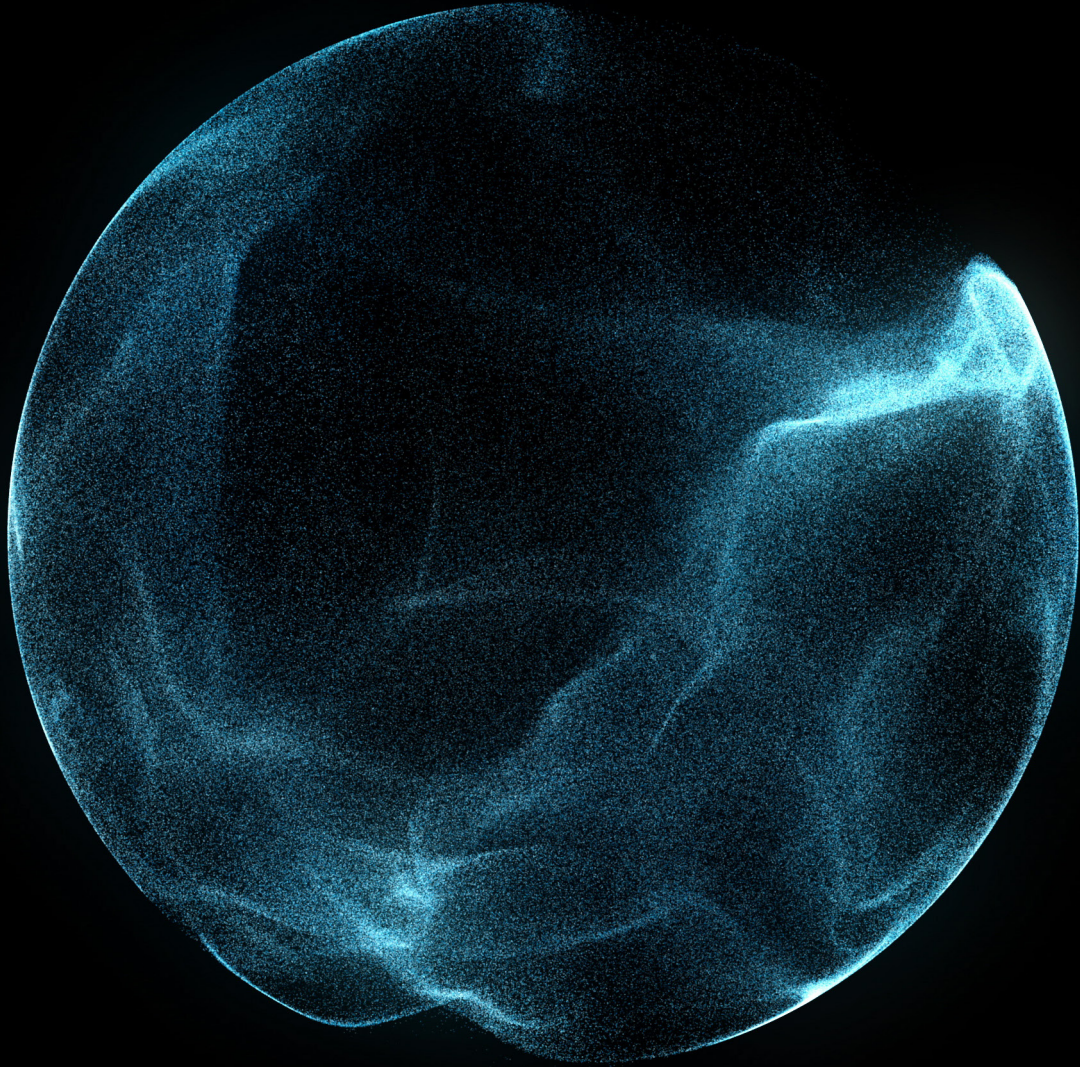


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The Open and Disaggregated Network Era

