NTT

ORAN

The future of mobile networks

In an industry shift towards an open architecture for mobile networks, NTT DOCOMO delivers vendor diversity and a path to innovation.

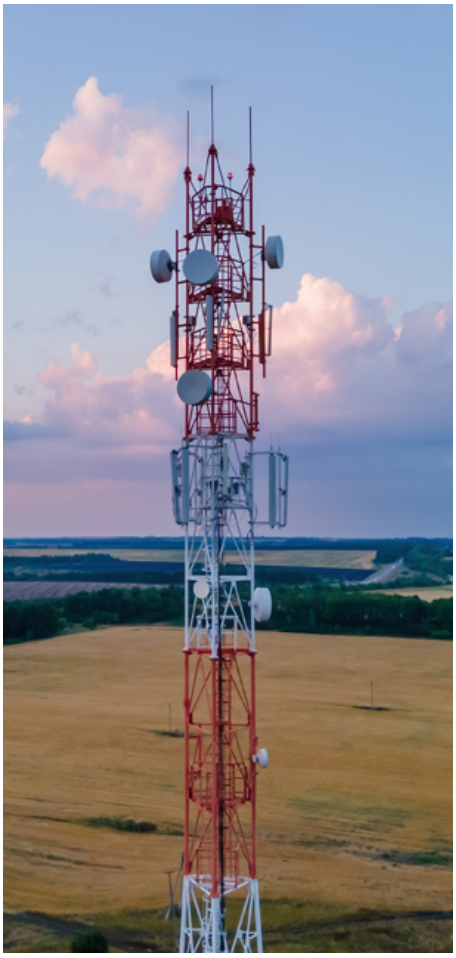
A new open architecture being explored by telecommunications companies worldwide promises to reduce costs and improve customer experiences while breaking the stranglehold of locked-in proprietary systems. It's called open radio access network (Open RAN) and it allows mobile system operators to diversify their supply chain, which opens the door to healthy competition, best-in-breed components, and innovative developers of all sizes.

With significant experience operating mobile networks, NTT is a leader in the transition to this new architecture, helping to reduce technical obstacles through its research efforts and building an ecosystem to explain, demonstrate, and enhance the advantages of Open RAN. NTT DOCOMO, the largest mobile operator in Japan with more than 89 million customers, is leading this effort, offering a global integration solution to help other networks evolve to Open RAN.

The technology is gaining momentum in the industry to create a healthier supplier market in which robust competition helps keep costs down, encourages innovation, and provides greater choice for network operators. It will also be an accelerator to further promote more advanced technologies, including 6G mobile systems, which are expected to roll out near the end of the decade.

Success will require collaboration across a broad ecosystem and pioneering moves by visionary business leaders. NTT is at the forefront of this movement, working closely with a wide range of Open RAN partners.

What's new with Open RAN



Open RAN brings together the abilities and components from diverse vendors in a crucial segment of mobile networks and allows them to work seamlessly as one. The structure liberates mobile operators from the traditional proprietary set-ups that tie them to a single vendor and its technology for components. Instead, they can choose the hardware and software from various vendors that best fit their needs and priorities.

The main task of a radio access network (RAN) is communication between mobile phones and base stations. Since the early days of mobile phone systems, hardware and software for these components and their interfaces have generally been produced by major players using proprietary technology that followed standards established by groups such as the European Telecommunications Standards Institute (ETSI), the 3rd Generation Partnership Project (3GPP), and the Groupe Speciale Mobile Association (GSMA).

Traditional RAN

At its most basic, the traditional system comprises a remote radio head (RRH) on the antenna, a baseband unit (BBU) that processes incoming and outgoing signals, and an interface that connects the two. Historically, closed systems have been supplied primarily by the major equipment manufacturers – Ericsson, Huawei, and Nokia – that provide turn-key equipment, service packages, and maintenance.

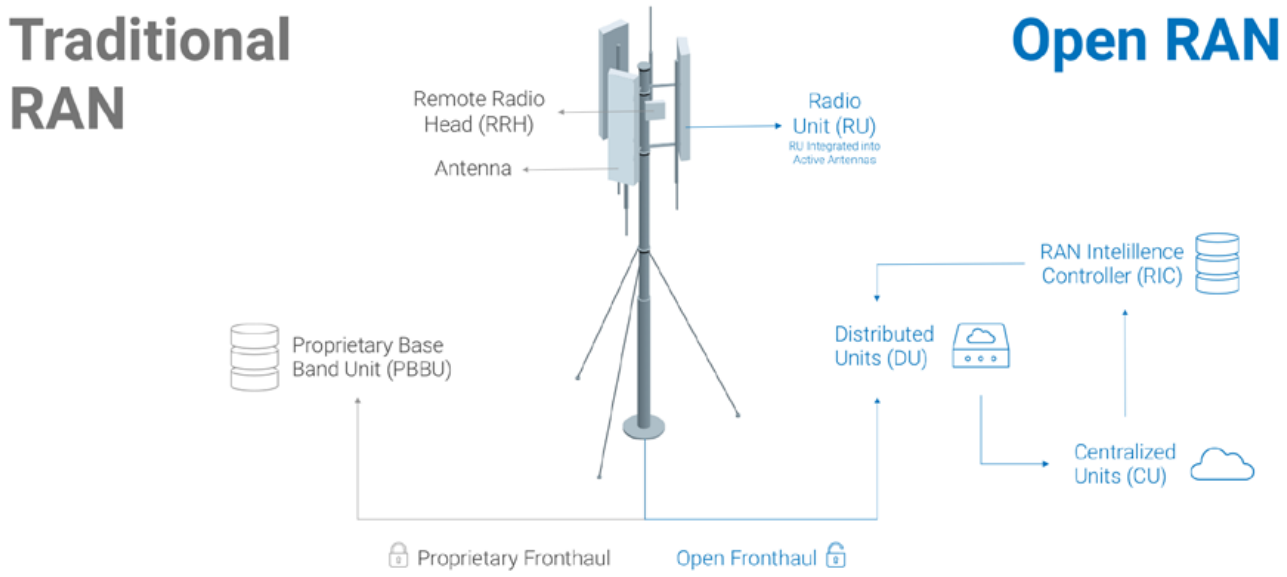
This system is convenient for network operators – while at the same time creating dependence on a single vendor and allowing for little negotiating power or flexibility. The components and interfaces are all proprietary, and hardware often comes with built-in software.

