

# Open.RAN



## Open architecture networks at the heart of supply chain resilience

The digital transformation of economies is well underway, with the COVID-19 crisis demonstrating the need to accelerate the deployment of secure, resilient and reliable high-speed connectivity. However, the global mobile network equipment supply chain has become increasingly concentrated, with just three scale suppliers with more than 70% market share, and a lack of interoperability between those vendors' equipment. As with any highly concentrated supply chain, this has raised concerns about the potential impact of a lack of competition, innovation and resilience.

These concerns have contributed to EU policy makers' thinking on innovation and growth, in particular the need to build EU ecosystems, cloud and AI in the edge of the networks. Through investment in cutting edge European technologies and start ups, a secure and safe digital environment can be achieved, resulting in digital sovereignty in European networks. In turn, greater diversity of suppliers and resilience of networks can drive faster 5G deployment and rural coverage. In the long term, this can increase the impact of EU tech companies on the EU's data economy and innovation potential.

**With the right conditions and investment, Europe can be a leader in OpenRAN, stimulating faster rollout of 5G.**

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Open architecture

OpenRAN 101

OpenRAN adoption

Accelerating tomorrow





Open architecture networks allow network operators to source RAN equipment from a more diverse range of general purpose processor hardware, software and radio antennae vendors, each specialising and competing in different parts of the RAN supply chain.

This more dynamic ecosystem is expected to drive competition, avoid vendor lock-in, boost innovation and increase the resilience and security of future generation networks, enabling emerging vendors to compete amongst themselves and with the existing major vendors. This competition will drive innovation, improve network economics and encourage enhanced functionality (including security).

The resulting potential for reduced deployment costs, network efficiency and capability has important implications for the speed and extent of 5G network deployment across Europe; itself a key step in ensuring all of Europe benefits from the long-lasting transformative opportunities inherent in the current acceleration towards fully digital economies.

**Open architecture technologies, such as OpenRAN, will be a key enabler of this digital transformation of European economies and societies. It will also contribute to the absolute priority of network protection, as a more diverse market is expected to provide greater incentives for vendors to compete on security and trust.**



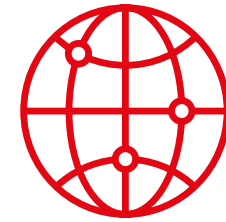


The key benefits include:

## Increased supply chain competition

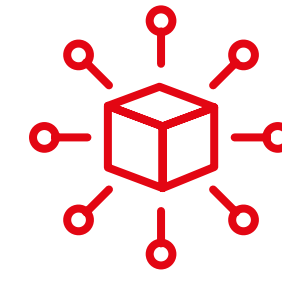
Open interfaces mean that operators are able to procure equipment from a wider range of vendors, reducing reliance on a single vendor. This leads to increased competition in individual market sub-segments, with greater rewards for innovators and accelerating improvements in network performance and security.

**500 member companies**



With more than **500 member companies** worldwide and multiple suppliers, the Telecoms Infrastructure Project (TIP) provides a central point of contact for OpenRAN delivery

**50%**



**Around half of operators** in a recent GSMA survey are concerned about supply-chain diversity and think it is important to bring new vendors into their network

**12+**  
**new vendors**



Competition is already on the rise within the OpenRAN space as more than a **dozen new vendors** are developing competitive open interface products across different network technologies and trialling them across Europe.

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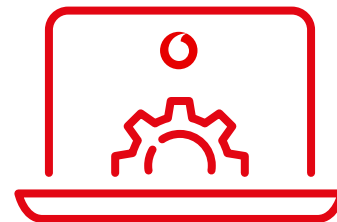


## Accelerated innovation in connectivity

OpenRAN enables networks to be operated in entirely new ways, for example, network automation will drive operational innovation and efficiencies. The fact that the software and hardware layers are disaggregated, brings additional flexibility to network operations, allowing new features and capabilities to be introduced simply via software upgrades, enabling the delivery of flexible high quality services tailored to customers' specific needs.



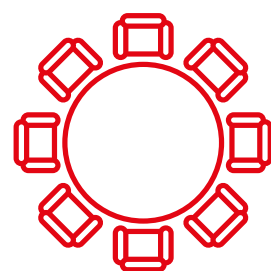
Vodafone has begun trials of OpenRAN across Europe and Sub-Saharan Africa, focussing on low cost rural deployments



Vodafone trials are collaborations with vendors, supporting them in developing the technology



Based on trials in Turkey with Parallel Wireless, Vodafone has produced an OpenRAN Playbook to guide further development



Vodafone chairs, and is a leading contributor to, TIP, which has made recent innovations in OpenRAN hardware.