Path to success and hurdles for Open RAN



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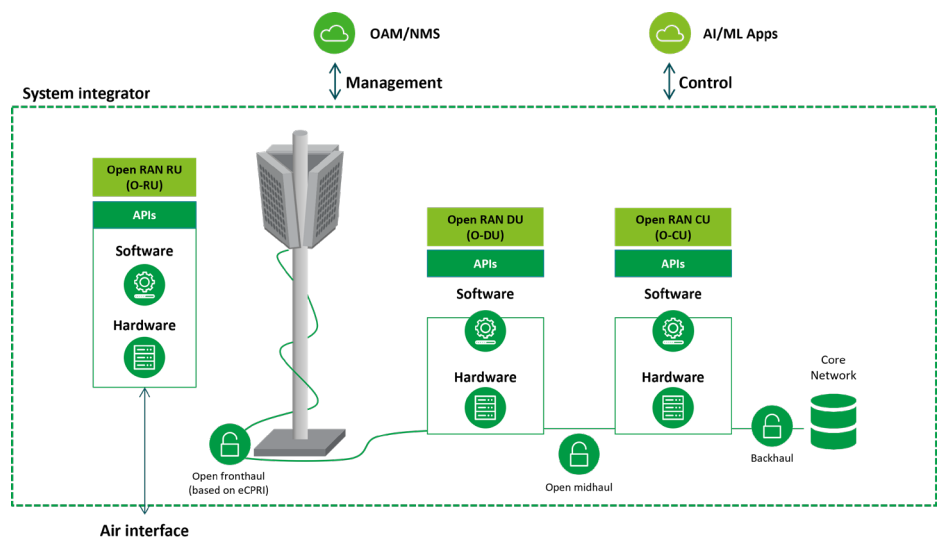
Introduction

Until recently, RAN technology was exclusively offered as a combination of hardware and software in an integrated solution based on proprietary/non-open interfaces and limited interoperability. This resulted in mobile network operators (MNOs) being vendor-locked, which compelled them to procure a complete solution suite from a single supplier.

However, global security concerns surrounding China and its largest telecommunication equipment provider Huawei led to regulatory and political challenges. Many countries, including the United States and several European nations, imposed restrictions or bans on Chinese vendors' participation in their network infrastructure, citing concerns over potential backdoors and security vulnerabilities. An unfavorable development for German MNOs, with Huawei equipment representing significantly more than 50 percent of Germany's 5G RAN network installed infrastructure.

Open RAN emerged as a viable alternative, offering the promise of vendor neutrality and increased security. In addition, German MNOs, along with their counterparts worldwide, see Open RAN to diversify their supply chains, reduce dependency on a single vendor, and enhance the security and flexibility of their 5G networks. The analyst community is expecting considerable growth of the Open RAN market over the coming years.