Open RAN

Open RAN disaggregates this arrangement. It replaces the RRH with a radio unit (RU) and splits the BBU into a distributed unit (DU) and a centralized unit (CU). Most importantly, these components are connected with standardized open interfaces. Each component can be developed and provided by different vendors, and switched out when necessary to improve performance, add features, or reduce costs.

A crucial advantage is that Open RAN adds a new element to the architecture, a RAN intelligent controller (RIC) that works with the DU and CU to add functions and features, much like smartphone applications, from various vendors. These applications can use artificial intelligence (AI) and machine learning (ML) to create greater efficiency and improve performance. High-value uses include traffic steering and load balancing, which could be automated to achieve optimal capacity and energy use results.

The history of the core network, the workhorse of mobile telecommunications, offers an appropriate study on the benefit of open systems. In the early 2010s, when 4G technology was introduced, the interface between the core network and the RAN was well-defined and open. As a result, competition among vendors for the core network was intense, delivering greater choice, lower prices, and operational efficiencies.



O-RAN Alliance

Accepted interface standards and specifications must be developed to create similar benefits around Open RAN. The O-RAN Alliance, founded in 2018 by NTT DOCOMO and four other mobile network operators (later expanded to include vendors and researchers), is at the vanguard of this effort. The O-RAN Alliance is fine-tuning interface specifications that will likely become the industry standard.

The O-RAN Alliance also monitors the spread of Open RAN systems. In early 2024, it reported that 32 mobile network operators announced their commitment to Open RAN systems, and almost 300 companies were active in the field worldwide.

Open RAN Growth Outlook

Estimates vary on how quickly Open RAN will take off and become a predominant player in mobile telecommunications, though most envision steady, vibrant growth. While the technology offers clear benefits – particularly to network operators but also to users – it faces hurdles, like any other disruptive innovation.

Many expected a surge of interest in 2022 and 2023, but this never materialized, delayed primarily because of uncertainties brought by geopolitics and post-COVID demographics that saw workers returning to the office, reducing demand for work-from-home telecom services.

A wave of investment decisions favoring Open RAN environments is expected in 2024 and 2025 and will come to fruition later in the decade. In a late 2023 report, professional services company EY estimated that between 2023 and 2029 the global market for Open RAN will grow from $4 billion to $44.7 billion.[1] Interest is expected to accelerate as the technology matures, bringing costs down and attracting more companies into the initiative.

Adding to the promising outlook, the Dell'Oro Group, a U.S.-based market research company, estimated in early 2024 that global market share for Open RAN systems will reach 20 to 30 percent by 2028, up from 7 to 10 percent in 2024.[2] The forecast shows faster growth than a similar estimate Dell'Oro made just six months earlier.

Benefits of an open system

The main benefit of switching to Open RAN systems from traditional closed systems can be summarized as follows: a more competitive ecosystem. Freed from proprietary systems, mobile phone networks and their customers can reap rewards from an environment of greater vendor diversity and innovation.

Vendor diversification delivers various benefits to mobile network operators and, by extension, to their corporate and private customers. These are linked to the benefits of healthy competition, such as a more balanced negotiating environment and a greater choice of suppliers.

Open RAN's more liberated architecture and greater flexibility allows operators to adapt quickly to changing technologies and evolving consumer behaviors. It enables mobile systems to cater more closely to the unique needs of different enterprise sectors, such as autonomous vehicles, smart factories, automated agriculture, telemedicine, virtual reality entertainment, and real-time logistics, without being confined by the limited catalog offered by a single supplier.

While the overall benefits to network operators and their customers outweigh the challenges presented by the nascent technology, the balance needs to shift more quickly. Up-front integration costs mean real returns won't be visible for at least two to three years into deployment. Investors focused on short-term gains could be frustrated, and those with longer horizons could be rewarded.

For network operators

The direct benefits of Open RAN architecture fall largely on mobile network operators and flow from a more competitive and diverse supply chain. A more comprehensive choice of suppliers allows network operators to select custom-built or off-the-shelf solutions based on specific criteria, such as price or sustainability.

In addition, by disaggregating the RAN into individual components, Open RAN gives vendors the flexibility to specialize in specific areas of hardware or software, becoming best-in-breed for that niche and offering performance improvements in that area. By picking the leaders for each component, operators can build a more robust and efficient system while eliminating the risks of being beholden to a single vendor.

