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The next-generation radio access network

Open and virtualized RANs are the future of mobile networks

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MOBILE NETWORK OPERATORS (MNOs) are known for their ability to build and operate massive, high-performance wireless networks. They rely on highly specialized radio access and networking equipment with tightly integrated proprietary software to deliver the cellular services that connect our cell phones, tablets, computers, and other devices. But high costs, limited flexibility, and constrained vendor choice are prompting MNOs to shift away from such systems toward more open, standards-based, software-centric virtual platforms.

Many MNOs are well on the journey toward opening and virtualizing their core networks, achieving significant operational gains. They now have their sights on their distributed mobile edge networks: the radio access network (RAN). And because MNOs must replace or augment existing RAN equipment to deliver 5G service, they have the opportunity to adopt open and virtualized RAN architectures—which we will refer to simply as "open RAN"—as part of these deployments.

The open RAN market is still in its early days. We estimate that there are currently 35 active open RAN deployments across the globe,[1] many of which involve MNOs testing open RAN in greenfield, rural, and emerging markets. Although deployments are starting slowly, they could easily double in 2021. While it may take anywhere from three to five years for the technology to fully mature, open RAN adoption should accelerate rapidly thanks to the logic of its network design and its strategic alignment with carrier needs. Economic and competitive forces are also converging to drive the market forward. If this trend continues, the open RAN market has the potential to grow substantially, with some estimating double-digit growth rates[2] that will push open RAN to approach 10% of the total RAN market by 2025[3] from less than 1% today.[4] Moreover, if governments force MNOs to replace installed 5G RAN equipment from restricted vendors, the growth rate may be even higher.

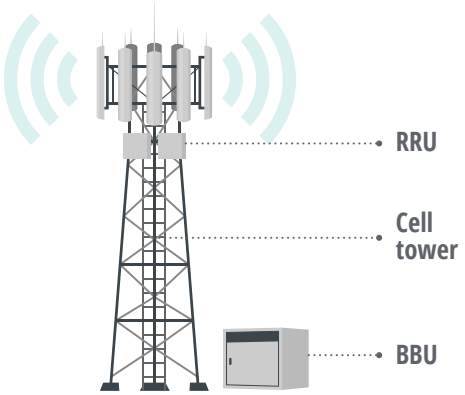
Why open RAN?

At its most basic level, the RAN architecture at the mobile network edge comprises a remote radio unit (RRU or RU) at the top of a cell tower that communicates with a baseband unit (BBU) located at the tower's bottom. The RAN uses proprietary hardware and vendor-defined communication interfaces, and its software-driven functionality is tightly integrated inside the hardware.

While these traditional systems have worked well for MNOs, they have many drawbacks. Making any upgrade or change to the wireless network, even seemingly minor ones, requires replacing physical hardware throughout the network—a costly, manual, and time-consuming process. Moreover, the proprietary nature of the equipment and

FIGURE 1

The traditional RAN architecture relies on specialized hardware and proprietary software, which raises costs, limits flexibility, and constrains vendor choice



Note: RRU = remote radio unit; BBU = baseband unit
Source: Deloitte analysis.

interfaces that connect the hardware locks MNOs into existing relationships with the vendor that originally supplied them.

Virtualizing the RAN and replacing proprietary interfaces with standards-based interfaces enables equipment interoperability and multivendor RAN deployments. This gives network operators more flexibility to pick and choose among best-of-breed solution providers. By opening the market, currently dominated by a handful of vendors, to new suppliers, open RAN can not only lower costs but also prompt greater innovation through competition, as well as allow MNOs to avoid restricted vendors.[5] Additionally, because they allow operators to use software to push out network functions and intelligent automation, virtual architectures can speed the roll-out of new services that can help carriers better manage their networks, improving network performance.

Open RAN is not an entirely new idea; MNOs have discussed the concept of an open RAN architecture for decades. But despite open RAN's appeal, adoption has hitherto been slow and met with skepticism due to technical engineering and integration challenges. Substantial confusion over the terminology and available technology options has also hindered adoption.

Now, however, open RAN's momentum is growing as the ecosystem develops, partnerships form, suppliers ramp up investments, and operators commit to experimentation, trials, and deployments. Over the past several years, aggressive experimentation through both lab trials and live deployments are closing performance gaps between open and proprietary RAN solutions, steadily tearing down perceived barriers. Rising capital costs and national security concerns that further limit financial flexibility, as well as the rise of government policies to support vendor choice, are also accelerating the movement toward virtual and open RAN architectures. Finally, open RAN is riding the wave of several technology trends, including 5G, cloud virtualization, distributed edge computing, and artificial intelligence (AI)–driven automation. All of these factors can help push open RAN from just a cool idea toward reality.

