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Overcoming Challenges of Multi-Vendor Open RAN

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To keep pace with the ever-increasing user expectations for instant access to information, mobile network operators (MNOs) need the agility to scale on demand, make changes quickly, and launch innovative services that drive the success of their businesses. At the same time, MNOs face the challenges of efficiently managing their CAPEX and OPEX to sustain profitable growth. Managing CAPEX and OPEX in the radio access network is critical as continuous growth in data traffic can drive the total cost of ownership (TCO) of mobile access networks up by as much as 300 percent.[1] To this end, network operators are leading the path to an open architecture that uses well-defined interfaces between elements that are implemented on general-purpose hardware. Products that work in the open radio access network (RAN) architecture can lead to more flexible and cost-effective deployment options for MNOs.

While vendors and standards bodies are working hard to publish open interfaces, multi-vendor interoperability is not always guaranteed. Even with products built to comply with published guidelines, a substantial question remains: do the implementations successfully work with each other to provide the desired services? This question points to the need for early interoperability activities between O-RAN Alliance member companies.

This paper discusses the challenges and opportunities associated with the adoption of an open RAN architecture. With different vendors supplying components, ownership and serviceability of multi-vendor RANs must be addressed. It is critical that the ecosystem develops and maintains truly open specifications and robust interoperability programs to generate confidence in open RAN networks.

> **Open RAN is about standardizing open interfaces that allow a service provider to build best-of-breed networks using radio and baseband functions from different vendors.**

Last year, the open RAN initiative cleared an important hurdle with the active participation of many major network equipment providers in the O-RAN Alliance. With their involvement, the operator-led O-RAN Alliance can drive contributions to the 3GPP standards that support the open RAN goals.

1. https://www.mckinsey.com/industries/telecommunications/our-insights/the-road-to-5g-the-inevitable-growth-of-infrastructure-cost

Whose Open RAN Interpretation Is Correct?

To deliver products that meet the open RAN standards, the implementations of the different vendors' products must align with the specification. The complexity of the functions in the RAN and their interactions create the first set of challenges that the open RAN participants are collaborating to solve.

Key Open RAN Success Factors
- Collaboration and strong ecosystem
- Multi-vendor interoperability

The definitions of the RAN functions must provide equipment suppliers with the appropriate level of detail that allows development teams to build components that work together successfully. The active participation of experienced equipment suppliers provides the group with knowledgeable resources who can ask the appropriate questions and can jointly solve the challenges that the new architecture encounters.

Samsung has a sound understanding of how to optimize latency-sensitive functions found in the RAN. Samsung's leadership in the xRAN Forum provided significant direction in the creation of the open and standardized fronthaul interface. These outputs from the xRAN Forum served as the foundation for the O-RAN Alliance Work Group 4, where Samsung continues to contribute enhancements to the open fronthaul interface specifications. Samsung also continues to collaborate with major carriers, such as AT&T and Verizon, to demonstrate the readiness of open RAN.[2,3]

Proving the Products Work Together

Given the hyperdynamic nature of mobile networks in which a single small outage can cost millions of dollars in lost revenue and reputation, systems must perform stably and reliably in multi-vendor open RAN networks. This combination of critical requirements is one of the reasons for the delay in moving away from single-vendor radio networks.

Operators of multi-vendor networks also need confidence that the products they are deploying interoperate. The interoperability of different vendors' RAN systems in the past only needed to focus on successful handover of an active call from one RAN to another. While highly relevant in an open RAN, unsuccessful handovers between vendors are only one aspect of interoperability; it is critical to identify and eliminate the risks of incompatibilities between the disaggregated radio and control products from different vendors as well.

In some cases, operators created dedicated initiatives to prove interoperability. For example, Verizon launched a 4G LTE Open RAN initiative, with a goal of proving that a network can operate using open interfaces between different vendors. Samsung began collaborating with Verizon in 2018 to advance their initiative by supplying remote radio heads and baseband units that work with products from other vendors in Verizon's network.[3]

Additionally, under the leadership of service providers, an Open Testing and Interoperability Center (OTIC) initiative was launched in September 2019. OTIC provides a controlled and managed environment where multiple equipment providers and system integrators can integrate and test their open RAN products and verify compliance with the O-RAN Alliance specifications. Samsung is a committed founding partner in the OTIC initiative.

2. https://about.att.com/innovationblog/2019/09/first_ecpri_call_for_millimeter_wave.html
3. https://www.samsung.com/global/business/networks/insights/press-release/samsung-selected-as-a-4g-lte-open-ran-provider-on-verizons-4g-lte-network/
4. https://www.businesswire.com/news/home/20191219005289/en/

> "Samsung strongly supports open architecture that will take 5G networks to new heights, allowing the industry to continue driving innovation further. I am confident that OTIC will play a key role in accelerating the O-RAN based open platform development by empowering rapid creation of the robust ecosystem."
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> — **Jaeho Jeon,** Executive Vice President and Head of R&D, Networks Business at Samsung Electronics

AT&T recently hosted the O-RAN Alliance Plugfest and proof of concept activities in New York City, which is one of the first OTIC events. At this event, Samsung demonstrated the multi-vendor compatible Configuration, Performance, and Fault Management capabilities of the O1 interface. Samsung also demonstrated their implementation of the Open Fronthaul Management Plane specification on the O1 interface.[4]

While collaborative efforts continue, the success of open RAN also hinges on operators' abilities to develop and execute a thorough test and integration model. Many service providers believe that nearly 80 percent of the verification tasks are common across all service providers. By testing in the integrated OTIC environment, network service providers will gain more confidence in multi-vendor interoperability and focus their live network efforts on the remaining areas that are most important to them. Likewise, vendors and system integrators will be able to collaborate and validate their solutions prior to network deployment, reducing the deployment risks inherent in multi-vendor open RAN deployments.

Samsung is a Leading Open RAN Equipment Partner

Samsung is an active proponent of open RAN initiatives and continues to execute the strategy that will make the open RAN a reality for its customers. Samsung's commitment to open RAN is unsurpassed. By partnering with service provides to deliver cutting edge open RAN solutions, Samsung demonstrates its commitment to producing products that will drive successful open RAN solutions for operators. From delivering solutions that include open RAN components to the deployment of cloud-native 5G core network elements, the 5G vision is becoming a reality.

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