O-RAN Outlook

Q&A with EXFO's Xanthos Angelides, Nova RAN Product Line Manager

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How mature is O-RAN?

Xanthos Angelides
Nova RAN Product Line Manager

O-RAN is at about a 4 out of 10 on a maturity scale and accounts for about 5% of operator spend. According to analysts at ITR, **as of December 2020 there were nearly 40 commercial O-RAN deployments around the world, which is about one-third of the total number of live 5G networks.**

Based on project experience, network trials and lessons learned from operators and vendors, the first O-RAN specifications
and standards are expected sometime in 2021. Most of the O-RAN standardization work so far comes from 3GPP, Telecom Infrastructure Project (TIP) and the ORAN Alliance.

We are seeing O-RAN networks and use cases focused on rural coverage in the case of Vodafone in Africa, Turkey, the UK and Ireland; MTN in Nigeria; and Telefonica in the Middle East, Africa, and South America. Rakuten in Japan is running the first live network built on O-RAN and claims 40% lower cost than traditional networks. Dish, Charter and AT&T in the U.S. are looking to fully deploy O-RAN within the wider network for all their broadband and 5G needs. Orange Group also believes O-RAN will heavily reduce their network infrastructure and operations costs.

O-RAN can provide 5G coverage in rural areas, where it is harder to justify a business case using standard network equipment. This is important for many reasons, as this could hasten the pace of 5G adoption and could enable significantly more 5G coverage earlier than anticipated. This is necessary for some 5G use cases such as mobile broadband services, IoT and unmanned aerial vehicle (UAV) connectivity. Using O-RAN for rural 5G deployments can also help operators achieve regulatory coverage requirements in a cheaper and faster way.

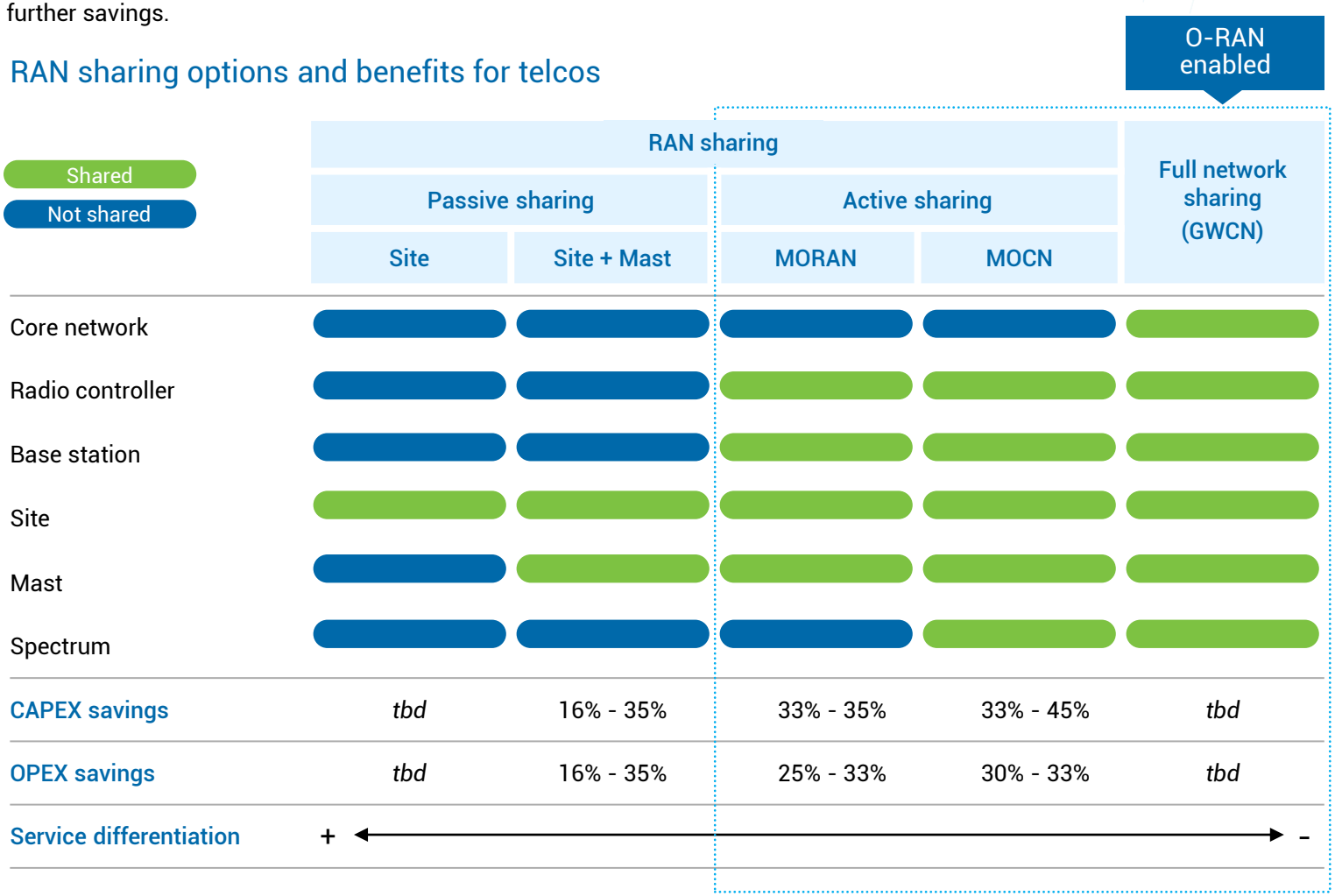
The overall sharing of network infrastructure is a key driver in cost reduction, but can be complex. Any operator considering network sharing will look at O-RAN to reduce RAN sharing costs, especially in less competitive rural markets. Every country in the EU has passive and active sharing agreements (e.g., sharing sites and masts and multi-tenant sharing (MORAN)) but O-RAN makes full, active sharing possible including at the core, which can deliver further savings.