Lower costs

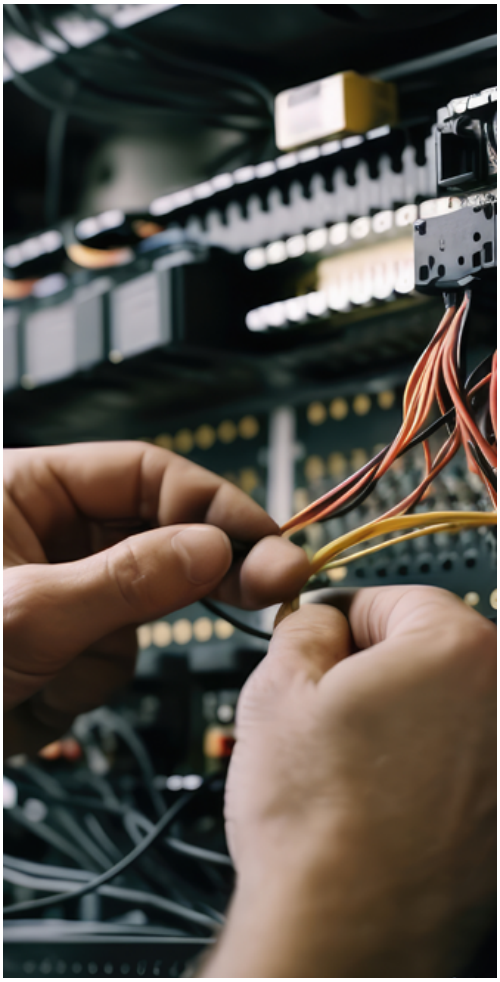
With a long-term view, total cost of ownership (TCO) – upfront costs plus operating costs – would be reduced because network operators could select suppliers in a more competitive market. Procurement of RUs, for instance, could be open to tenders from a range of vendors, and costs – along with other criteria, such as quality and reliability – would be a factor in making the selection.

The same would be true for other hardware and software components in an Open RAN system, giving operators greater negotiating power than in a traditional RAN system, where a specific supplier is essentially locked in.

In a 2019 study, Strategy Analytics (now part of TechInsights) found that Open RAN lowered capital expenses by 40 percent over five years compared to traditional RAN systems.[3] In addition, the study concluded that operating expenses for Open RAN were 34 percent lower over that timeframe.

Capital expense savings would primarily come from an increased RU, DU, and CU hardware supplier network. As network operators break down their legacy systems, replacement components, upgrades, and new components are expected to be less expensive in the larger market.

Vendor diversity and the system's new architecture are the roots of lower operating expenses. Simplified operations and easier network maintenance, for example, would result from software components enabled by AI and ML that are connected to the RIC. Lower energy consumption would result from greater choice and competition and a more efficient physical structure, among other benefits.



Reduced supply-chain risk

Open RAN also reduces supply-chain risk. Under this architecture, the security of a system is not dependent on the viability of a single vendor. Financial problems, consumer preferences, and even shifts in political climate could diminish the attractiveness of certain vendors. In an Open RAN system, components provided by those vendors could be seamlessly swapped for those from another as necessary.

A diverse supply chain also reduces external risks not unique to a specific company. Global supply disruptions brought by the COVID-19 pandemic are an extreme example of this danger. However, localized natural or other disasters that sever supply lines can also bring severe problems to operations and investment strategies if alternative vendors are not quickly available.

Increased innovation

Innovation is inevitable as more companies vie for contracts in the mobile telecommunications market. Imaginative apps, for example, that use AI to improve load balancing or generate other efficiency and operational gains, could be plugged into the RIC as warranted.

Traditional telecom systems provide two services: phone calls and data transfers. Innovative developments linked to Open RAN and other emerging technologies could pave the way for multiple use cases, such as enterprise applications and the Internet of Things (IoT), where devices communicate directly, such as cars near each other or household appliances.

In another example, a private Open RAN system that covers a sprawling corporate campus could allow secure connectivity beyond the reach of a Wi-Fi network. It would create room for innovative use cases, and such a system could be central to a company's overall digital transformation.

The impact could be similar to the GSMA Open Gateway initiative that created a welcoming environment for app developers and software designers. The program promotes standardized interfaces between mobile phone apps and devices, bringing innovation from productivity to entertainment.

The possible innovations could also create new value-added revenue streams for network operators struggling to find funds to cover the infrastructure investments needed to meet the growing consumer demand for data. Rapid access to innovative applications could provide mobile network operators with the agility to respond quickly to changing market conditions.

