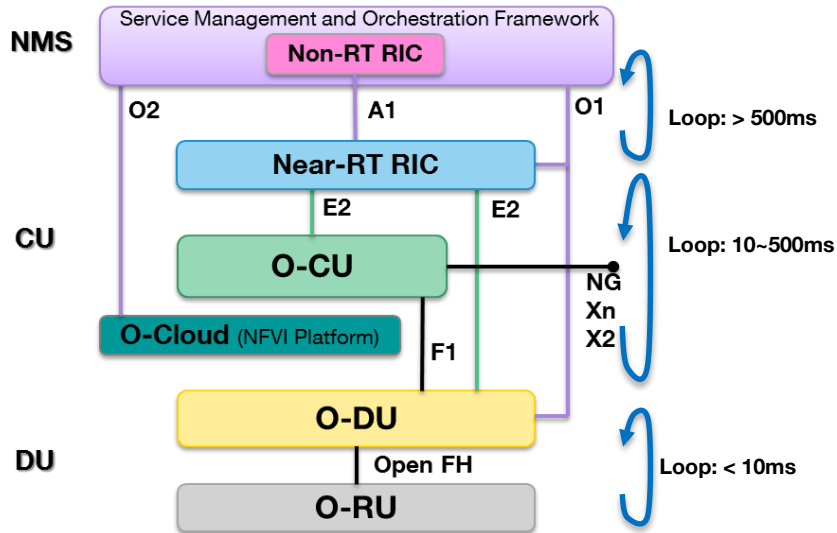


## O-RAN Software Community mission:

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

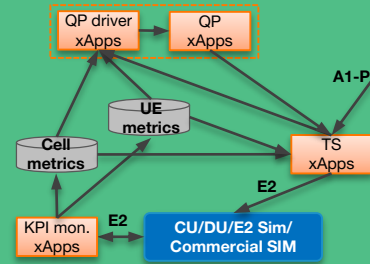
# O-RAN Software Community Cherry Release

Cherry aims at improvement of already connected O-RAN's elements (SMO, non-RT RIC, near-RT RIC, xApps, O-CU, O-DU, O-RU) together for a complete end-to-end RAN ecosystem.



## Traffic Steering use case

- Continue Developing Traffic Steering (TS) and Quality Prediction (QP) xApps using ML
- Develop E2 data ingest pipeline from E2 simulator to perform traffic steering analytics



*AI-enabled RAN and  
Open RAN Interfaces  
(O1/A1/E2)*

## Health-check use case

Ensure a properly monitoring and health reporting of O-RAN components. Thus, the key goal is that the O-RAN elements can do the following:

- near-RT RIC self-check Flow
- O1 near-RT RIC health-check
- A1 near-RT RIC health-check
- O-DU and O-CU health-check Flow

## 2<sup>nd</sup> O-RAN Plugfest/PoC in September 2020

The plugfest took place in four venues with different scopes: Asia, Europe, India and North America

The plugfest in Europe was organized as the first joint O-RAN and Telecom Infra Project (TIP) plugfest. O-RAN and TIP jointly worked on the definition of test cases and test scenarios enabling future cooperation/synergy between **Open Testing and Integration Centre (OTIC)** and TIP community lab.



<https://www.virtualexhibition.o-ran.org/classic/generation/2020>

# Thanks

Join us to build the next generation mobile network !

<https://wiki.o-ran-sc.org>



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