Fig. 1 – Open RAN reference architecture

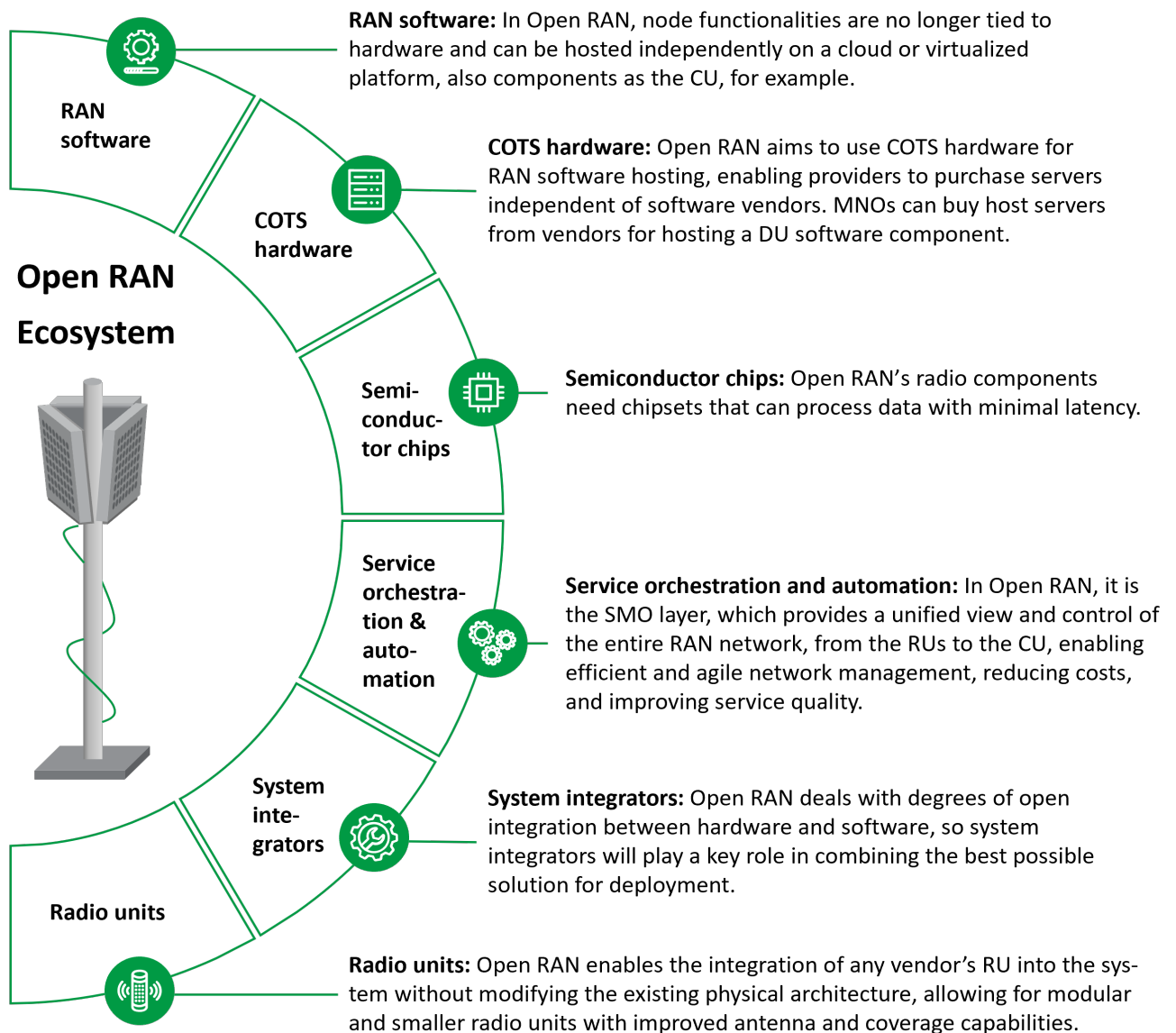


The prevailing view within the MNO community is that an “open” approach is the preferred direction, as demonstrated by industry leaders committing to deploy Open RAN architecture at scale. In this thought piece, we will take a brief look at the current landscape of Open RAN and examine the benefits and challenges as it pertains to MNOs.

Open RAN ecosystem

The transformation from vendor-locked proprietary solutions to Open RAN marks a paradigm shift in network architecture, creating an ecosystem that can cater to this demand.

Fig. 2 – The Open RAN ecosystem



Market status Europe and Germany

In the European market, Open RAN is significantly gaining traction with MNOs as early adopters. They recognize Open RAN's potential to increase flexibility and reduce costs. Open RAN adoption has become particularly important due to the governments' heightened pressure on Chinese radio elements in 5G networks and the potential ban of Huawei equipment.

Government

The German government is actively supporting the adoption of Open RAN technology, with a dedicated €300 million fund from the Federal Ministry of Transport and Digital Infrastructure (Bundesministerium für Verkehr und digitale Infrastruktur, or BMVI). They have already announced their first projects within this initiative, which are focused on advancing industrial 5G networks. These projects include establishing a test lab, deploying testbed city rollouts, and launching a research program designed to encourage the development of a compatible component ecosystem. The BMVI expects the use of Open RAN to aid the digital transformation of businesses and industries, stating Open RAN to be "an important driver for setting up 5G campus networks due to the high degree of customization of the network architecture".

Germany is not the only European government supporting the development and adoption of Open RAN technology. The European Commission has allocated funds

for an Open RAN research and development (R&D) stream within its Horizon Europe program. Concurrently, the UK has introduced its Open Networks Research and Development (R&D) Fund, a £250 million government-supported initiative aimed at fulfilling the objectives of the UK's 5G Supply Chain Diversification Strategy.