Lower cost than traditional networks - this is quite a saving!

With Open RAN we can expect growth in active sharing

O-RAN makes full, active sharing including the core possible, which can deliver further savings.

RAN sharing options and benefits for telcos



Source: Deloitte Consulting, 2020

What areas of this new architecture pose monitoring challenges?

A big change with ORAN is the decomposition of radio and baseband unit (BBU) resources to central (CU) and distributed (DU) units. In other words, the radio is distributed whereas the processing is centralized.

Traditionally a single vendor would provide these resources as a single set of software and hardware. With cloud RAN, the software was decomposed to run on any standard hardware.

Now, O-RAN fully decomposes the CU and DU, opening up the potential to use new and different vendors for these components. In virtualized O-RAN, the CU and DU are virtualized as virtual network functions.

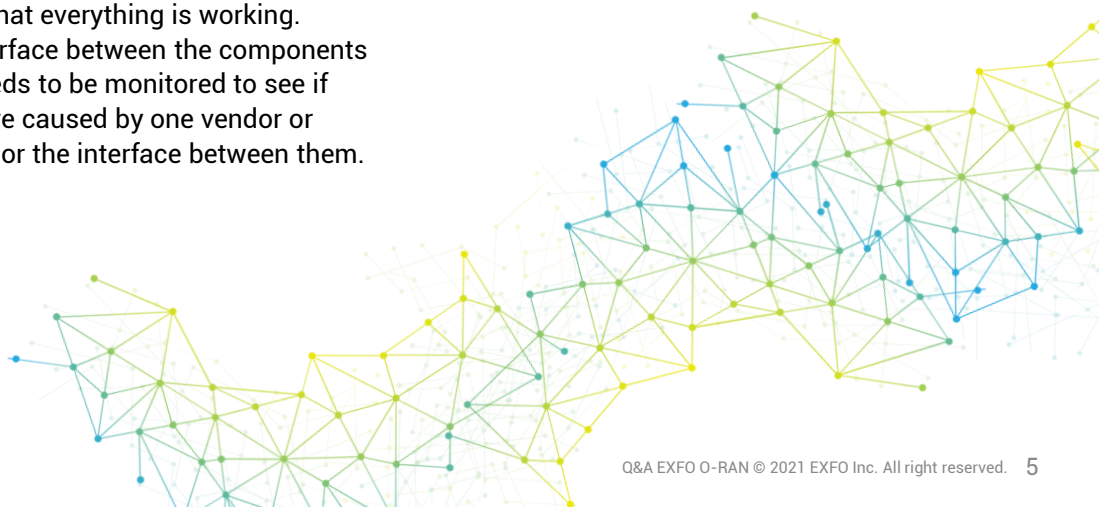
As O-RAN opens up an ecosystem of vendors, the role of independent testing and monitoring will increase in importance to ensure interoperability, fast troubleshooting and quick problem resolution.

