Publication date:
August 2022
Authors:
Rémy Pascal
Roberto Kompany
Angie Yang

EMEA: Fostering Innovation and Supply Chain Diversity with Open vRAN

Commissioned by:
intel. Red Hat

Brought to you by Informa Tech

Contents

Summary

This white paper introduces the concepts of virtual radio access networks (vRANs) and open RAN and explains how these new approaches help transform the way networks are designed, built, operated, optimized, and maintained. It presents the key benefits service providers can expect from the adoption of virtual RAN or open RAN, which include flexibility, scalability, agility, innovation, vendor diversity, lower cost of ownership, and simplicity of operations.

The second part looks specifically at the case of Europe, Middle East and Africa (EMEA), a large region that comprises different countries and economies. Over the last several years, in an effort to reduce dependencies on China-based suppliers and reduce reliance on a small number of suppliers, several European governments have become supporters of open vRAN. They are keen to leverage open vRAN to build and maintain more resilient and secure networks and to facilitate a more competitive ecosystem and foster innovation in the supply chains.

Omdia' latest open vRAN tracker forecasts revenue in EMEA will reach $1.5bn in 2026. Several leading service providers in Europe have been actively conducting open vRAN lab tests and trials in recent years, and service providers in the Middle East and African markets are expected to follow.

Such early deployments are also an opportunity for Red Hat and Intel to validate and demonstrate the solutions and capabilities they offer to support a service provider's RAN transformation.

A brief introduction to vRAN, open RAN, and RAN functional disaggregation

Service providers around the world are continuously investing in their networks to augment their capacity in order to address the rapid increase in traffic and support new applications and scenarios. However, the traditional approach where mobile networks are built using dedicated equipment presents some limits in terms of scalability, flexibility, and agility.

This is why telecom service providers have been looking for new approaches and ways to modernize their network. Network functions virtualization (NFV) introduced the concept of deploying network functions on virtual machines (VMs) running on general-purpose infrastructure instead of dedicated hardware. This trend started about a decade ago in the core network domain, and because many service providers are now well advanced in that transition, they are moving into the next phase: the virtualization of the RAN domain.

Virtual RAN creates an opportunity to disaggregate the base station hardware and software and to run the baseband software function on generic commercial off-the-shelf (COTS) servers. A further evolution is to run RAN functions as microservices on containers instead of VMs and to adopt cloud principles such as development and operations (DevOps) and GitOps, which describes and observes systems such as the RAN with declarative specifications.

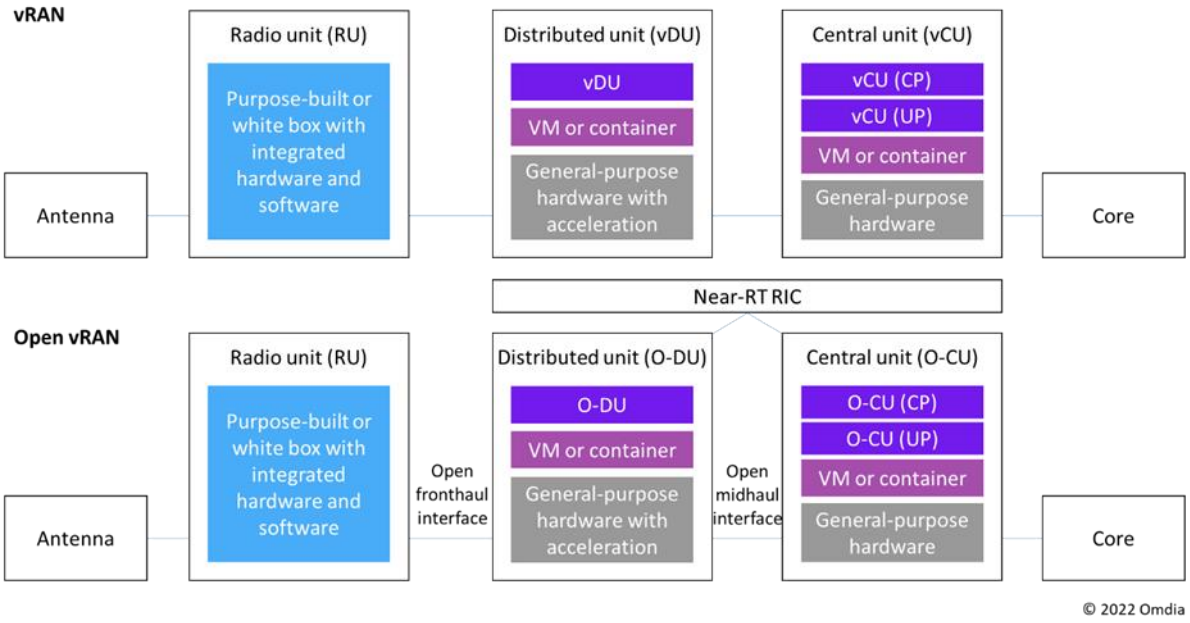
Recently, service providers have also shown a lot of appetite for open RAN. *Open RAN* describes the opening of interfaces within the radio access network domain and, in particular, the interface between the two main elements that constitute the base station: the radio unit (RU) and the baseband unit (BBU) or digital unit, known as the fronthaul interface. Opening interfaces enables buyers to separately purchase the RU and the digital unit and mix and match products from different vendors.