Private Sector

Private industry players in Germany and rest of Europe are also embracing the technology. Vodafone has announced that it plans to equip 30 percent of all its European sites with Open RAN by 2030. Vodafone has followed this up with plans to conduct a commercial pilot of 5G Open RAN at mobile sites across two rural areas in Germany – its largest European market – starting in 2023. German MNO 1&1 secured 5G spectrum in 2019 and is now committed to building its own nationwide fully virtualized greenfield 5G network using Open RAN technology in partnership with Rakuten Symphony. Meanwhile, major providers such as Deutsche Telekom, Telefonica,

It is increasingly viewed by both governments and industry players as a key enabler of future innovation and economic growth in the telecommunication sector:

and Orange S.A. are joining forces for a full Open-RAN-driven network. Open RAN is also finding its way into private campus networks, research institutions like the Fraunhofer Society (Fraunhofer-Gesellschaft) are using Open RAN private 5G solutions for their 5G Industry 4.0 testbeds. Deutsche Telekom is leading a consortium that runs the Open RAN lab known as i14y. The i14y Lab focuses on facilitating interoperability and integration testing between various vendor solutions.

Nonetheless, Open RAN is still in its early stages of deployment in Europe, with initial limited-scale and private/campus network deployments underway. Despite the sluggish momentum in commercial adoption, there is growing interest in Open RAN, and it is expected to play a significant role in the future of 5G networks.

Industry bodies/coalitions

As the ecosystem for Open RAN technology develops, several industry bodies have emerged to help drive its growth.

The Telecom Infra Project (TIP), a collaborative telecom community founded in 2016, has an Open RAN project group that aims to develop, productize, and promote Open RAN solutions and reference designs to accelerate adoption of the technology. TIP also operates a lab for testing and validating Open RAN solutions.

The O-RAN alliance, founded in 2018 through the merger of C-RAN alliance and X-RAN forum, has the objective of evolving RAN towards more intelligence and openness. To this end, they specify reference designs consisting of virtualized network elements using open and standardized interfaces, and they call for more intelligence in the network through information collection for these virtualized network elements. Among other things, the O-RAN alliance is focused on developing, promoting, and enforcing standards and specifications to ensure RAN openness and vendor interoperability.

The Open RAN Policy Coalition and the Global Mobile Suppliers Association (GSA), both organizations representing companies across the mobile ecosystem, are also actively involved in advocating for the technology. They are pleading for policies that support the development and deployment of Open RAN, while also working to educate policymakers about its advantages. Similarly, the Next Generation Mobile Networks (NGMN) alliance promotes network disaggregation as one of its key focus areas.

These are just a few of the industry bodies working on Open RAN. As this technology continues to evolve, we can expect to see more organizations emerge to help drive its development and adoption.