The taxonomy of virtual and open RANs

As is common with emerging technologies, the open RAN taxonomy is fluid. Evolving developments in engineering, configurations, and standards have led to conflicting terminology. Here, we will attempt to untangle the language needed to better discuss and understand the technology.

Open RAN encompasses two underlying concepts: virtualization and openness.

Virtual RAN decouples software-driven functionality from the underlying hardware, replacing purpose-built hardware with a programmable RAN infrastructure built with

low-cost, general-purpose hardware. This allows operators to use a single virtualized BBU to support multiple radios instead of needing a proprietary physical BBU with fixed functionality at every cell site.[6] These virtual architectures facilitate the dynamic introduction and administration of software-based services at RAN edge networks without having to replace the underlying hardware.

Open RAN takes virtualization a step further. It not only disaggregates software applications from the underlying hardware infrastructure, but also replaces the proprietary communication interfaces between baseband components—the centralized unit (CU), the distributed unit (DU), and the radio units (RUs)—with open, standards-based interfaces. Open and standards-based interfaces enable operators to source the radio, baseband, and software from different vendors with plug-and-play interoperability.[7]

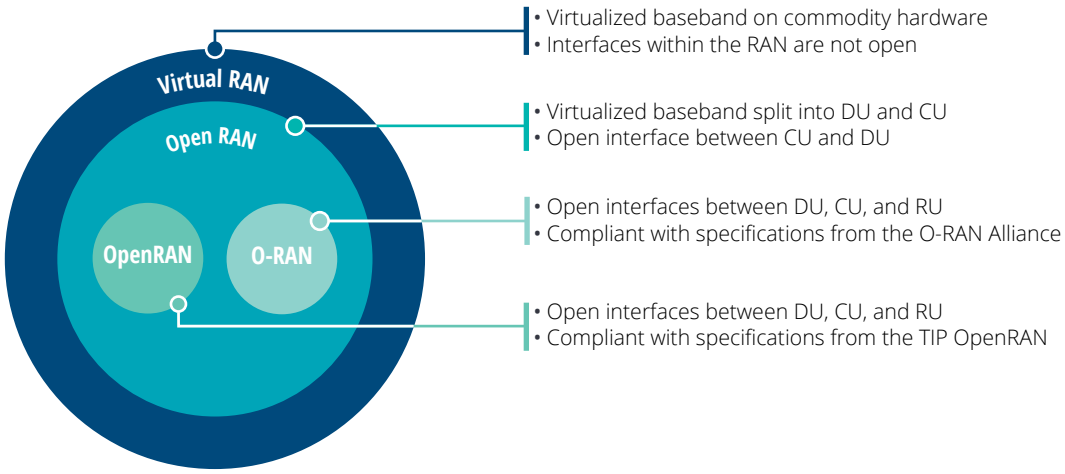
A RAN can be virtualized but not open. Virtualizing and opening RAN edge networks are separate decisions. An operator can virtualize the RAN by disaggregating software functionality from the underlying RAN hardware and migrating to a cloud-native architecture *with or without* opening and standardizing the communication interfaces. For purposes of this article, however, we use the term "open RAN" to refer to a virtualized *and* open RAN architecture that gives MNOs both the flexibility to virtually manage RAN baseband components and the choice to source baseband hardware and software components from different vendors (figure 2).

Many would argue that virtualization is only a first but necessary step in the journey toward an eventual full opening. As long as the interfaces remain closed and controlled by the vendor, new entrants cannot participate.

Besides different degrees of openness, there are also multiple "flavors" of open RAN. For example, the O-RAN Alliance (with O-RAN) and the Telecom Infrastructure Project (with OpenRAN, not to be confused with our use of "open RAN") promote specific standards-based open RAN

FIGURE 2

A RAN can be virtualized but not open



Note: CU = centralized unit, DU = distributed unit, RU = radio unit
Source: Deloitte analysis.

reference architectures, standards, and protocols that seek to foster vendor interoperability.

Multiple converging factors are driving open RAN adoption

Several main drivers—each, however, associated with a set of hurdles—are helping to accelerate open RAN adoption.