A third trend is the functional disaggregation of the RAN. The 3GPP release 15 and the O-RAN Alliance define functional disaggregation of the baseband unit into a central unit (CU) and a distributed unit (DU), offering new architecture options and more possibilities in terms of disaggregation and distribution or centralization of resources.

Cloud RAN, open vRAN, and RAN functional disaggregation will transform the way service providers build and operate their mobile networks. Though they are still at an early stage, Omdia observes that these trends have gained significant momentum in the past few months with many service providers around the world committing to adopting these new approaches and many others evaluating and testing them.

It is also important to understand that vRAN can be implemented regardless of open RAN, and conversely, open RAN and open interfaces can also be implemented without virtualization. Effectively, open RAN is often associated with vRAN because the two are complementary, as summarized in **Figure 1**. The convergence of the two into open vRAN will enable service providers to maximize the benefits of the transformation.

Figure 1: vRAN and open vRAN simplified architectures



Source: Omdia

The expected benefits of RAN virtualization

The key benefits of opening interfaces, including the possibility of introducing new vendors, selecting best-of-breed solutions, and fostering price and technology competition, are well understood by the telecom community.

Virtualization and hardware/software disaggregation facilitate the introduction of different vendors of hardware, the virtualization layer, virtual network functions (VNFs), and cloud-native network functions (CNFs). In addition, vRAN brings other benefits in terms of flexibility, scalability, efficiency, and time-to-market reduction. These are summarized in **Figure 2**.

Those benefits are known by service providers that have already virtualized their core network, but because of the sheer size of the RAN, virtualization in this domain can potentially be more transformational. Service providers believe that the open vRAN approach is promising, but they also realize that RAN virtualization will be complex and potentially more challenging than virtualization in other network domains. This is primarily because of the specificities of the RAN, including the need for real-time processing and timing and synchronization requirements.

When vRAN was first introduced, vendors themselves acknowledged challenges—particularly around latency, performance, feature parity, and energy efficiency—in comparison with integrated purpose-built RAN solutions. However, vRAN offerings have developed very fast in the past few months, closing the gap. In terms of performance improvement, for example, RAN-specific hardware accelerators, which complement generic processors and handle some of the most demanding workloads, play a key role.

Figure 2: Key benefits expected from the adoption of vRAN

Expected benefit	How is it realized?
Flexibility, scalability, and optimization of resources	• Scale in and scale out easily via the addition of virtual machines or container-based resources enabling the capacity of the network to be precisely adapted to the actual demand in real time. • A horizontal cloud platform across access, edge, and core will play a critical role, ensuring consistency and reducing integration efforts.
Easier and faster innovation	• Installation, configuration, updates, and upgrades are software based and therefore can be introduced to the market faster and in a continuous manner. • It is possible to benefit from innovation from the broader IT/cloud community both in terms of hardware (including silicon) and of software (including open source).
Greater vendor diversity	• A larger choice of suppliers is available with new entrants. • Disaggregation enables the supply of different components from different vendors and greater vendor diversity of specialists in each area (COTS hardware, acceleration, virtualization, vRAN software), rather than having to buy an end-to-end integrated system from a single supplier.
Lower TCO	• The use of COTS servers and of common infrastructure across domains (RAN, core, OSS/BSS) reduces capex. • The pooling and sharing of hardware resources enables increased resource utilization and the simplification of cell sites, which in turn means a small footprint and rent and fewer site visits. • Automation is necessary to deploy and maintain vRAN. A zero-touch approach to automation is the desired state to realize the reliability and resilience and for self-healing and scaling of a highly distributed system.
Simplify operations and improve operational agility	• Automated service provisioning reduces human intervention and associated costs. • Operators are able to manage and maximize the lifecycle of their RAN. • Simplified workflows reduce complexity and ensure reliability.