<sup>1</sup> GillottResearch (2020), 'Open RAN Integration: Run With It'; Senza Fili Consulting (2017), 'How much can operators save with a Cloud RAN? A TCO model for virtualized and distributed RAN'; Samsung, 'Open RAN 1 - Driving New Network Economies, Efficiencies and Experiences'; NEC (2020), 'Open & Virtualized - The Future of Radio Access Network'.



## Enhanced network economics

Through greater competition in the equipment supply chain, OpenRAN equipment providers are expected to compete more heavily on price within different market sub-segments once the technology has been further developed and scale of vendors increased. In addition, OpenRAN enables network operation and functionality to be virtualised and aspects of their operation to be automated.

In the longer term these effects can be expected to drive significant improvement in operators' network economics, thus facilitating faster and more widespread 5G rollout. In the short term, however, and in context of these longer term benefits, public financial support for testing, integration and deployment trials will be required to accelerate OpenRAN maturity and adoption.

**30% - 50%**

OpenRAN and virtualisation are expected to reduce network costs<sup>1</sup>

**40%**

TIP's Evenstar programme launched in February 2020 and aims to deliver a \$1,000 radio equipment by 2021 - at least 40% cheaper than current radios sold by incumbent vendors.



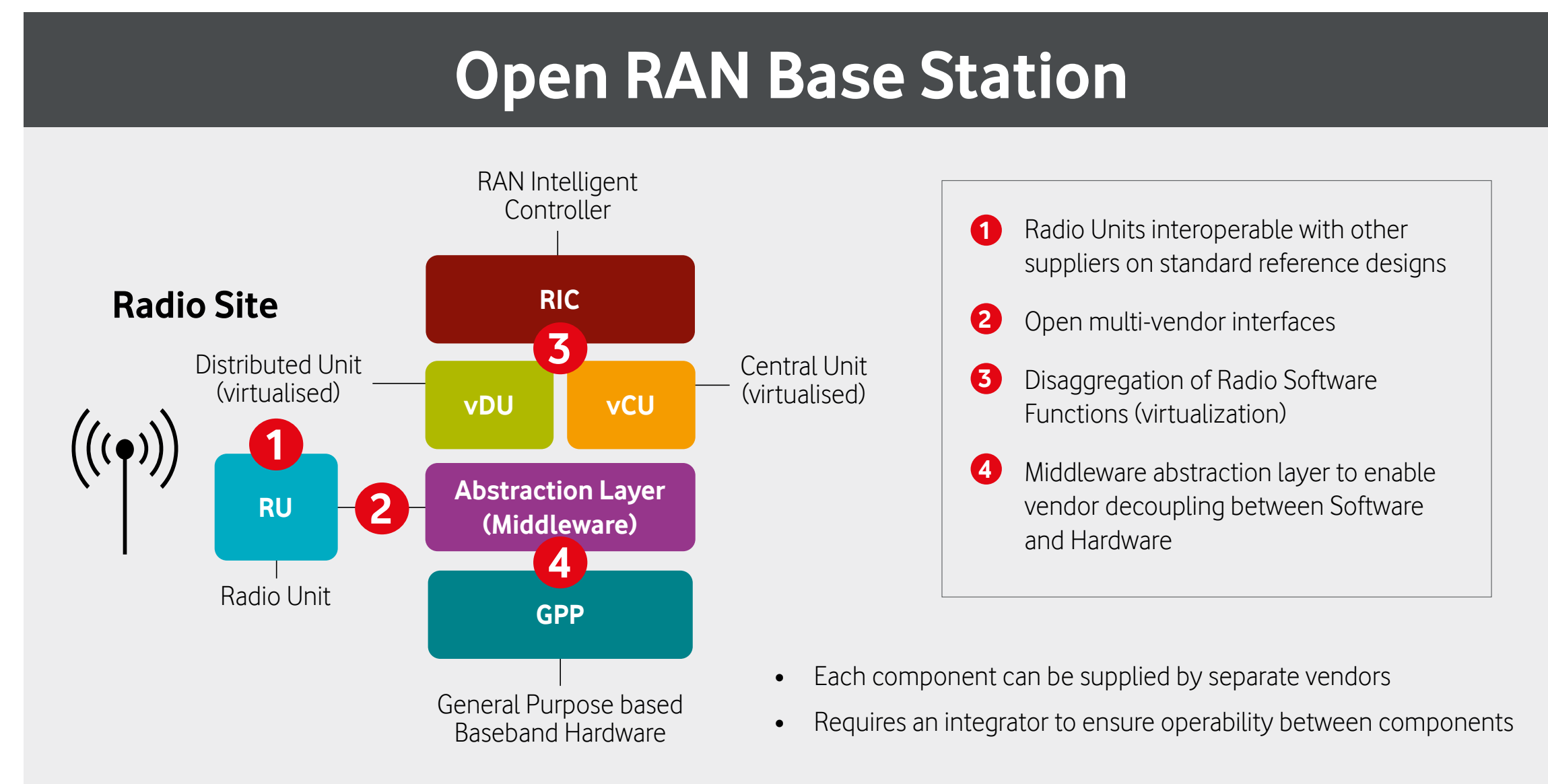
# OpenRAN 101

The current default position is for one of the major global network equipment vendors to supply all of the equipment and managed services that a mobile network operator needs for its RAN, with the various components connected via closed proprietary interfaces.