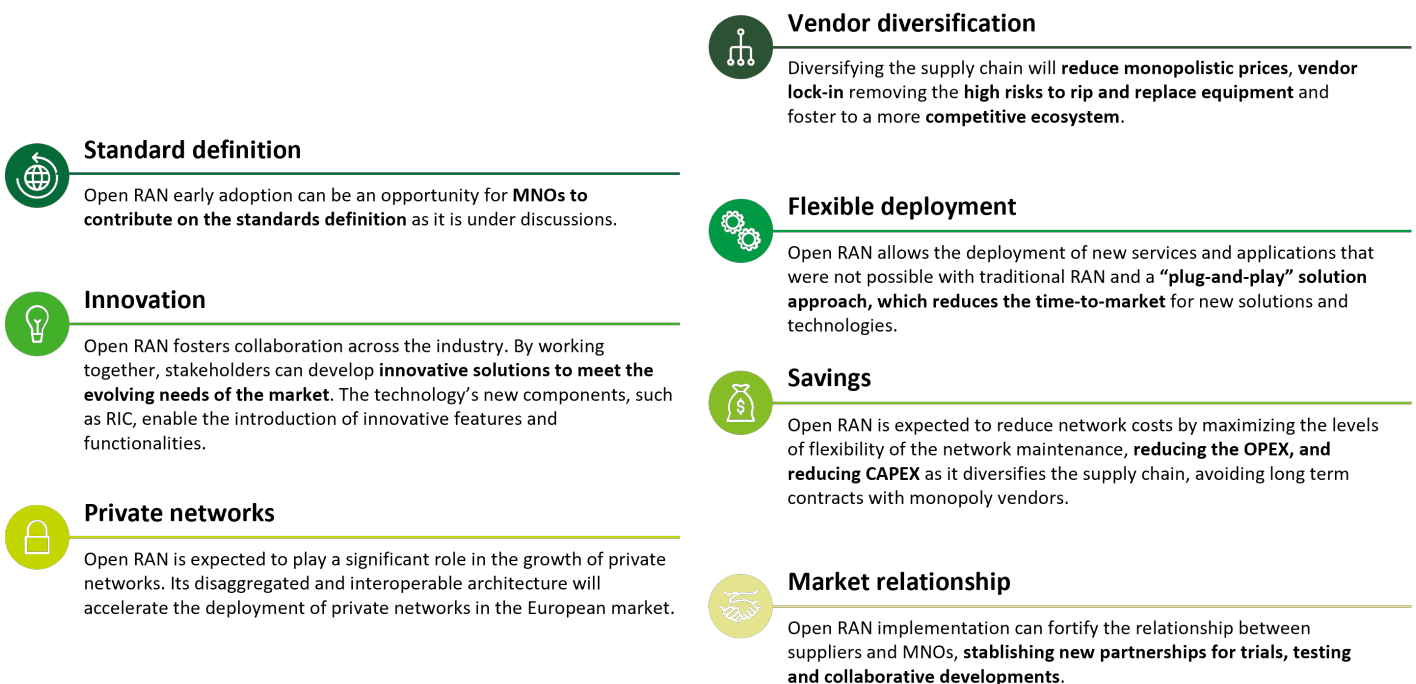
Overall, the growing support and investment in Open RAN technology in Germany and Europe signal its potential to transform industries and drive innovation across its networks.

The technology also promotes something novel in this vendor-locked industry, an ecosystem of new players entering and acquiring the know-how to deliver parts of the solution. This is creating a new vendor landscape, which could move us away from end-to-end vendors and their solutions.

Why to embrace Open RAN

Open RAN can address several challenges and issues that network operators face with traditional RAN architecture, such as vendor lock-in, reliance on traditional solutions and lack of innovation. The major benefits for MNOs from embracing Open RAN are as shown in figure 3.

Fig. 3 – Key benefits that are driving the implementation of Open RAN solution



Downsides and challenges

Open RAN is a promising technology that offers many benefits. However, as with any new technology, it also presents challenges that operators must address. These challenges extend beyond just the technological aspects of Open RAN and can include commercial and organizational gaps.

From a technology perspective, Open RAN relies heavily on disaggregation, meaning components are sourced from different suppliers, increasing the importance of hardware compatibility and performance. It's crucial to thoroughly assess and validate these diverse parts to ensure the system's overall functionality and efficiency. There could be potential challenges related to maintaining high performance and reliability while integrating components from multiple vendors, which might not be as




optimized as those from a single, large-scale vendor.

The process of integration presents additional challenges; the integration of hardware and software from various suppliers into one cohesive network demands significant time, effort, and cost. The need for continuous testing, validation, and optimization during integration can potentially escalate project expenses and extend timelines. Additionally, the reliance

on multiple suppliers raises the specter of potential vendor lock-in situations, where operators become dependent on specific vendors due to the complexity and specificity of their products, resulting in reduced flexibility and potential increased SI costs for the operator.

Commercially, operators must navigate a range of issues related to vendor selection, contract negotiation, and supply chain management.

Fig. 4 – The key barriers to faster Open RAN adoption

 <p>Technology</p>	<p>Feature and performance parity with traditional RAN</p> <p>Open RAN must provide similar functionalities to traditional RAN, but mobile network operators are wary of its ability to match the same performance.</p>	<p>Interoperability</p> <p>Need for interoperation across Open RAN and legacy RAN, coupled with standardization gaps and potential design differences between Open RAN implementations from different suppliers.</p>
 <p>Commercial</p>	<p>Investment costs</p> <p>Initial costs for the transition to Open RAN are high. Deploying Open RAN systems can require significant upfront investment to procure hardware, software, and the necessary services to integrate them.</p>	<p>New contracting models with vendors</p> <p>Operators need to shift to a recurring service model, as the solution would require continuous optimization and maintenance.</p>
 <p>Organizational</p>	<p>Processes and operating model</p> <p>MNOs need to adapt their processes and governance to enable interoperability in Open RAN, requiring a shift in tech expertise from hardware- to software-centric operations.</p>	<p>SI Dependency</p> <p>Higher dependency on SIs can reduce visibility and responsiveness of solutions. This dependency also results in a lack of control over the network, increasing security issues.</p>

They need to carefully evaluate different vendors and ensure that they have the necessary expertise, quality standards, and financial stability to deliver Open RAN solutions. They also need to ensure that the supply chain is secure and resilient, especially given the potential risks associated with sourcing components from multiple vendors.