Source: Omdia

Omdia’s view: The global perspective

Though open vRAN is still in its early development, Omdia observes that service providers in EMEA and many other parts of the world are increasingly interested in it and in how it can benefit them. There is a strong and undeniable open vRAN momentum, seen in the membership of and participation in organizations such as the O-RAN Alliance and the Telecom Infrastructure Project (TIP), the number of trials and deployments, and service providers’ announcements of their commitment to adopting open RAN.

The open vRAN concept was initially championed by the greenfield service provider Rakuten Mobile (Japan), but it has been rapidly adopted by a number of brownfield service providers, noticeably not just in the most technology advanced markets but in all types of markets and on all continents.

While most initiatives are often small scale, the size of trials and deployments tends to grow from a few sites initially to dozens or sometimes hundreds. There is also an increasing variety of scenarios and use cases considered, including rural, suburban, and urban deployments; outdoors and indoors; and on public and private networks. In EMEA, service providers such as Telefónica and Vodafone have made public commitments to open vRAN deployments, while Deutsche Telekom (DT) launched what it claims was Europe’s first live multi-vendor open vRAN deployment, O-RAN Town, in Germany.

Open vRAN is actively promoted by vendors including a few market pioneers, pure players, and new entrants, but RAN incumbents are now also adding vRAN offerings to their portfolios and opening their interfaces as a response.

Omdia believes that while purpose-built integrated RAN will continue to be dominant for years, open vRAN deployments will play an increasingly important role, and this segment will grow faster than the rest of the market. In its current forecast, Omdia estimates that open vRAN deployments will represent 19.5% of the $7.5bn RAN market in EMEA and 3.9% of the $37bn RAN market globally by 2026.

Public funding and service providers' commitments show intent on open vRAN in EMEA

Some EMEA countries have committed public funds to open vRAN

Over the last several years, in an effort to reduce dependencies on China-based suppliers and reduce reliance on a small number of suppliers, several European governments have become supporters of open vRAN. They are keen to leverage open vRAN to build and maintain more resilient and secure networks and to facilitate a more competitive ecosystem and foster innovation in the supply chains.

As part of the 5G supply chain diversification strategy, presented to the UK Parliament in November 2020, the UK's Department of Digital, Culture, Media and Sport (DCMS) set out three main elements:

- Support incumbent suppliers
- Attract new suppliers into the UK market
- Accelerate the development and deployment of open-interface solutions

To achieve this, £250m ($340m) funding was allocated to support telecom diversification and build momentum.

The DCMS, in collaboration with the four major service providers in the country, established a target to ensure sufficient infrastructure is built so that 35% of UK's mobile network traffic is carried by open RAN by 2030.

In July 2021, the UK launched Future RAN Competition (FRANC) with £30m ($41m) funding to fast-track open RAN development and to discover and fund talented new vendor specialists. This funding was later increased to £50m ($69m) by December 2021: £36m ($49m) was allocated to FRANC and £15m ($20m) to the 5G SmartRAN Open Network Interoperability Centre (SONIC).

In November 2021, Germany's Federal Ministry of Transport and Digital Infrastructure (BMVI) announced €300m ($402m) in funding over the next 10 years. The funding will

- Support the establishment of an open RAN lab, designated i14y, to develop and test open RAN technologies

- Support the rollout of open RAN trials in two testbed cities: Neubrandenburg and Plauen
- Support a research project to help stimulate the ecosystem