Energy savings and sustainability

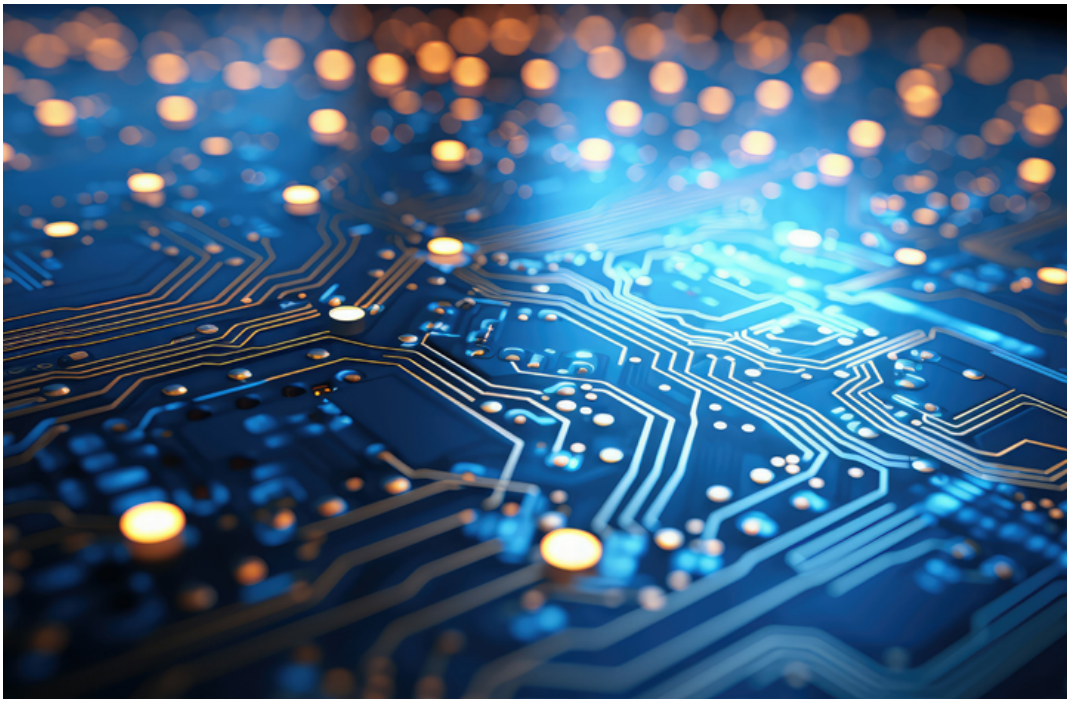
The GSMA estimates that about three-quarters of the energy consumed by mobile networks is concentrated in the RAN.[4] By offering centralized and virtualized options, Open RAN can significantly reduce energy use and the carbon footprint for mobile network operators, resulting in cost savings and more sustainable operations. The Open RAN Policy Coalition, a US-based group supporting the technology, in 2021 estimated that better load balancing and other efficiencies could generate power savings of 30 to 40 percent for operators.[5]

A crucial factor in sustainability is improved utilization of hardware and less waste. Because the components in Open RAN are disaggregated, DUs and CUs can be centralized rather than installed at each mobile tower. This could mean a need for fewer servers and their requisite cooling systems. Software can also be centralized, cloud-based, or virtualized since it is no longer integral to the hardware. Overall, material resources needed for components in a system could be reduced, as well as energy consumption.

In addition, AI system management features linked to the RIC could optimize energy consumption. With a larger pool of suppliers, sustainability criteria – in operations or product manufacture – could easily be included in procurement protocols for new components.

For businesses and private users

The benefits promised by Open RAN for corporate, government, not-for-profit, and private telecom users are more indirect. Open RAN as the core of mobile telecom infraastructure will be a success if end-users don't even notice its presence. By contributing to the ongoing deployment of 5G technology and accelerating the introduction of newer technologies, open architecture could be essential to the continued growth in data availability and connectivity consumers have come to expect.



The consultancy PwC, in a 2023 report, estimated that between 2022 and 2027, annual global demand for data over telecom networks will triple to about 9.7 million petabytes, pushed primarily by video streaming.[6] (A single petabyte can hold almost a quarter of a million full-length, high-definition movies.) Failure to meet this demand – for instance if higher latency becomes a common issue - is what consumers would notice. Applications users now take for granted, such as social media, ride-sharing and streaming platforms, survive only on high-speed, reliable network infrastructure with low latency.

In addition, some of the cost savings captured by network operators could be passed along to users or reinvested in service improvements. Open RAN also eases connectivity to mobile services and data in rural areas since some components can be centralized, and the equipment needed at the towers would be less complex and costly.

For example, Open RAN is the backbone of Telefonica's Internet para Todos (Internet for All) initiative. In 2019, the network operator launched the program to connect rural residents in Peru to 4G Internet aided by cost-savings delivered by Open RAN.[7] Such connectivity would open the way for significant improvements in living standards for people in these areas, including enabling remote education, remote medicine, and remote work. By mid-2023, Telefonica reported that the effort had delivered high-speed Internet to 3.3 million people in 17,000 remote coastal, mountain, and jungle communities.

Open RAN also accelerates the development and deployment of future technologies like 6G and Innovative Optical and Wireless Networks (IOWN), a system development led by NTT that leans on energy-efficient optical technologies. This progress is essential for a wide range of applications consumers eagerly anticipate.

With these other innovations, Open RAN paves the way for many technological marvels. For example, beyond the idea of self-driving, cars of the near future could essentially become mobile devices, with myriad onboard computers to handle sensors, engines, and driving, each communicating individually with the network and outside devices – and adding millions to the number of data receptors in use in mobile networks around the globe.

In addition, remote medicine can be a blessing in all service areas with aging populations. Advanced applications supported by Open RAN can allow virtual patient observations, such as monitoring movements and activities in hospitals, care facilities, or homes, along with existing medical metrics like blood pressure and heart rate.