**OpenRAN, by contrast, is based on open interoperable interfaces between the key components of the radio network. This means that different hardware components, and the software that controls them, can be supplied by different vendors, according to the needs of the operator.**

In a traditional integrated-architecture RAN, a radio base station comprises of the radio unit (RU), which connects to the antenna, and the baseband unit (BBU), which connects the base-station to the rest of the network. These components are then connected via a proprietary common public radio interface (CPRI), which requires the RU and BBU to be provided by a single vendor.

OpenRAN opens up this interface. The BBU is replaced with a centralised unit (CU) and a distributed unit (DU), so that the RU from one vendor can be connected to the CU/DU of other vendors and baseband functions can be centralised and located away from base-stations. RAN Intelligent Controller (RIC) software then manages the CU/DU functions.



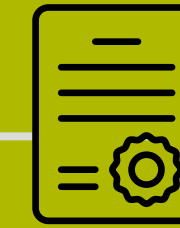
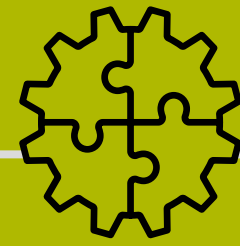


# OpenRAN, ready to go?

Notwithstanding the potential of OpenRAN to unlock competition in the network equipment market, support EU strategic objectives, and drive cost and supply chain resilience and security benefits, there is work to be done to make the technology ready for wide scale deployment at the heart of European 5G and future networks:



3G  
5G 2G  
4G



## Generation game

There remain practical interfacing challenges, which become more complex where multiple technology generations are present at a single cell site. However, **vendors are exploring solutions that cover all generations**, including 2G and 3G, as well as opening the interfaces between different technologies.

## Testing Testing

To make OpenRAN a reality for wide scale network deployments, **emerging vendors need to continue developing and testing their solutions**. This will help demonstrate the required performance, solution maturity and reliability in the complex high load environments that characterise European mobile networks. Extensive field testing will also provide assurance that OpenRAN-based networks can meet the quality of service and resilience demanded by European operators, regulators and consumers. To accelerate testing cycles, Governments could provide support for OpenRAN R&D, pilot projects and test beds.

## Standards!

There has been rapid progress towards the common open interface standards required to deliver full interoperability in complex multi-vendor requirements, but work still needs to be done. This will continue to be **driven by cross-industry collaboration between key players**, such as Vodafone, and will also **require active engagement with policymakers to resolve remaining challenges**.

## Scaling up

The production capacity required to support wide scale deployment, and to realise the economies of scale that will enable OpenRAN vendors **to compete with the global scale integrated network equipment vendors, requires further investment** by, and in, the emerging vendors and start-ups that will continue to drive innovation in the space.

## Certifications

To encourage wide scale adoption across European mobile networks, **OpenRAN must be equally or even more secure than the equipment provided by today's incumbent vendors**. To further strengthen the resilience and engender trust in the security of the 5G ecosystem, we encourage the application of appropriate certification schemes to RAN components.





# gathering momentum

The European Commission has taken a number of steps to support the development of OpenRAN. For example, the 5G Cybersecurity Toolbox identifies a common set of measures for EU governments to mitigate cybersecurity risks, including recommendations to promote vendor diversity, leading to a standard operating model for deployment of new technologies such as OpenRAN.

**In addition, a recently commissioned study on 5G supply markets and OpenRAN aims to set out options for the Commission to facilitate the development of a diverse and sustainable 5G ecosystem in the EU.**

Further, the European Association of Next Generation Telecommunications Innovators (EANGTI) has a mission to foster SME-led innovation in the European telecommunications space, specifically for 4G and 5G networks.

**However, the nexus of OpenRAN architecture research is currently outside of Europe. Consequently, there is a risk that, without support to innovative EU-based start-ups, OpenRAN suppliers to European network operators will be established elsewhere.**



## Public financial support to OpenRAN R&D and network deployment trials is essential

There is both the opportunity and the incentive for public financial support of European-based hardware and software start-ups whose future success will drive, and be driven by, the adoption of open architecture networks.