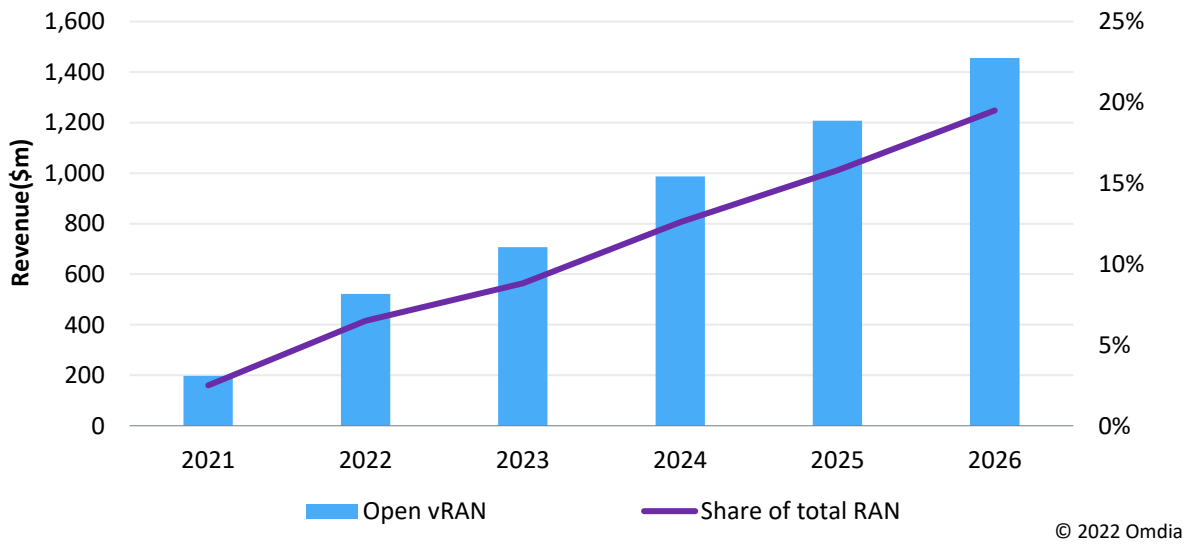
The i14y Lab, hosted and run by DT together with Telefónica and Vodafone, is an industry-led consortium of European and German vendors and system integrators (SIs) that focuses on open RAN and network disaggregation. The lab receives some funding from BMVI in support of open system development.

Through programs such as the current Horizon Europe and its predecessor Horizon 2020, the European Commission (EC) has funded telecom infrastructure research and innovations. However, despite the call from major European service providers, such as DT, Orange, Telefónica, TIM, and Vodafone, to the EC there has been a limited coordinated approach to an open vRAN strategy.

Service providers in the region show interest in and clear intention to deploy open vRAN

The EMEA market is a large region that covers different countries and economies. Omdia' latest open vRAN tracker forecasts revenue in EMEA will reach $1.5bn in 2026 (see **Figure 3**). Several leading service providers in Europe have been actively conducting open vRAN lab tests and trials in recent years, and service providers in the Middle East and African markets are expected to follow.

Figure 3: EMEA, open vRAN revenue and as percentage of total RAN forecast, 2021–26



Source: Omdia

Service providers in the region have formed an alliance in an effort to facilitate open vRAN development and deployment. In Europe, the open RAN memorandum of understanding (MoU)

group, formed by DT, Orange, Telefónica, TIM, and Vodafone, is working to define and develop open RAN solutions. As a challenger and new entrant, Germany's fourth service provider 1&1 is currently building what it claims is Europe's first fully virtualized multi-vendor mobile network using open RAN.

An MoU group similar to the European one was formed by five service providers from the Middle East: du, Etisalat, Mobily, Saudi Telecom (STC), and Zain. These were later joined by two other service providers: Batelco and Omantel. Following the signing of the Open RAN MoU, the Middle East service providers opened the first regional community lab in collaboration with TIP and Intel. Service providers in the region have announced several open vRAN trials and deployments since 2019 (see **Table 1**).

In Africa, South Africa is leading the continent in the pursuit of open vRAN. In March 2022, the MTN Group announced it had signed an MoU with Rakuten Symphony to carry out 4G and 5G open vRAN proof-of-concept trials in South Africa, Nigeria, and Liberia based on the Rakuten Communication Platform (RCP). Vodacom SA is also looking to follow suit in South Africa, Mozambique, and the Democratic Republic of Congo. These tests are designed to manage commercial traffic in urban, rural and ultra-rural areas. These trials, however, are not the first in the continent: Vodafone conducted open RAN lab trials with Vodacom in South Africa in October 2019.