Operators are moving from a single vendor network to multiple vendors and components, and therefore require a standardized way to assess interoperability and monitor performance—ideally in real time.

Prior to going live, operators need to test that everything is working. The interface between the components also needs to be monitored to see if faults are caused by one vendor or another or the interface between them.

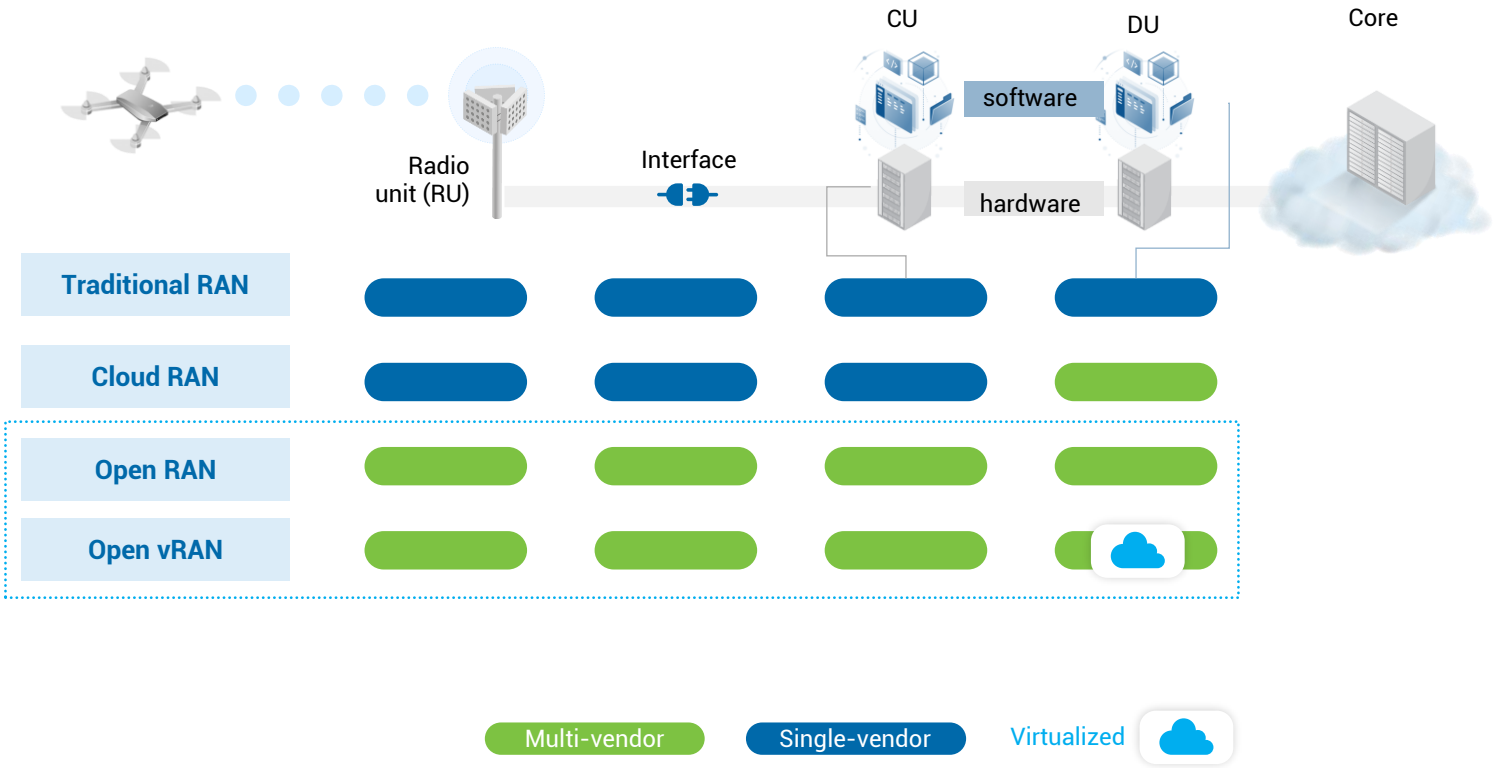
EXFO can test and measure interoperability in the lab and assure live network interactions with O-RAN, the core, and the F1 interface, as well as interactions and fault visibility between the components.