Finally, by helping to keep costs down for mobile network operators, Open RAN will promote the affordability of connectivity for individual end-users in all locations.

Overcoming the challenges

While progress and aspirations toward broader use of Open RAN are evident, the technology remains in the early stages of development. NTT and DOCOMO are active with others in the industry to overcome the hurdles common with any new technology and to deliver optimal benefits to networks and users. As with any emergent technology, some challenges can be seen as growing pains that will ease with maturity. Others, often raised by purveyors of traditional RAN equipment, appear more significant than the facts suggest.

In many respects some of these challenges, such as integration costs, will be less relevant for greenfield operators that do not have to wrestle with legacy systems. Brownfield operators with existing networks must plan carefully to mitigate some impacts as they move toward Open RAN architecture.

Integration costs

The upfront costs of switching to Open RAN are cited most often as a hurdle to deploying this new technology, and they figure heavily in the TCO. These costs are less of a burden on greenfield developments than on brownfield development.

Integration costs go beyond the capital expenses of replacing equipment with a new generation of technology. Open RAN is more complex than traditional RAN. The interoperability among the various components must be tested; for example, testing and integrating RUs and DUs from separate vendors can take two to three months.

In addition, under the proprietary system of the traditional RAN architecture, vendors have typically taken responsibility for maintaining the closed system. In Open RAN, the network operator takes over many maintenance duties. For many operators dependent on a sole supplier, staff capabilities must be built around operating a more complex system, coordinating a broader supply chain, and overseeing the health of the whole system.

From one perspective, these initial costs can be expected when moving to any new technology and could be considered the price of progress. Indeed, these costs will drop as the technology matures and the industry gains more experience integrating Open RAN into brownfield systems.

But immediate measures can also be taken to mitigate these costs.

Neutral third-party partners can take over some of the integration tasks. NTT DOCOMO, for instance, offers an integration solution that provides compatibility testing and other services to mobile operators implementing Open RAN systems. It's currently the only operator providing Open RAN integration services globally, allowing mobile network operators to piggyback on its experience and capabilities to lower their initial integration costs.

The shift to Open RAN can also be phased in over time for brownfield operators, allowing a smoother transition. For many, the interface between the RU and DU could be a valuable first step. By opening this interface, the RU is open as well. This is significant because most of the capital and operating expenses linked to a RAN rest with the RU.

Another measure to help reduce disruption and lower integration costs would be to create an architecture compliant with Open RAN specifications but retain a single, known supplier. This was the path taken by AT&T in the United States when it announced in late 2023 that it would invest $14 billion to deploy an Open RAN architecture over 70 percent of its network by the end of 2026 and retain Ericsson as its primary supplier.

Although the AT&T approach seems somewhat paradoxical against Open RAN's principal goal of nurturing a diverse supply chain, it opens the possibility of bringing new vendors into the expansive system. It is a step in the right direction.

Governments have also been proactive in supporting Open RAN and helping to reduce TCO. In one example, the US Commerce Department in 2023 earmarked $141 million for Open RAN development, the first tranche of a wider, $1.5 billion mobile infrastructure program.[8] Similarly, the UK in 2020 allotted approximately $320 million in its "5G supply chain diversification strategy" to ensure that it is "never again dependent on a small number of suppliers."[9] Many other governments are also encouraging broader development of Open RAN.

Accepted standards

Open interfaces between the components are the hallmark of an Open RAN system and, led by the O-RAN Alliance, the industry is finalizing appropriate standards.

However, at first, different interpretations of standards set by the O-RAN Alliance and 3GPP, an umbrella group that sets global standards for mobile systems, have added to the integration challenge. Flexibility that was purposefully built into early standards needed to provide more clarity and rigor for hardware and software providers to proceed smoothly.

This challenge will be mitigated significantly by more transparent communication between network operators and vendors detailing the requirements of the standards. In addition, the O-RAN Alliance will continue to fine-tune its standards, curtailing some flexibility that led to initial confusion and signaling the preferred approach among the options available.

By early 2024, the O-RAN Alliance had crafted standards for three critical interfaces in an Open RAN system: (1) the link between the RU and the DU; (2) links between the RIC and other components; and (3) links between Service Management and Orchestration (SMO) – a component that automates some features – and the other components.

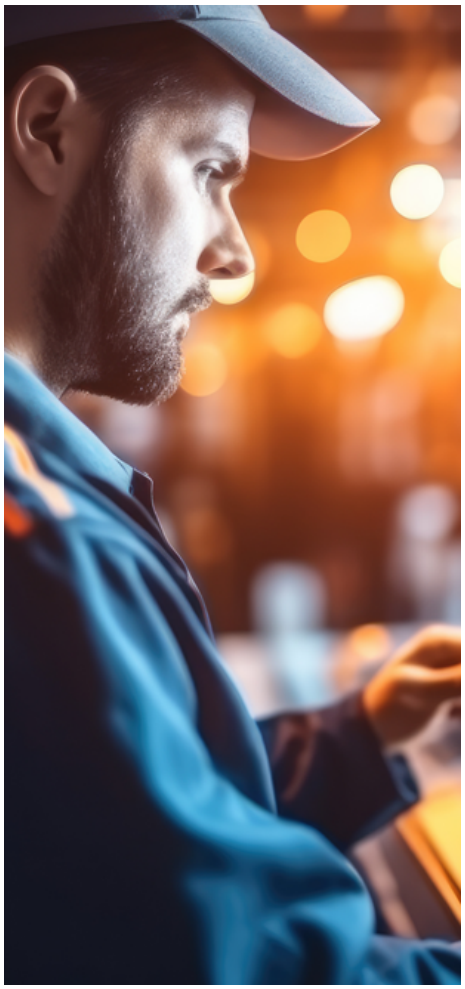
Security

Some observers have raised concerns that system security could be a more significant risk with Open RAN than with traditional closed systems. The argument says a system with multiple open interfaces and components poses a higher risk.