Table 1: Selected European and Middle East service provider open vRAN activities

Service provider	Main countries of presence	Radio generation	Deployment, plan, and timeline
Etisalat	UAE	4G and 5G	Launched what it claims was the first open vRAN deployment in the Middle East and Africa in January 2020. Set to trial 2G, 3G, 4G, and 5G open RAN solution across its markets in Middle East & Africa.
DT	Germany	4G and 5G	Launched what it claims was Europe's first live multi-vendor open vRAN deployment, O-RAN Town, in Neubrandenburg, Germany in June 2021. Planned to expand O-RAN Town in phases across 2021 and 2022 and commercialize open RAN by 2023.
Telefónica	Pan-European	4G and 5G	Announced a target of reaching "50% radio network growth" based on open RAN by 2025, which Omdia interprets as 50% of new radios deployed to be O-RAN compliant. Announced three live sites and plans to deploy a further 1,000 sites with open vRAN by end of 2022. Announced precommercial trials in Brazil, Germany, Spain, and the UK.
Zain	Kuwait	4G and 5G	Completed the first open vRAN live trial in Kuwait in June 2022.
TIM (Telecom Italia Mobile)	Italy	4G and 5G	Among the first service providers in Europe and the only one in Italy to launch open vRAN solutions on the mobile network in April 2021.

BT	UK	4G and 5G	Announced open vRAN trial in January 2022 across a number of sites. Plan to open a dedicated Open RAN Innovation Center later in 2022 for vendors to demonstrate their equipment and to provide a platform for open architecture progress.
Vodafone	Pan-European	4G and 5G	First open RAN lab at Newbury, UK tech campus opened in April 2021. Plans to deploy 2,500 4G and 5G O-RAN sites in the UK by 2027 and will use open RAN in 30% of its masts in Europe by 2030. Switched on what it claims is the country's first 5G open RAN site in January 2022.
Saudi Telecom (STC)	Saudi Arabia	4G and 5G	Deployed a commercial open vRAN network in January 2021. Deployed 4G and 5G network using open vRAN platform in June 2022.

Source: Omdia

Service providers face different challenges as they prepare their open vRAN investments

Despite the positive push for open vRAN by some governments in the region and the trials carried out by the high-profile service providers, the region faces several challenges that affect the timing of open vRAN investment decisions. One of the most significant questions, which affects the so-called brownfield service providers that already have existing legacy networks using a purpose-built RAN, is how to maintain existing 2G and 3G networks alongside the new open vRAN networks.

Many European service providers have deployed their 2G, 3G, 4G, and 5G networks using a single-RAN infrastructure, which creates efficiencies in both power utilization and space requirements at sites. It would therefore be inefficient if service providers had to deploy an open vRAN infrastructure for both 4G and 5G alongside the existing hardware that provides 2G and 3G. In the coming years 3G is set to sunset in many markets, while 2G will continue to be used to deliver services such as voice and Internet of Things (IoT). For example, Orange (Belgium) will utilize 2G until 2028, while the UK government's timeline for 2G sunset is 2033. Support for 2G is therefore a requirement, and recently some vendors have started announcing 2G solutions for open vRAN. It still remains to be seen how quickly these will be implemented in real networks.

Deploying multi-vendor open vRAN is challenging and requires the integration of multiple components. In the past, service providers depended on their RAN vendors to deliver a preintegrated RAN equipment; however, in the age of open vRAN, some service providers are looking at global systems integrators (GSIs) to deliver the design and the integration of the necessary infrastructure, functions, and applications. Service providers also see the benefit of working with a GSI in the areas of emerging technology such as microservices and containers, artificial intelligence, automation, and the use of hybrid cloud to mitigate risk and accelerate their time to market.

Service providers will also only achieve an efficient rollout of the thousands of servers and other infrastructure required for open vRAN sites if they adopt holistic operation and automation models. For example, the same cloud platform should be deployed at the data centers (DCs) and at the far edge locations where most of the DU workloads will reside, to ensure the same tools and common security elements are used. However, many service providers in the region show signs that they have not yet fully acquired the software competencies or implemented the organizational changes required for this level of cloud deployment and operations.

A changing operational model for brownfield service providers is both complex and risky. Service providers may be afraid to disrupt their operations by introducing new ways of working. The investment trigger for these service providers may not come until the existing networks are depreciated sufficiently, end of life is reached, or new spectrum allocation requires existing sites to be upgraded.