VIRTUAL RAN ARCHITECTURES LOWER TOTAL COST OF OWNERSHIP

One of the most compelling value propositions of virtual RAN architectures, open or closed, is in their potential to lower the total cost of ownership of RAN networks. These cost reductions can derive from sources such as:

Lower upfront capital deployment costs. With rising capital intensity and slowing subscriber and revenue growth, MNOs view virtualized RAN as an important lever for fundamentally changing network economics. For instance, lowering capital costs is key to the optimal deployment of next-generation 5G wireless networks. 5G will require the addition of approximately three to four times more cell sites, albeit generally smaller cells on rooftops, lamp posts, and utility poles.[8] Greater network density is needed to achieve 5G's promise for enhanced coverage, capacity, speed, and low latency, as well as to overcome the limited propagation characteristics of high-band spectrum. Estimates call for the addition of more than 2 million 5G cell sites in the United States by 2021, up from roughly 200,000 today.[9] By allowing operators to aggregate baseband functionality using a single virtualized BBU to support multiple radios, open RAN reduces overall hardware cost and enables a smaller, simpler, and more energy-efficient installation footprint.

Virtual architectures can also "future-proof" investments in the physical network. Operators can use software to upgrade RAN features and functionality on the same physical infrastructure to keep pace with changing market conditions instead of having to rip out and replace whole physical systems.

Opening RAN architecture interfaces introduces vendor competition that can further reduce hardware costs. Open RAN allows operators to pick and choose among vendors—not just traditional telecom vendors, but big tech companies such as hardware manufacturers, webscalers, original design manufacturers, and others looking to enter the market. The ability to change out individual RAN components with off-the-shelf hardware from any vendor can improve flexibility as well as reduce costs and downtime for system scaling and maintenance. That said, these savings from vendor choice are theoretical. Many industry pundits argue that the additional cost, time, and effort to test and integrate multivendor systems could well offset, if not completely negate, any benefits from vendor diversity.[10] Additionally, the performance of processing intensive RAN capabilities on general-purpose hardware may not match what can be achieved on bespoke optimized hardware platforms.

Lower operating expenses through automation. Open RAN has the potential to reduce ongoing network operating and maintenance expenses while simultaneously addressing the conflicting challenge of rising data traffic growth and customer expectations. Software-mediated RAN architectures empower operators with new levels of operational flexibility and intelligent automation that fundamentally shift how they manage networks.[11] Programmable RAN infrastructure also makes it simpler and more cost-effective to roll out new features and functions at distributed RAN locations at a mobile network's edge. Moreover, open interfaces enable these new network features and functions to operate on any vendor's hardware without having to send out

engineers and technicians for vendor-specific integration, as is common practice today. Thus, open RAN could replace much of the time-consuming and manual work of maintaining, upgrading, and optimizing networks with light-touch, centrally managed, automated computing processes.

This type of automation, however, comes with its own challenges. To achieve these types of operational efficiencies, operators should become more adept in IT-style systems management and software engineering, imitating cloud service providers whose velocity in innovation showed the world how to drive value from network platforms. Operators should also adopt service-oriented practices using rapid-fire DevOps and continuous innovation and delivery (CI/CD) practices to deploy new applications with speed and precision—something operators did not have to do with more traditional RAN deployments.[12]

Not all operators are eager to take a more hands-on approach toward operations. For instance, anything that could interfere with network reliability is likely to give pause to MNO adoption.[13] To reduce this risk, some carriers prefer the ease and simplicity of traditional systems in which they rely on a few trusted vendors to provide new, fully tested, carrier-grade solutions with turnkey deployment, maintenance, and integration support. Should something go wrong, these operators can lean on their one vendor for remediation instead of having to identify and isolate the issue, then chase down the culprit from a pack of small, unproven vendors who may point the finger at anyone but themselves.

OPEN RAN ENCOURAGES INNOVATION

Beyond the capex and opex savings discussed above, open RAN also drives faster innovation. Instead of having to replace network gear to introduce new features and functions, MNOs using open RAN can use software updates on white-box gear to affect change, materially shortening upgrade and innovation cycles. Moreover, vendor interoperability negates the need to send out technicians for custom onsite integrations, further reducing the time, effort, and cost of launching new products and services.