A 2023 report by the Quad Open RAN Forum, with representatives from the governments of Australia, India, Japan, and the United States, suggested these concerns are likely inflated.[10] The report acknowledged that "higher security risks" are associated with Open RAN components and interfaces. Still, these were primarily linked to cloud systems, which are not unique to Open RAN and are shared by traditional RAN architecture. "A total of four percent of the analyzed security threats are considered unique to Open RAN," it reported.[11]

The report also said Open RAN has "potential security advantages" compared to traditional RAN architecture, which included "openly specified, verifiable security controls and capabilities associated to virtualization and cloudification that can help to improve operational security tasks."[12]

The transparency of Open RAN systems also offers security advantages. This allows the network to be continuously monitored. Operators can detect abnormal traffic or activity early and take immediate steps to mitigate or avoid the impact.



Maturity

Open RAN is a nascent architecture, and some concerns focus on the maturity of the technology. For example, because a significant proportion of early deployments have been in rural areas, the question of whether such systems can handle the much higher capacity demands of densely populated cities has arisen.

With the expected growth of Open RAN in the coming years, these maturity concerns should ease significantly in the short term and in some cases have already evaporated. For instance, NTT DOCOMO already operates an Open RAN architecture network in densely populated Tokyo.

Mobile network operators and vendors willing to navigate and help overcome these challenges will garner significant first-mover advantages. They will help shape the contours of the global Open RAN architecture and build valuable capabilities and experience ahead of their competitors.

Building an ecosystem around Open RAN

To reach its potential, Open RAN requires a rich ecosystem of diverse stakeholders that can drive it forward and push for broader adoption. Governments, telecom companies, and partners outside the industry, such as cybersecurity firms and online service providers, must collaborate to lower the hurdles faced by early adopters and build momentum around this promising architecture.

Information sharing and collaboration are critical as any new technology finds its legs. Operators, vendors, and other stakeholders must be prepared to exchange experiences and lessons to lower the costs and hurdles of integration.

Collaborative efforts build trust and confidence in the architecture among the participants. As deployment accelerates, personal knowledge of the quality and capabilities of a large pool of vendors can help operators pick out best-in-breed suppliers for individual hardware and software components.

The first blocks of this ecosystem are already in place. Among the significant groupings are:

O-RAN Alliance:

Founded in 2018 by NTT DOCOMO and four other mobile network operators, the O-RAN Alliance has since expanded to include vendors and researchers. The group's goal is to support the deployment of Open RAN systems, primarily by promulgating standards for interfaces and components.

3rd Generation Partnership Project (3GPP):

3GPP is an umbrella organization formed in 1998 to sanction mobile network specifications for technologies that include RAN, core networks, and service capabilities. Its membership comprises organizational partners from Asia, Europe, and North America and trade organizations representing mobile operators and other industries.

Telecom Infra Project (TIP):

Founded by Meta (formerly Facebook) in 2016, TIP has grown to hundreds of companies worldwide, essentially mobile service providers, suppliers, and integrators, including NTT. Its focus is promoting disaggregated mobile systems to bring high-speed connectivity to populations yet to be reached by the Internet.

Open RAN Policy Coalition:

The Open RAN Policy Coalition is a grouping of companies, including NTT DOCOMO and other mobile network operators, equipment makers, and online service providers, that promotes policies that encourage the growth of Open RAN systems, mainly in the United States. It was founded in 2020.

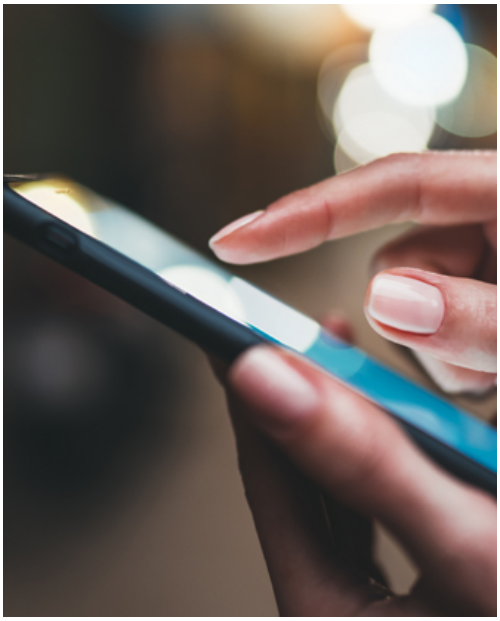
These groups generally work together to promote Open RAN architecture while avoiding redundant or conflicting efforts. For example, in 2020, the O-RAN Alliance and TIP, the two organizations with perhaps the highest potential for overlap, announced a liaison agreement that clearly defined each group's roles.[13]

The ecosystem must also bring in companies from outside the telecommunications sector to help nurture Open RAN. Meta's efforts are a clear example. The company is interested in bringing reliable Internet connections to more people, partly to complement its corporate strategy of taking its online services to new areas. As part of this drive, the company founded TIP and is working with Telefonica in its Internet para Todos program, among other efforts.