Red Hat and Intel enable the transition to open vRAN

Red Hat joined the O-RAN Alliance in 2018 with a primary focus on the working group 6 (WG6): Cloudification and Orchestration and is now one of O-RAN Alliance's top 10 voting members. Red Hat is one of the world's leading providers of carrier-grade open source solutions, using a community-powered approach to deliver high-performing Linux, cloud, container, and Kubernetes technologies. Red Hat integrates key technologies from open source communities and is one of the top contributors to OpenStack and Kubernetes, among other projects. It provides a telco-cloud platform and automation framework that allows the disaggregation of hardware and software and the running of virtualized RAN functions on top of generic servers.

Red Hat has been working with its service provider partners to support their journey toward cloud-native platforms, helping them understand how these together with automation tools can help to reduce network total cost of ownership (TCO) and deliver advanced capabilities. The migration to 5G is a good trigger for investments into open vRAN. Service providers should take advantage of this partnership to start with rural environment use cases and null spots, which are ideal for early deployments and learning because these have no existing infrastructure and can be treated as green fields. Service providers that engage with a wide ecosystem of partners and embrace cloud-native platforms will be in a good position to take deployments to the next level. This includes urban and dense urban environments as soon as the open vRAN infrastructure, such as massive MIMO, becomes commercially ready from late 2022 or early 2023.

Red Hat's portfolio for vRAN includes Red Hat® Enterprise Linux®, Red Hat OpenStack® Platform, and Red Hat OpenShift® Container Platform® that makes network functions run in a cloud environment. Together these solutions enable operators to design, deploy, and orchestrate DU and CU VNFs or CNFs.

Red Hat collaborates closely with Intel to provide a preintegrated open platform for vRAN and cloud-native RAN combining Red Hat's virtualization layer with Intel's silicon and software. Intel supplies several critical components including its Xeon processors for general compute, hardware accelerators including its vRAN dedicated accelerator ACC100 (ASIC) and FPGA Programmable Acceleration Card, and the FlexRAN reference architecture used in most open vRAN deployments around the world today. Such a preintegrated solution enables service providers to start from an existing framework when designing and implementing their vRAN, thereby reducing the amount of effort and time required as well as the complexity of the project.

Conclusion

Open RAN and vRAN will change the way service providers supply, design, build, operate, and maintain their mobile networks. They represent an opportunity for service providers to innovate and reduce their costs, but this transformation also represents a major endeavor. Open vRAN is not just about introducing new vendors: it is about introducing new architectures and new ways to deploy and operate the RAN, working with cloud-native principles, new processes, and new methodologies. A horizontal cloud platform will allow service providers to manage their RAN components in a consistent and efficient manner, driving benefits that include increased agility and reduced costs. This is a fundamental transformation and a multiyear journey.

Service providers need to start, and for that they should first clarify their expectations and define their requirements. They should talk to platform vendors and RAN vendors and organize tests in labs and then in the field. Service providers should, naturally, also verify the business case and, when doing that, consider the specificities of the market where they operate, their existing assets, and their internal capabilities, because there is no such thing as a standard or guaranteed level of savings. Once they have done all that, service providers will be well positioned to decide when and where it makes sense to deploy open vRAN.

Some will start with virtualization and others with opening interfaces; some will try to do both in parallel, but what is probably common to all except greenfield service providers is that they will start in pilot areas or with pilot scenarios before progressively expanding to their entire footprint.

Finally, even if they plan to rely heavily on partners, service providers should try to acquire a minimum set of skills and internal capabilities to remain in control of their transformation and manage the relationship with their technology providers and partners.

Appendix

Author

Rémy Pascal
Principal Analyst, Mobile Infrastructure

Roberto Kompany
Principal Analyst, Mobile Infrastructure

Angie Yang
Research Analyst, Fixed and Mobile Infrastructure

customersuccess@omdia.com

Get in touch

www.omdia.com
customersuccess@omdia.com

Omdia consulting

Omdia is a market-leading data, research, and consulting business focused on helping digital service providers, technology companies, and enterprise decision makers thrive in the connected digital economy. Through our global base of analysts, we offer expert analysis and strategic insight across the IT, telecoms, and media industries.

We create business advantage for our customers by providing actionable insight to support business planning, product development, and go-to-market initiatives.

Our unique combination of authoritative data, market analysis, and vertical industry expertise is designed to empower decision-making, helping our clients profit from new technologies and capitalize on evolving business models.

Omdia is part of Informa Tech, a B2B information services business serving the technology, media, and telecoms sector. The Informa group is listed on the London Stock Exchange.

We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help your company identify future trends and opportunities.

Copyright notice and disclaimer