Suppliers also benefit from open RAN because it opens up market participation and lowers barriers to entry. Because of interoperability, vendors can develop products and solutions for use by multiple operators instead of having to create unique one-offs for a specific operator. Interoperability also fosters best-of-breed solutions because vendors can focus on what they do best—whether hardware, software, or silicon—instead of having to develop an entire integrated end-to-end system.

Perhaps most importantly, open RAN systems enable MNOs to leverage insights from the traffic flowing across their networks to develop solutions that improve network performance. Open interfaces encourage third-party development of AI/machine learning-driven solutions, which help operators deal with an increasing array of bandwidth-intensive applications and the explosion of data flowing over ubiquitous networks and devices. Applications such as RAN intelligent controllers (RICs) and self-optimizing networks (SONs) are emerging as essential and cost-effective methods to manage future network complexity. The ultimate objective is to lower costs and achieve super-lean operations with zero-touch, fully automated end-to-end network management and service orchestration using AI-optimized closed-loop automation.[14]

Open RAN innovation offers operators additional opportunities to evolve from merely providing commoditized “dumb pipe” connectivity to delivering differentiated customer experiences. For instance, MNOs might offer enterprise customers networks optimized for specific use cases.

Examples of these could include ultra-reliable networks with near–real-time response for factory robotics or pervasive low-power wide-area networks for widespread monitoring of assets such as gas pipelines or oil rigs. While it remains to be seen whether enterprises would take up, let alone pay for, these types of services, they do have the potential to open the enterprise market to operators—a market in which they have not been historically active.

While innovations made possible by open RAN could generate new revenue, it also introduces the risk of competition from new entrants. Although "coopetition" currently characterizes the competitive landscape, open RAN makes it easier for alternative players (webscalers, equipment vendors, system integrators, and so on) to capitalize on the greater availability of new low-cost wireless equipment to disrupt the mobile communications market. **Rakuten** and **DISH Networks**, for example, plan to use open architectures to build low-cost alternative networks in direct competition with incumbent MNOs. And better access to lower-cost wireless equipment was the initial inspiration for **Facebook** to start the Telecom Infrastructure Project.

OPEN RAN DRIVES GREATER VENDOR DIVERSITY AND SUPPLY CHAIN SECURITY

Consolidation over the years has concentrated the RAN vendor market to five major players: **Huawei**, **Ericsson**, **Nokia**, **ZTE**, and **Samsung**. Together, they account for more than 95% of the market, with the top three vendors, **Huawei**, **Ericsson**, and **Nokia**, controlling 80% of the market.[15]

Market concentration has come to the forefront of political debate in the United States, where the government advisory and prohibition against using federal funds to purchase communications equipment or services from companies that pose a national security risk has restricted business with Chinese equipment manufacturers.[16] This effectively eliminates two of the five top vendors mentioned above (**Huawei** and **ZTE**) and highlights the degree of market concentration. Additionally, in April 2020, the US Department of State announced the 5G Clean Path initiative, which restricts the use of untrusted vendors in the transmission, control, computing, and storage equipment of all 5G mobile traffic entering or exiting American diplomatic systems at home or abroad.

The United States is not alone in making such moves. Multiple government initiatives around the globe are aiming to restrict the use of untrusted vendors. In July 2020, the United Kingdom announced that it would ban new purchases and require the complete removal of restricted kit from UK networks. And Australia, New Zealand, and Japan all effectively ban the use of untrusted vendors from their 5G deployments.

With more countries restricting vendors, the urgency for a new approach is driving greater worldwide interest in open RAN. To allow for alternatives, US policymakers increasingly seem to favor open RAN initiatives. They prefer the market development of alternative vendors to expand the supplier ecosystem that can give MNOs greater flexibility and choice.

For US MNOs, the lack of a US "national champion" equivalent to the largest players could become problematic if trade tensions escalate and national security is tied to homegrown network providers. However, even though it lacks a major integrated wireless equipment manufacturer, the United States is home to some of the most prominent emerging open RAN startups, including **Altiostar**, **Mavenir**, and **Parallel Networks**. Most of these suppliers offer open RAN networks compliant with the O-RAN architecture. Moreover, the United States boasts many of the most significant players in the hardware, silicon, and software supply chain ecosystem. These companies can partner with one another to cobble together an end-to-end carrier-grade open RAN solution.

The industry is uniting around open RAN

By opening the market and introducing competition, open RAN sets up a rift between traditional incumbents and forward-looking new entrants. Most of these new entrants, however, still need to establish themselves in the market; for now, the balance of power rests firmly in the camp of a few traditional vendors, which may, in fact, emerge stronger. Nonetheless, open RAN will likely force incumbent vendors to shift their business models away from a hardware to a more software-centric approach, introducing new business and competitive risks through the transition.

