



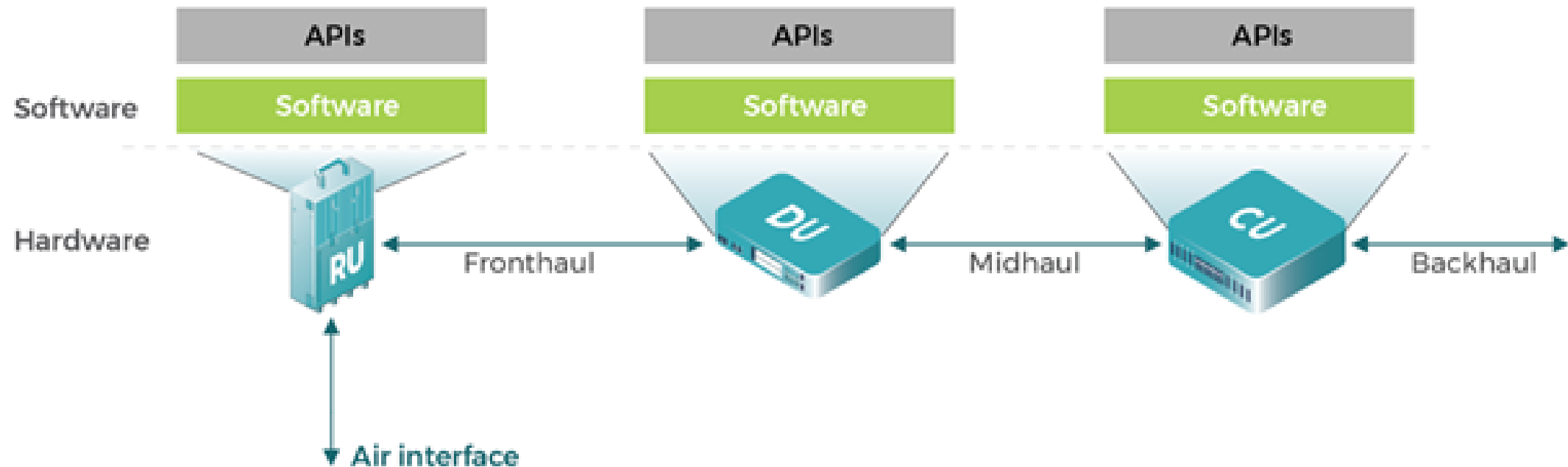
FCC Actions to Facilitate Open RAN

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Note: The views expressed in this presentation are those of the author/presenter and may not necessarily represent the views of the Federal Communications Commission

OpenRAN Reference Architecture



The Promise of Open RAN

- Open RAN promises to create a multi-supplier RAN solution that allows for the disaggregation between hardware and software with open interfaces and virtualization, hosting software that controls and updates networks in the cloud.

Open RAN: The Good News

ADVANCES IN STANDARDIZATION

INCREASING GOVERNMENT SUPPORT

A GROWING ECOSYSTEM OF VENDORS

ADVANCES IN TESTING AND R&D

Open RAN: The Challenges

Industry work is ongoing, for example on:

- **Standards and Interoperability**
- **Concerns associated with using multiple vendors**

Initially there is a steep learning curve for operators

Developing Ecosystem/Market for Vendors

The Global Ecosystem and Open RAN



Chipmakers



System Integrators



Radio Units



VRAN Core and Software



Baseband Software

U.S. Operators and Open RAN



DISH – Committed to building a greenfield cloud-based 5G network with ORAN-compliant equipment



Verizon – Some ORAN-compliant deployment, trials and testing



ATT – trials and testing

FCC Efforts to Advance Open RAN

- Initiated a proceeding in 2021 specifically focused on ORAN.
- Made ORAN eligible for “Rip and Replace” funding.
- Encouraged ORAN through information sharing events.
- Created “testbeds” for ORAN integration.

FCC Investigation of Open RAN



Open RAN Notice of Inquiry (NOI) (March 2021)



Open RAN Solutions Showcase (July 2021)



Ongoing discussions with Open RAN innovators and interested service providers



The FCC's Communications Security, Reliability, and Interoperability Council VIII (CSRIC VIII) is providing recommendations to promoting security, reliability and interoperability of open RAN equipment and explore what new efforts can be taken to ensure secure-RAN deployments.

Promoting Innovation in Open RAN Research and Development



Under a Program Experimental License, qualified institutions may conduct testing for multiple non-related experiments under a single authorization within a defined geographic area under control of the licensee and where the licensee has institutional processes to manage and oversee experiments.

