Institute for the Wireless Internet of Things
at Northeastern University

O-RAN Alliance: Next Generation research Group

Panel Discussion
Mar 29 2023

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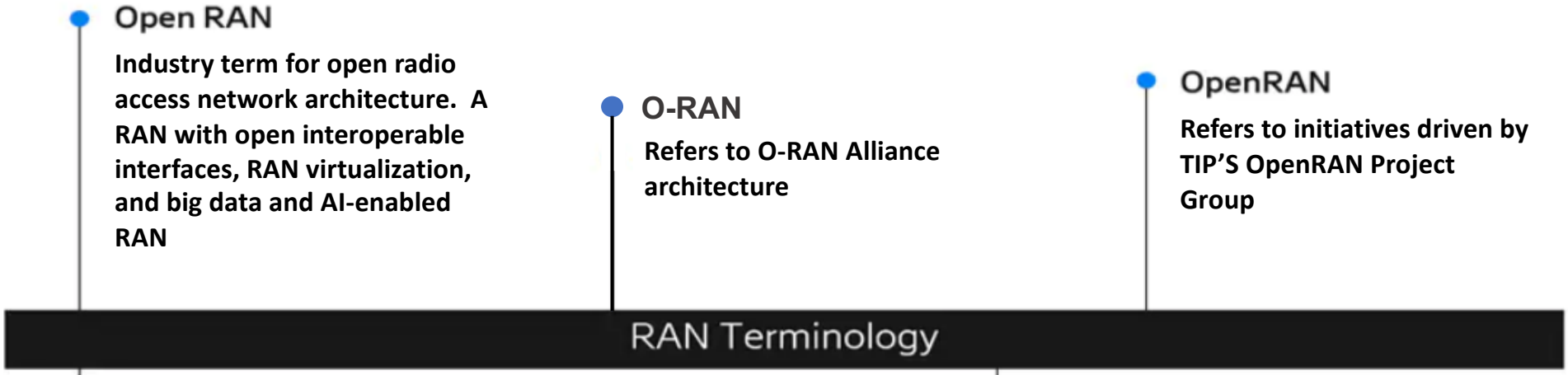
Radio Access Network Terminology



Open RAN

Industry term for open radio access network architecture. A RAN with open interoperable interfaces, RAN virtualization, and big data and AI-enabled RAN

O-RAN

Refers to O-RAN Alliance architecture

OpenRAN

Refers to initiatives driven by TIP'S OpenRAN Project Group

Cloud RAN

Cloud RAN is a virtualized RAN that is designed to be cloud native, built in a future proof architecture and incorporating key elements such a microservices, CI/CD, and containerization

vRAN

Technical approach to run RAN functions as disaggregated software on common hardware platform, generating additional RAN architecture flexibility, platform harmonization, and simplification

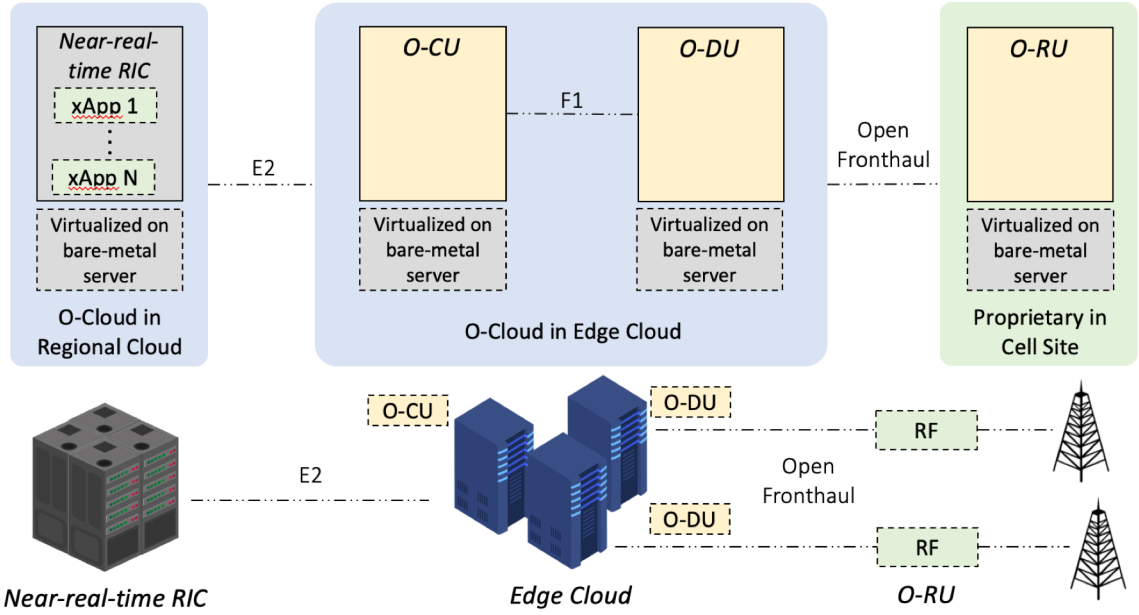
Open RAN: Much More than “Horizontal Disaggregation”