The most unlikely collaborators needed in the Open RAN ecosystem are the major telecom equipment suppliers that have historically profited from proprietary RAN systems and may feel threatened by the disruptive technology. Their experience and reach would be invaluable in accelerating the deployment of Open RAN systems.

The major suppliers have expressed support for Open RAN architecture. Still, concerns exist on how actively they will push the shift to the new technology, especially in light of their success with proprietary systems. A fundamental change from this group might require network operators to use their market power to pressure large equipment vendors to provide Open RAN-compliant products and take more active roles in deploying the technology. This would not only accelerate adoption but, even if the traditional vendors are kept on, provide options for the future if needed.

NTT and NTT DOCOMO has been at the vanguard in building an ecosystem around Open RAN. NTT was one of the founding members of the O-RAN Alliance and is active in several other supportive bodies. NTT DOCOMO's OREX integration solutions line works with companies globally to smooth any friction during the transition to the new architecture. Also, in early 2023, NTT DOCOMO announced a major Open RAN partnership with five global telecom operators: DISH Wireless in the United States, KT Corporation in South Korea, Singtel in Singapore, Smart Communications in the Philippines, and Vodafone Group in the United Kingdom.



Even under the most optimistic scenarios, closed RAN and Open RAN networks will co-exist for many years, much like combustion engines lingering on the roads even as electric vehicles become more and more common. The overlap will provide a workable buffer as brownfield operators phase in Open RAN architecture.

Looking into the future

Expanding Open RAN architecture across mobile networks offers additional benefits for the telecom industry and toward global digitization. Future applications, many founded on AI and ML, and greater streaming will consume vast amounts of data, with estimates predicting that global demand will triple by the end of the decade.

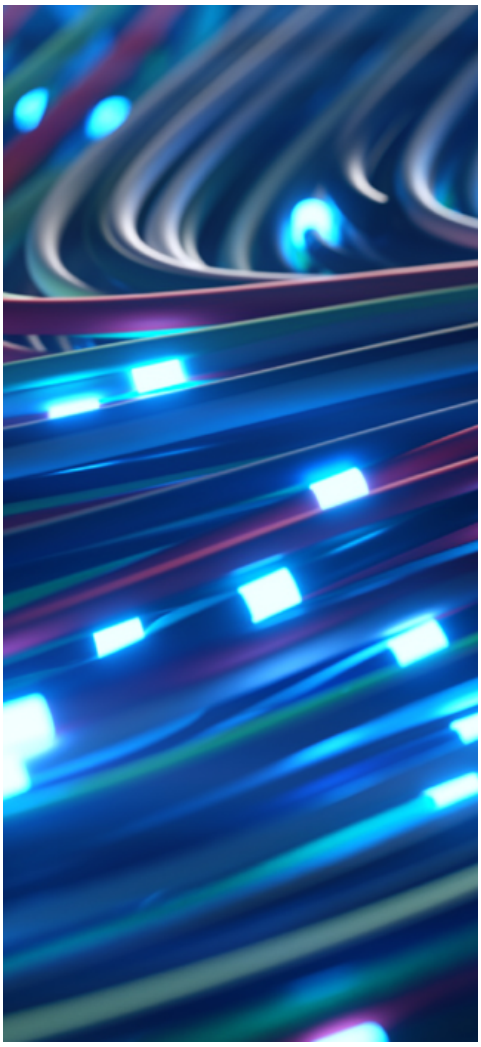
Open RAN can ease the transition by providing flexibility for agile responses to changing market situations, technologies, and global priorities. By disaggregating a critical and expensive mobile network function, Open RAN enables operators to replace or upgrade only the components or software that must be adapted for new technologies, including 5G, rather than the entire bundle. Centralization and software-based components also ease this process, allowing more efficient energy consumption, reducing costs, and improving sustainability.

Open RAN will be either an enabler or an accelerator for many of the mobile technologies on the horizon. Some of the most exciting include 6G technology, IOWN, and cloudification.

6G technology

The next generation of mobile technology is expected to debut around this decade's end. While its aspects remain unclear, the technology will likely be cloud-based. Efficiencies offered by Open RAN can set the stage for the transition and lower the costs. For instance, RUs may need to be replaced. Open RAN allows this without disrupting other components and can ease any needed software updates, all using best-in-class vendors.

IOWN



IOWN is an initiative led by NTT and the IOWN Global Forum that explores replacing electrons with photons in delivering data and other content. Electrons, the basis of electronics, produce vast amounts of heat and require cooling, which consumes energy. Their power also depletes with distance. Photons, the basis of optical systems, can travel infinite distances at the speed of light and produce no heat.