This tension is creating momentum for several industry-led open RAN initiatives that seek to unite an ecosystem of supply chain partners and advance open RAN through the definition, development, and testing of standards and reference architectures. Beyond the standards defined by the 3rd Generation Partnership Project (3GPP),[17] multiple industry groups are leading the open RAN movement, each with a different purpose. Prominent industry-led open RAN initiatives include:

O-RAN Alliance. This alliance, formed in early 2018, is a worldwide carrier-led effort that seeks to define new radio architectures. Its main objective is to open designs and interfaces between the RRU and BBU. It also focuses on vendor interoperability.

Telecom Infrastructure Project (TIP). Launched in early 2016 by Facebook, the TIP has more than 500 members and 12 project groups. Its OpenRAN project group focuses on building white-box baseband and radio unit designs based on O-RAN Alliance architecture and interfaces. TIP's primary goals are to develop an ecosystem to spur innovation, enable supplier diversity, and reduce deployment and maintenance costs across access, transport, and core networks.

Open RAN Policy Coalition. The Open RAN Policy Coalition, launched in mid-2020, advocates for government policies to help drive open RAN adoption. Its growing membership spans operators, equipment manufacturers, software developers, and silicon chip makers.

Open Networking Foundation (ONF). In August 2020, the ONF announced several new initiatives in the open RAN domain. This group is looking to deliver open-source implementations of functionality included in open RAN components such as CU, DU, and RICs.

From a technical perspective, the O-RAN Alliance's work is the most foundational, prompting partnerships with many other organizations. The TIP announced a liaison agreement with the O-RAN Alliance in early 2020 that will allow the two groups to share information and hopefully prevent duplication of effort. In mid-2020, the telecom industry lobby group GSMA announced that it would partner with the O-RAN Alliance to accelerate the adoption of open RAN technologies.[18] The ONF has also indicated it will work with the O-RAN Alliance to develop its solutions.

Like other aspects of open RAN, the dependencies between and interactions across these groups can be confusing. And while well-intentioned, the plethora of initiatives has the potential to further fragment the industry, with each offering slightly different flavors of open RAN. To deliver a solution that universally appeals to multiple stakeholders, it will be critical for these various organizations to harmonize their efforts and provide a simple way for operators to learn about and embrace open RAN.

A SAMPLING OF OPEN RAN VENDOR ECOSYSTEMS

Companies big and small across the telecommunications ecosystem, including tier one and tier two operators, webscalers, traditional vendors, and startups from all corners of the industry, are beginning to coalesce around the open RAN model. Some of these players include:

Traditional RAN equipment vendors. These companies differ widely in the degree to which they embrace open RAN.

- Examples: **Huawei**, **Ericsson**, **Nokia**, **Samsung**, **ZTE**

New open RAN vendors. Several well-financed new companies are focusing on software-driven RAN architectures using plug-and-play, hardware-agnostic infrastructure to radically improve mobile network economics. These companies are slowly strengthening their reputation and positioning themselves to become key beneficiaries of the shift to open RAN.

- Examples: Altiostar, Mavenir, Parallel Network

Network hardware, software, and component providers. Many traditionally enterprise-focused hardware and component vendors are participating in open RAN industry initiatives to position their product portfolios to meet carriers' emerging needs. While most of these vendors do not offer radio technology, they are seeking partnerships in which they contribute software, hardware equipment, or components in efforts to engineer a complete integrated solution.

- Examples: Cisco, Fujitsu, IBM, NEC, Samsung, Hewlett Packard Enterprise (HPE), Dell Technologies, Lenovo

Chipset vendors. Each chipset vendor offers distinct solutions, with several providing accelerator kits to advance open RAN adoption. Sentiment is growing for the need for significant investment in 5G RAN silicon solutions to close the performance gap between restricted and unrestricted vendors.

- Examples: Intel, Qualcomm, Nvidia, Marvell, Xilinx

Cloud service providers. Cloud providers initially sought to offer MNOs cloud-based virtual environments to house and run internal applications and, eventually, external software-defined solutions. Now, webscalers and MNOs are increasingly partnering with each other to provide joint enterprise-oriented solutions for specific use cases, such as the need for low latency. With the emergence of new types of wholesale wireless arrangements from new entrants like **Rakuten** or **DISH**, webscalers and over-the-top media providers may emerge as formidable competitors to traditional mobile operators. They may even one day use open architectures to develop competing networks in their quest to connect the next billion consumers. It is this vision, coupled with frustration with the high cost of telecom equipment, that led Facebook to spearhead the TIP.