EXFO's technology can ingest and analyze data from any vendor to prevent and predict faults from occurring in the first place.



O-RAN vs. cloud RAN vs. traditional RAN

RAN openness enables a **software-centric approach based on COTS hardware**, potentiating **interoperable multi-vendor RAN ecosystems**, in which the RU and CU/DU solutions deployed by the telco can be from different suppliers.



Source: Deloitte Consulting, 2020

EXFO's role within the O-RAN Alliance

EXFO is a member and actively participates in various workgroups related to the Nova adaptive service assurance platform as well as EXFO's test and measurement product lines.

In terms of service assurance, we monitor the progress of specifications in terms of O-RAN specific interfaces and the adoption of 3GPP interfaces as well as the real-time and near real-time RIC use cases. From a test and measurement perspective, we participate in work groups related to fronthaul and backhaul.

We participate to follow the progress of specifications and use cases in related discussions, plugfests and seminars and also to align with the relevant clusters that are actively undertaking trials.

Overall, the O-RAN alliance engagement ensures that we align EXFO solutions with the needs of our operator customers with regard to O-RAN—from lab testing through to network operations and optimization—in a similar way to how we support traditional networks.

O-RAN ALLIANCE

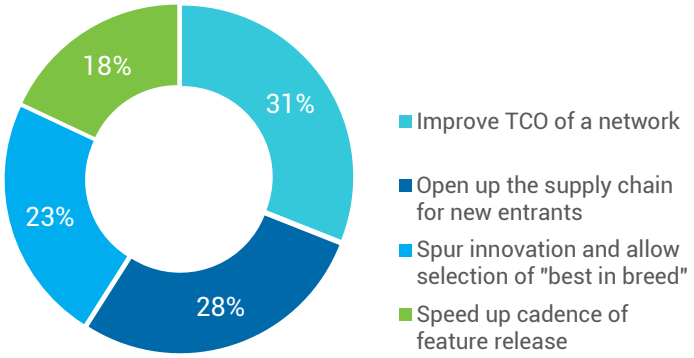
EXFO participates in relevant working groups highlighted below

O-RAN Working Groups	
WG1	Use Cases and Overall Architecture
WG2	Non-real-time RAN Intelligent Controller and A1 Interface
WG3	Near-real-time RIC and E2 Interface Workgroup
WG4	Open Fronthaul Interface
WG5	Open F1/W1/E1/X2/Xn Interface
WG6	Cloudification and Orchestration
WG7	White-box Hardware
WG8	Stack Reference Design
WG9	Open X-haul Transport

What are operators' expectations with O-RAN?