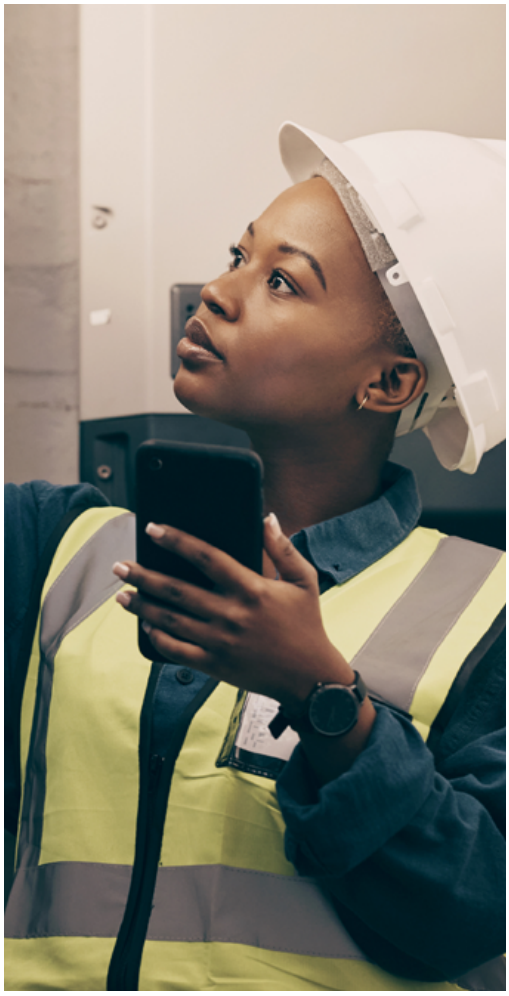
IOWN would be an exponential advancement over electronics, creating increased stability, quality, and sustainability in mobile networks. It would open many of the best possibilities of a digital world, from immersive virtual environments to remote medical procedures. The optical network would work with wireless systems that bring these applications the final distance between the core networks, users, and their devices. By delivering efficiencies and encouraging innovations, Open RAN provides the optimal architecture to support this technology.

Cloudification

Cloud-based applications and storage will likely be hallmarks of near-term technological advances. The efficiencies brought by Open RAN architecture would accelerate the development of these technologies. Smart cars, for example, would need fast, reliable mobile links to cloud-based applications to suggest optimal routes or locate nearby services, among other applications.

Ultimately, the benefits of these advances can only be delivered with a reliable and efficient path to mobile towers and from there to devices, whether autonomous or in human hands. Open RAN creates an environment that alleviates any bottleneck to progress.

In conclusion



The dawn of Open RAN is inevitable, even if the exact pace remains unknown. Most observers and those involved in developing the technology expect rapid growth throughout the rest of the 2020s, almost 50 percent a year on average, according to EY.[14] Along with its direct benefits, Open RAN will ease the deployment of various other innovative technologies needed to continue the world's digital transformation, particularly 6G, IOWN, and further cloudification.

Open RAN will create more robust mobile communication networks. It will also lead to a wide range of business opportunities for network operators, pioneering vendors, and, by easing data connectivity, corporations and individuals generally. Those who join with NTT to embrace the initiative early will add to its momentum and capture valuable advantages in the market.

NTT, NTT DOCOMO, and a group of telecom pioneers have been collaborating for years to push Open RAN. It is now time for more to join, inside and outside the telecom industry. NTT and NTT DOCOMO believe that corporate leaders in all industries reliant on stable, fast Internet – and that's all industries today – should promote the expansion of this new technology. One important way is to work with governments and other stakeholders to enact policies that provide incentives and encourage the rapid deployment of Open RAN.

For ORAN to deliver its full promise, crucial efforts from the ecosystem must:

1. Inspire governments and regulators to offer incentives, such as tax breaks, to help network operators transition to Open RAN.

2. Promote the benefits of Open RAN in all sectors, stimulating interest, demand, and momentum.

3. Share the quantifiable benefits of Open RAN captured by early adopters.

4. Advocate for Open RAN as a critical enabler for other technological evolutions in AI, 6G, optical networks, and other areas.

NTT and NTT DOCOMO are heavily involved in the movement to deploy Open RAN globally, leading in business strategy and bringing together passionate visionaries. We and our partners are focused on proving the value of Open RAN networks and moving forward, buttressed by a rich ecosystem of supporters. Each success creates multi-fold, beneficial knock-on effects.

Glossary

Baseband unit (BBU)	A component in traditional RAN architecture that manages the base station and controls the RRH.
Centralized unit (CU)	A component in an Open RAN system that handles higher protocol stack layers, as defined by the Third Generation Partnership Project (3GPP) and the O-RAN Alliance.
Cloud computing	A way to deliver digital services using software and data stored at different locations.
Core network	The heart of a mobile network, allowing the operator to provide digital services to end users.
Distributed unit (DU)	A component in an Open RAN system that handles lower layers of a protocol stack, as defined by the Third Generation Partnership Project (3GPP) and the O-RAN Alliance.
Innovative Optical and Wireless Networks (IOWN)	A technology innovation that replaces electrons with photons in data delivery, creating greater quality, speed, and sustainability.
Open RAN	A RAN architecture that features open or non-proprietary interfaces between components, allowing vendor diversification for hardware and software.
Radio access network (RAN)	The part of a mobile network that delivers services provided the core network to end-user devices.
Radio unit (RU)	A component of an Open RAN system that performs a function similar to that of the remote radio head (RRH) in a traditional RAN.
RAN intelligent control (RIC)	A component of Open RAN architecture responsible for controlling and optimizing RAN functions.
Remote radio head (RRH)	A transceiver on wireless base stations using traditional RAN that connects devices to the networks.

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Citations:

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