- Examples: **Amazon web services**, **Microsoft**, **Google**, **IBM**, **Facebook**

Barriers and challenges

Many challenges to open RAN adoption exist, many of which involve highly technical engineering issues that are beyond this chapter's scope. The following are some of the more commonly cited concerns that are slowing open RAN's adoption among MNOs:

Carrier-grade scalability. Experimentation with open RAN has thus far been largely limited to local and regional deployments. At a small scale, open RAN's complexity of integration and its load on RAN network functions is readily managed. Several operators are experimenting with open RAN architectures in underserved areas where the potential for stranded investment and pressure for high performance is low since there is little or no existing infrastructure. In Turkey, for example, **Vodafone** is working with vendor partners using agile methods to make rapid iterative updates to software and equipment configurations, tracking key performance indicators to provide evidence of and confidence in achieving performance thresholds.

Whether this architecture is scalable to larger networks with greater traffic loads and higher performance requirements is still unproven. Still, some evidence of scalability comes from one of open RAN's few live deployments, undertaken by the Japanese e-commerce giant **Rakuten**. Rakuten is on track to deploy 7,000 open RAN sites in Japan by the end of 2021—the equivalent of a medium-sized European country such as Austria or Portugal.[19] But as the number of subscribers on this network is relatively low, the technology's scalability to support tens of millions of subscribers is still in question.

Sunk costs. A traditional RAN's total cost of ownership, including the underlying equipment, site rental, support, maintenance, and energy costs, can be the most expensive part of a mobile network, representing 65%–70% of its total cost. Given that, open RAN's appeal from a cost perspective is easy to understand. Several studies have concluded that open RAN can reduce capex by 40%–50% and operating expenses by 30%–40% relative to a traditional cellular setup.[20] Most of these studies cite **Rakuten**, which is striving to build the first and largest end-to-end virtualized cloud-native network using open RAN architectures.

The caveat is that while the total cost of ownership claims may be valid in greenfield environments such as in Rakuten's effort, this magnitude of cost savings seems highly improbable in "brownfield" environments where significant investments have already been made. One of the main reasons for this is that 5G deployments build on and require interoperability with existing 4G infrastructure—and 4G's closed vendor implementations lock operators into using the same vendor. Accordingly, operators seeking to adopt open RAN in existing infrastructures would need to replace legacy equipment, which would significantly raise an open RAN deployment's overall cost.[21]

Vendor interoperability concerns. New solutions must compete against proven, tightly integrated legacy RAN systems designed and optimized for high performance. While open RAN provides greater vendor choice and flexibility in implementation, it also increases opportunities for incompatible configurations from multiple possible combinations of software and hardware. Each combination of multivendor end-to-end solutions must undergo extensive testing in a controlled environment, which would require significant additional time, effort, and cost relative to traditional setups.

To explore ways to alleviate this problem, several industry-led initiatives, including the O-RAN Alliance, are hosting "plugfest" events that bring together diverse ecosystems of component vendors to test, validate, and harden end-to-end operator solutions that can also interoperate with existing

legacy architectures. Several leading vendors and consortia are also launching communal labs to test and validate interoperability in a controlled and managed environment.[22]

System integration. Integration complexity also presents a significant obstacle to open RAN adoption, as one of the key benefits of remaining with the traditional model is that operators can turn complete responsibility for implementation, upgrades, and maintenance over to the vendor. Should something go wrong—and it always does—accountability in the current environment is clear. If operators are to evolve away from reliance on integrated turnkey systems from a single vendor, they should incubate new capabilities to orchestrate and manage complex multivendor RAN deployments, which will necessitate the use of in-house, vendor-supplied, or third-party systems integrators. And since open RAN is a relatively new area, there are not many integrators with RAN experience that also have the operator's best interest in mind.