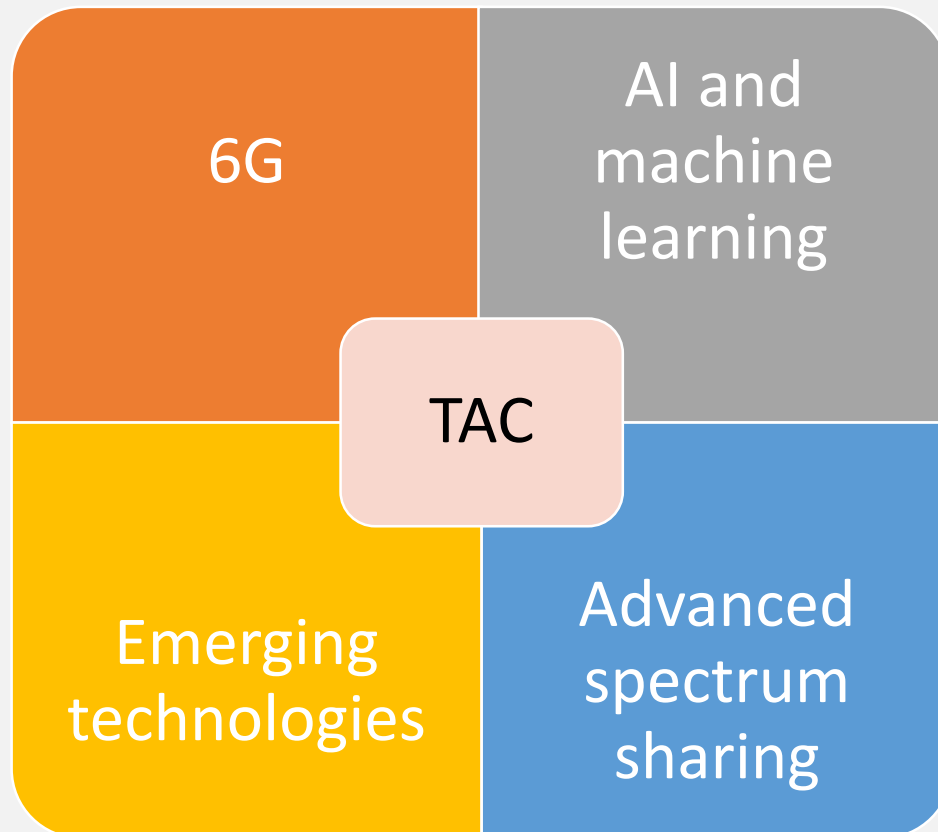
An Innovation Zone effectively expands a Program Experimental License's authorized area of operation. Such licensees are permitted to operate within an Innovation Zone, under the parameters set for that particular Zone, without having to modify their licenses to cover the new location. Innovation Zones can be created in response to a particular request or on the Commission's own motion.



Open RAN Innovation Zones

- In 2021, FCC, in coordination with NTIA and National Science Foundation, established two new innovation zones for wireless research including Open RAN.
- Aerial Experimentation and Research Platform for Advanced Wireless (AERPAW) will create a city-scale platform to focus on new UAS use cases for advanced wireless technologies.
- Colosseum, the world's largest wireless network emulator, at Northeastern University has unique capability to emulate full-stack communications, and to support artificial intelligence and machine learning algorithms and hardware in the loop.

FCC's Technological Advisory Council (TAC)



For the TAC 6G Working Group:

- Development and deployment of 6G
- Open RAN/vRAN
- Security in Open RAN/vRAN architecture
- Use of mmW/terahertz bands for fronthaul/backhaul/access/sensing
- 6G for autonomous driving, edge computing, emergency alerting, and smart city technology
- 6G for helping bridging the digital divide

Select International Efforts on Open RAN



Brazil. The Brazilian government has earmarked 32.4mn reais (U.S. \$5.76million) for the first phase of a program to foster ORAN for 5G in the country, and the program, which is a partnership between the science, tech, and innovation ministry, the national education and research network, and Brazil's ICT R&D center, will run until November 2023.



Colombia. Colombia's Comision de Regulacion de Comunicaciones has selected two of three pilot projects to work on Open RAN under the country's Regulatory Sandbox initiative. One project will be on ORAN connectivity.



Japan. Along with the U.S., greenfield operators in Japan have the largest ORAN deployments to date. Japan committed to cooperating with the U.S. and Quad countries to accelerate Open RAN, an effort under which the U.S. pledged \$2.5billion and Japan pledged \$2billion. The country also announced that it would set up a wide experimental network this year with 5G ORAN, an initiative directly aimed at countering the rise of Chinese equipment makers.



South Korea. In 2020, the government launched a private-public partnership to develop open standards for 5G base station linkage and vendor diversity. Korea's Telecommunications Technology Association (TTA) and Electronics and telecommunications Research Institute (ETRI) are running an Open RAN test and certification lab and recently selected Viavi Solutions as a partner.

The Process for Developing Standards

Open RAN is primarily driven by industry standards-settings bodies and market forces, not mandates from the U.S. government or any other government.

The U.S. and other governments have an important role to play in promoting Open RAN which is distinct from the setting of standards. For example, governments can provide appropriate legal structures, incentives for investment, and support for research.

Select Industry Organizations Working on Standardization

- **O-RAN Alliance.** A large and active organization comprised of most large industry players. It develops specifications and provides testing and certification.
- **Telecom Infra Project.** An industry association of operators, vendors and technology firms that has focused on ORAN. It helps providers streamline systems integration.
- **Open RAN Policy Coalition.** An industry policy group, with operators, vendors and technology firms.

Standards Bodies

Alliance for Telecommunications Industry Solutions (ATIS).

Active in ORAN. Expects to adopt standards in near future.

European Telecommunications Standards Institute (ETSI).

Active in ORAN. Recently approved first specs (details below).

3GPP.

Not currently active in ORAN.

Select Advances in Standardization

ATIS and O-RAN Alliance: Signed Memorandum of Understanding (MoU) to drive adoption of O-RAN in North America, with a focus on security issues and stakeholder requirements.

ETSI and O-RAN Alliance: Adopted first Open RAN specification, which focuses on "open fronthaul" – an interface in Open RAN architecture. The specification covers both LTE and 5G.

Thank You!