Transitioning to new suppliers poses potential downsides such as the risk of severing ties with incumbent suppliers and losing

favorable price agreements, the threat of unmet demand due to the potentially insufficient scale of the new suppliers, and the possible escalation of costs, as larger-scale incumbent suppliers often have the capacity to offer more competitive pricing. Organizational challenges related to Open RAN can include issues related to skill sets, training, and organizational structures.

Operators must ensure that they have the necessary technical expertise to deploy and operate Open RAN systems effectively.

This may require new training programs or hiring additional staff with specific skill sets. They may also need to rethink their organizational structures to take full advantage of the benefits that Open RAN offers.

Key takeaways

Open RAN networks are significantly gaining popularity in Europe. Open RAN allows mobile network operators to disaggregate their RAN components through open interfaces and virtualization, thereby allowing multiple suppliers to provide solutions to the traditionally vendor-locked network architecture.

Security concerns have led countries, to impose restrictions on Chinese network equipment vendors, citing concerns over potential backdoors and security vulnerabilities. This can be seen as one of the drivers behind governments' endeavors to promote Open RAN adoption through R&D initiatives to enhance network security, promote vendor diversity over China-dependency, and speed up 5G rollouts. The market for this technology is expected to grow – in the initial phase driven by MNOs' trials & testing complimented by government funds.

MNOs such as Vodafone, Deutsche Telekom, 1&1, Telefonica, and Orange, are all advocating for Open RAN, adopting it in their networks, and forming industry bodies to jointly build up the solution and the policies governing it. As the technology continues to evolve, more players are expected to enter the market, creating a diverse ecosystem that will bring numerous benefits to mobile network operators. These include vendor diversification, flexible deployment, innovation, cost savings. Open RAN technology offers many

benefits, but there are still significant challenges which prevent large scale deployments in the short term. This includes technological, commercial, and organizational gaps to be addressed. Furthermore, the decision to adopt an open architecture solution needs to be backed up with an executable strategy and well-defined roadmap.

How can Deloitte help?

Open RAN is a game-changing technology for the telecom industry, promising unprecedented flexibility, innovation, and potential cost savings to mobile network operators. At Deloitte, we understand the challenges and opportunities that come with Open RAN adoption, and can help operators through this new disaggregated and open journey.

Our Network Advisory team of experts bring a combination of telecommunications business expertise and deep knowledge of Open RAN solutions, and can work with operators to conceptualize and operationalize optimal solutions based on the client's vision and business objectives.

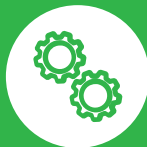
To ensure that our clients have access to the most cutting-edge technology on the market, we benchmark and evaluate the Open RAN

solutions available in the market to identify the most suitable options to our clients and ensure that their technological needs are met with the most efficient and effective solutions available.

With Deloitte support, MNOs can successfully transition to Open RAN while also optimizing their operating model and governance processes for maximum efficiency and innovation.



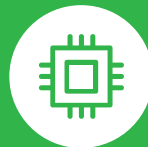
Business case assessment



Vendor assessment



Performing a network assessment to define the ideal strategy



Defining new operating model, processes, and governance



Defining a strategy and design a roadmap



Managing the rollout and process support implementation

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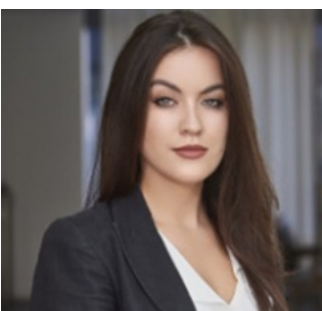
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