While anecdotal, **Rakuten's** experience again provides grounds for optimism. In assembling its greenfield mobile network, the company undertook a significant role as system integrator to orchestrate at least 10 different vendors, achieving many industry firsts in the process. Rakuten's CEO originally thought that the RAN integration would be the most complex part of coordinating these vendors. But he later acknowledged that although the RAN integration was extremely challenging, only 10% of the challenge came from the RAN and 90% came from "everything else."[23]

GETTING STARTED WITH OPEN RAN

Many operators are anxious to move forward with open RAN, and the market is developing rapidly. It may take some time, but many are confident the industry will eventually overcome the technical and engineering challenges that stand in the way of reaching a truly scalable commercial-grade solution. A mid-2020 survey of operators found that a majority believed that practical applications of 5G open RAN BBUs would emerge within two years.[24] The same study found that operators are not necessarily waiting for full feature and performance parity. Many said that they would be willing to accept open radio units if they showed 80% of the performance capabilities of a traditional integrated system, particularly for service in underserved areas.[25]

Even if open RAN is still not quite ready for widescale commercial deployment, this is no time to stand still. Since the telecom industry works on long multiyear planning cycles that can span decades, operators would benefit from taking action today. Now is a good time to assess the current state of their business, understand where the company needs to go, and determine how it needs to change.

Operators should start educating themselves on the opportunities and challenges presented by open RAN. A good place to begin is by separating hype from reality by participating in industry consortia, learning from those already testing open RAN in labs and field trials. Operators can also engage with vendors and other experts to understand global operator deployment trends, assess technology and ecosystem maturity, and evaluate the total cost of ownership of alternate deployments based on their own unique starting point.

While engineers tackle the technological issues, operators can take decisive action in developing an operationalization plan, building an organization and culture of innovation and continuous improvement to support new software-centric business and operating models enabled by open cloud-native architectures. If they want to successfully transition to open RAN, operators should acquire new capabilities, hire and develop internal talent, and adopt new ways of working.

SIGNIFICANT LIVE OPEN RAN IMPLEMENTATIONS AND TRIALS

Rakuten, with its 7,000-site deployment planned for launch by the end of 2020, is leading the telecom industry's transformation toward open RAN architectures. Rakuten, which has a reputation for disruptive innovation, is leveraging the strengths of different vendors for various parts of the network, which has never been done before.[26] The lack of legacy infrastructure helps reduce the risk and cost of deployment.

Dish Network in the United States intends to build the first fully open RAN-compliant stand-alone nationwide 5G wireless network. The company is in the process of selecting the vendors that will help build the new, greenfield network. Dish plans to cover 70% of the US population with 5G by June 2023.[27]

Vodafone is conducting extensive open RAN trials in the United Kingdom, South Africa, Mozambique, Turkey, Ireland, and the Democratic Republic of Congo with clear timelines for commercial deployments across multiple wireless technologies (2G, 3G, 4G, and 5G). The company is seeking to deploy open RAN technology across its considerable European footprint, which covers 100,000 cell sites and 400 million people across 14 countries.

Telefonica announced it will conduct 4G and 5G open RAN technology trials in Germany, Spain, the United Kingdom, and Brazil in 2020. The Spanish operator will collaborate with several vendors to develop and deploy O-RAN trials across its footprint.[28] Telefonica also has several open RAN projects in Peru.

Deutsche Telekom is collaborating with two vendors on developing a programmable open RAN platform based on a disaggregated open RAN architecture. The collaboration is part of Deutsche Telekom's European Open Test and Integration Center to test O-RAN-compliant solutions.

Etisalat, a telecom services provider based in the United Arab Emirates, is launching the first Middle Eastern virtual RAN in collaboration with leading RAN technology vendors. Its solution seeks to decouple programmable RAN software elements from the hardware. This would allow generally available hardware and server platforms to process the RAN software, improving deployment flexibility, scalability, agility, and energy efficiency.

THE BOTTOM LINE

The traditional RAN represents one of the last bastions of closed proprietary systems. If history repeats itself, the adoption of open RAN may mimic the time it took the industry to transition to open and virtual core networks—the seven years between 2013, when the tenets underlying core network virtualization were introduced, and 2020, when more than half of the industry's core wireless shipments migrated from purpose-built to virtual network solutions. The expectation is that more than 80% of core wireless network deployments will be virtualized by 2023.[29] Though open RAN is still in its infancy, the clear growing interest in the technology could be the start of a large and significant trend with the potential to revolutionize the telecom industry.

Endnotes

1. Deloitte analysis of publicly available information (e.g., press releases, company websites, and industry newsletters); analysis may combine multiple deployments in the same country and may not be exhaustive.
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