**European network operators – supported by Member State governments – have an opportunity to create a strong and vibrant market for EU-based OpenRAN vendors, enabling them to gain scale and a footprint in the global OpenRAN market. To maximise impact, public funding could be built around four key pillars:**



Furthermore, for local companies specialised in key areas



Funding for new innovation start-ups



Funding for OpenRAN R&D centres and labs



Funding to accelerate early OpenRAN deployments

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# progress towards OpenRAN adoption

Vodafone is actively supporting the development of the OpenRAN ecosystem. Our involvement includes chairing TIP and membership of the O-RAN Alliance. In both communities, Vodafone Group is working collaboratively to establish the basis for the development of OpenRAN and conducting trials to test the deployment and integration of networks.

Vodafone is also a founder of Tomorrow Street, an innovation centre supporting the scaling of technology start-ups,

## TIP

TIP is a global collaboration across the telecoms and digital sector, with members ranging from service providers and technology partners, to systems integrators and other connectivity stakeholders. The aim is to develop, test and deploy open, disaggregated, and standards-based solutions that deliver high quality connectivity.

TIP is currently working to accelerate OpenRAN innovation and commercialisation across 2G, 3G, 4G and 5G networks. The aim is to align the industry and emerging OpenRAN ecosystem around a common, holistic approach to developing the next generation RAN. Working with other TIP members, Vodafone has led the way in developing an understanding of the ecosystem and the readiness of vendors to deploy their technology, in particular through trials of the new technology.

## Trials

Vodafone, along with Parallel Wireless, recently authored a TIP Playbook from the first trial deployment in Turkey, and is progressing trials with Parallel Wireless in the Democratic Republic of the Congo and Ireland. Vodafone is also advancing trials with Mavenir in Mozambique and the UK. Parallel Wireless is providing OpenRAN solutions for Inland Cellular's 4G coverage – the first deployment of OpenRAN in the USA.



**2,600**  
cell sites

In November 2020, Vodafone announced a commitment to deploy OpenRAN across **2,600 cell sites** in the UK by 2027.

## Evenstar program

Vodafone and Deutsche Telekom, along with technology partners including Mavenir, Parallel Wireless, MTI, AceAxis, and Facebook Connectivity, are working together on the Evenstar Remote Radio Unit. The primary objective of the Evenstar program is to accelerate the adoption of OpenRAN by creating a healthy, robust and sustainable alternative ecosystem for infrastructure providers.

## Tomorrow Street

Tomorrow Street, based in Luxembourg, is a joint venture between Vodafone and Luxembourg's national incubator, Technoport. It is an innovation centre that focuses on accelerating innovative technology solutions from late stage start-ups. Tomorrow Street's focus is guided by Vodafone's strategic innovation priorities and the operating model ensures a deep engagement with group functions and markets to scale new technologies across the Vodafone ecosystem. Supporting start-ups in this way allows them to scale up and accelerate progress towards new network technologies, such as OpenRAN.

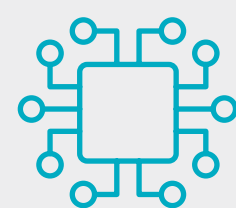
## O-RAN Alliance

Vodafone Group is a Board Member of the O-RAN Alliance – a community of more than 200 members made up of network operators, vendors and research institutions focused on open interface developments in Radio Access Networks. The Alliance plays an important role in developing specifications, releasing open software for the RAN, and supporting its members with the integration and testing of OpenRAN technologies.

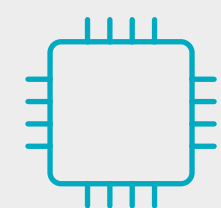


# accelerating tomorrow

There are compelling opportunities for European start-ups to develop a foothold across the emerging OpenRAN supply chain that is set to transform mobile networks, and for European network operators to provide a market for their services.



**Semiconductors**



**Chipsets**



**Systems Integrators**



**Cyber Security**

**The EU has the opportunity to develop a world-leading ecosystem of OpenRAN developers and manufacturers, which could put the EU at the forefront of the emerging global OpenRAN market.**

**Moreover, securing this leading position could account for cumulative economic output of as much as €8bn over the next six years and could support as many as 11,000 jobs.**

This assessment is based on existing forecasts of the OpenRAN market up to 2026 and assumes that the European OpenRAN ecosystem is able to match the current EU27 share of the wider telecoms equipment market in the new OpenRAN space.

† Based on Eurostat statistics for turnover per person employed for the manufacture of communication equipment.



**Beyond this potential economic impact, the success of OpenRAN, with Europe taking a leading role, also has the potential to:**



Ensure the telecoms sector can keep everyone connected and meet growing demands for connectivity, through appropriate investment in network expansion.



Stimulate research, engineering and construction associated network investment and deployment to help boost economic recovery.



Support increased traffic volumes with improved cost efficiency and economies of scale, resulting in better value for citizens and businesses.



Ensure supplier diversification and resilience, faster pace of innovation from new suppliers, faster network deployment, improvements in site coverage and better security.

**Questions on this paper?** We'd love to hear from you.  
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