Traditional “black-box”

RRC SDAP PDCP

RLC MAC RF PHY

Open, programmable and virtualized



L. Bonati, M. Polese, S. D'Oro, S. Basagni, and T. Melodia, *"Open, Programmable, and Virtualized 5G Networks: State-of-the-Art and the Road Ahead,"* Computer Networks, vol. 182, Dec 2020.

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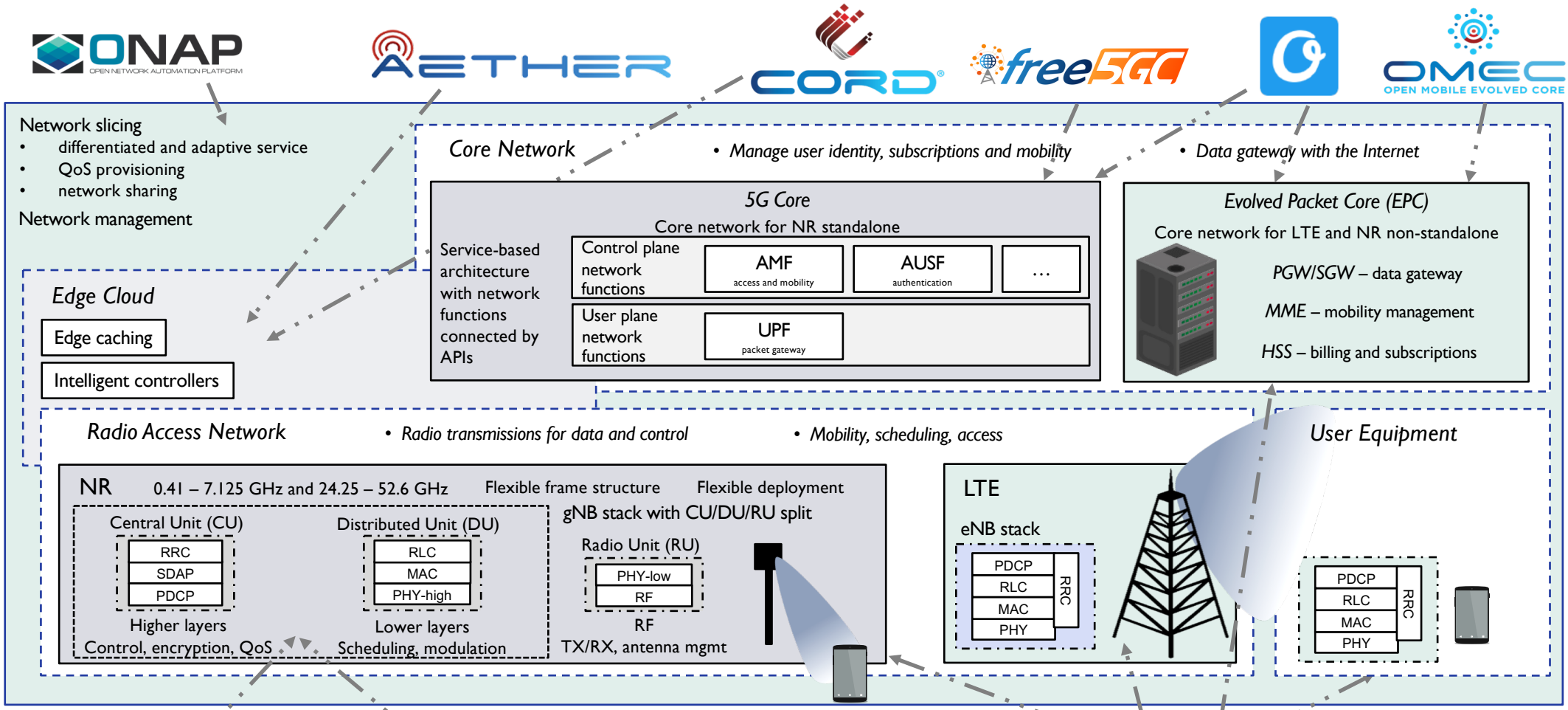
End to End Virtualized Programmable B5G Architecture