The ability to decompose and split components and move away from closed single-vendor solutions will drive prices down and open up the supply chain. **Open platforms allow MNOs to choose the best of breed solution for any given function**. This will also allow MNOs to enhance their networks and services on a rapid (eventually continuous) basis rather than having to wait for a major upgrade. ORAN will also accelerate RAN sharing deployments while reducing costs. **Their main driver to reduce the TCO of network using O-RAN, standard hardware and virtualized network functions.**

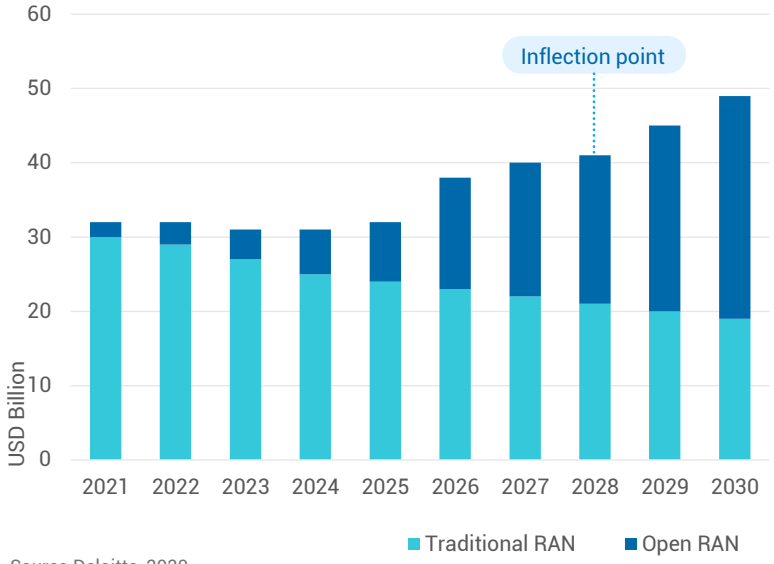
Drivers for adoption: TCO reduction, innovation and new vendors



Source: Analysys Mason, 2021

We expect operations to be cheaper for operators in the long run but not in the short-term. There will be learning issues, training and costs associated with deploying and training around a new technology.

Deloitte expects O-RAN to overtake the traditional RAN market in 2028



Source Deloitte, 2020

How can EXFO help operators reduce testing complexity?

Initially, operators can expect operations costs to increase as they invest in the right tools, solutions and expertise to integrate and manage O-RAN effectively. **It will also be important to work with experienced network and service assurance vendors that can support 4G and 5G interoperability.**

During the roll-out phase, operators cannot risk a poor customer experience. They must validate new site performance to be sure quality of experience (QoE) is properly matched to specific services.

To increase operational efficiency and reduce OPEX, operators turn to automated processes that can integrate with the RAN Intelligence Controller (RIC) and drive dynamic problem detection and resolution.

5G is not just another radio technology. It requires end-to-end network transformation and enables a new set of capabilities. EXFO provides full 5G test and monitoring solutions to assure services end-to-end from the RAN to the core.

O-RAN for 5G has many advantages but also presents challenges: standardization is immature and components and interfaces are still being adapted. Variations between vendors makes it harder for operators to standardize their operations.

The RIC will enable more advanced use cases at a wider area of network, as well as automated network control, monitoring and optimization at the edge. These use cases can drive 5G service innovation: network slice management, traffic steering and automated fault resolution for critical services, among others.

Another advantage of O-RAN is that vendors like EXFO and application developers can plug in to provide test and monitoring and service assurance for bespoke use cases like location-based services, private networks or edge computing applications.

How can things become efficient in such a diverse environment?

Given that the ecosystem of vendors and systems will increase, **operators will need a standard way to collect, exchange and analyze data and defined standardized processes across their network operations.**

Independent test and measurement and service assurance vendors such as EXFO are vendor-agnostic and can simplify and reduce the complexity of multi-vendor networks that are a mix of traditional and O-RAN components. EXFO's Nova platform can act as a single interface that understands and interacts with the vendors' standardized interfaces in the core and the RAN to present control and user metrics and KPIs in a standardized way. This will help deliver automated, real-time network operations and in-depth insights.

Another benefit to EXFO's technology that it helps reduce the time and complexity spent accessing multiple systems in order to piece together and understand different vendors metrics.

It also reduces training and processes costs around systems and tools. In addition to a strong technical solution, EXFO provides related professional services which can support operators in processes adoption and best practices, right through to the undertaking of specific analytics, troubleshooting and optimization activities.

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