3GPP and Open RAN: More Similar than Different

3GPP

Defines Signaling Mechanism
Control Plane Messages
User Plane Messages
Data Transmission Messages
F1/E1 Interface and CU,DU,RU

O-RAN Alliance

Focus on RAN Optimization and Inline hardware acceleration in the physical layer.

RIC uses AI/ML to optimize RAN

Defines control, user and synchronization plane (CUS) interface

Small Cell Forum

Focus on RAN Disaggregation

Focus on Radio Resource Management

Defines The network functional application platform interface (nFAPI) and p5,p7,p9 Interfaces

Comparative Tech Specs: Option 7.2X v/s 6

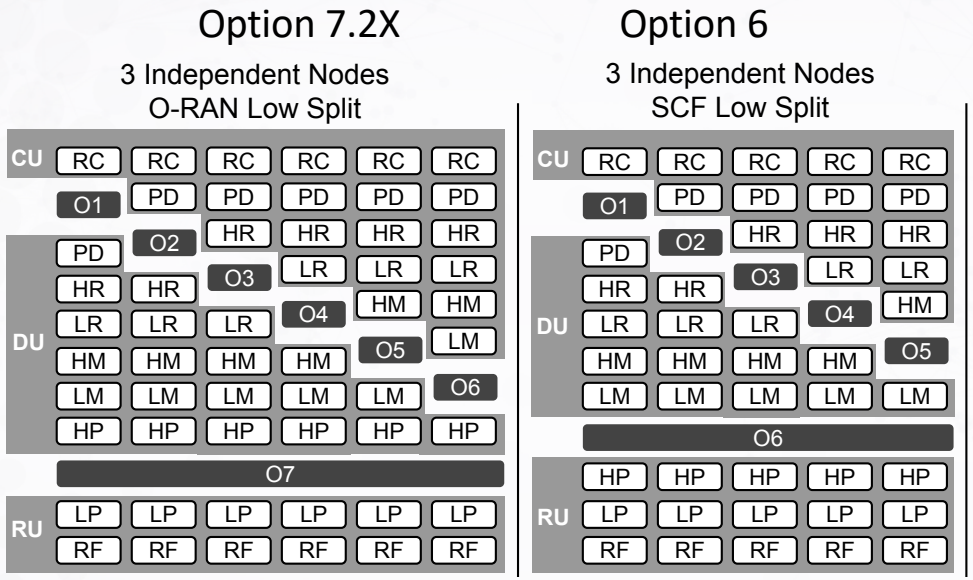


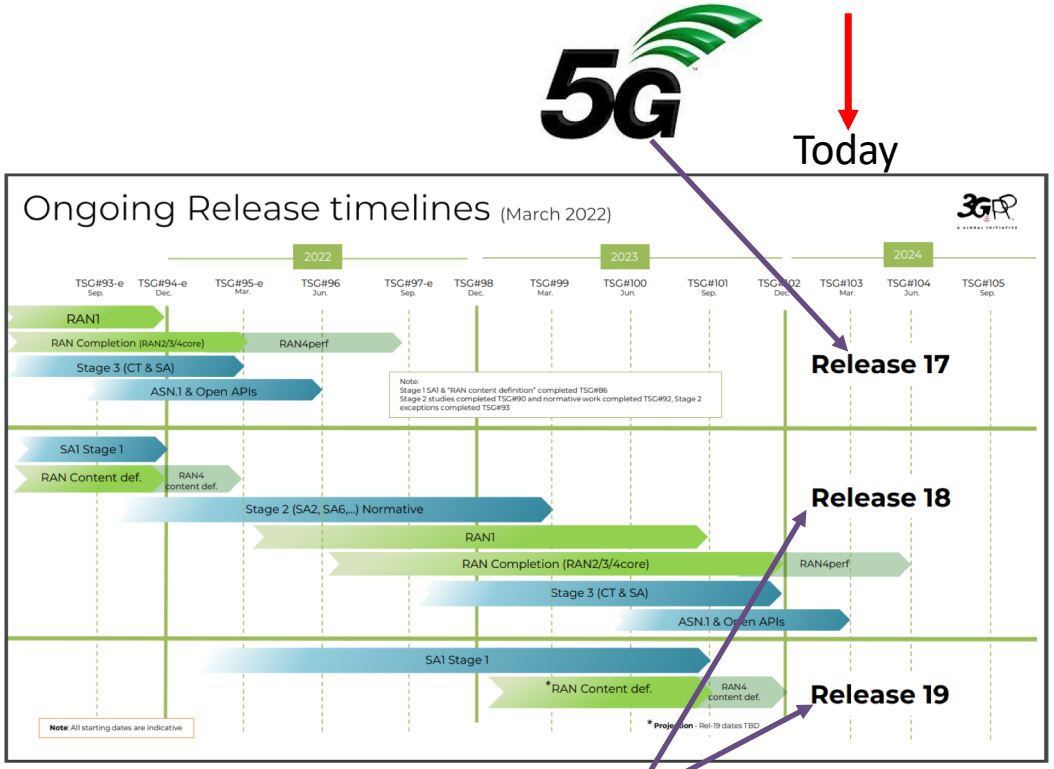
TABLE 1
3GPP Latency and bitrate requirements for each split [3].

Split Option	Functional Split	One-way latency	Bitrate (Gbps)	
			DL	UL
O1	RRC-PDCP	10 ms	4	3
O2	PDCP - High RLC	10 ms	4	3
O3	High RLC - Low RLC	10 ms	4	3
O4	Low RLC - High MAC	1 ms	4	3
O5	High MAC - Low MAC	< 1 ms	4	3
O6	Low MAC - High PHY	250 μs	4.13	5.64
O7	High PHY - Low PHY	250 μs	86.1*	86.1*
O8	Low PHY - RF	250 μs	157.3	157.3

O7 split maximum value.*

O2- 3GPP TS 38.801
O6- Small Cell Forum; FAPI/nFAPI
O7- O-RAN Alliance; eCPRI/FrontHaul

3GPP 5G to 6G Path



- Release 17 completed June 2022
- Primary aim of Rel-17 is to improve 5GS performance, support new use cases and verticals, and provide ubiquitous connectivity in different deployment conditions and scenarios
- 3GPP release 18 represents a major evolution of the 5G System and due to this the 3GPP has decided to brand it as the first release of 5G Advanced.
- Rel-18 will include major enhancements in the areas of artificial intelligence (AI) and extended reality that will enable highly intelligent network solutions that can support a wider variety of use cases
- Rel-19 is starting to look at advanced services such as Integrated Sensing & Comms, localized mobile metaverse services, service robots, and ambient powered IoT

Today's Deployments are based on R15
Deployments are typically ~24 months after a 3GPP release completion

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