What's next for RAN?

Cloud RAN innovation and purpose-built evolution

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We are seeing an increased interest in virtualization and cloud-native technologies with 5G Radio Access Networks (RAN) and beyond, that promise to meet diverse and varied needs for more resilient, open, sustainable and intelligent mobile networks. In the long run, we envision that **everything that can benefit from running in the cloud, will be running in the cloud.**

This paper aims to guide communication service providers (CSPs) interested in cloud network transformation on how to evolve their networks stepwise and cost effectively into Cloud RAN, while continuing to leverage purpose-built hardware and the installed base.

CSPs' transformation to the cloud started in the IT domain, continued with Core network functionality, and is now taking the next step into the RAN. By using cloud technologies in the RAN, the Cloud RAN, CSPs can achieve "**cloud economics**", create **common and unified network operations** across all network domains and **enable new offerings targeting enterprises and industries**.

Cloud economics means flexibility in deployment options and the possibility to create benefits of scale by using common, shared infrastructure across different network domains. With Cloud RAN, CSPs can manage the RAN following cloud-native principles, just as the cloud frontrunners have already started doing within their Core and IT domain. This brings a **common and unified operational model**, creating efficiencies and the ability to manage network complexity while leveraging processes and tools from the wider IT and cloud domains. This reflects the appeal for the change and the benefits the IT industry is realizing – fast pace, innovation and flexibility. In addition, Cloud RAN will be **attractive for enterprise deployments** of 5G, with the potential to share on-premises network and server infrastructure with the core network and enterprise applications. Additionally, the adoption of Cloud RAN provides the option of leveraging the wider public and large scale hyperscaler cloud providers as a potential for increased business flexibility, either for temporary network expansions or as a longer term option to add to the business toolbox.

Cloud RAN does not imply the end of purpose-built RAN. First of all, the RAN differs from the Core and IT domain because it contains elements, such as Radios and Antennas, that cannot be replaced by cloud solutions in the same optimized and specialized fashion. Secondly, purpose-built RAN powers the vast majority of radio access networks today, and will continue to evolve and be a competitive alternative for optimized performance, energy efficiency and size. Purpose-built RAN solutions, such as the Ericsson Radio System, is a tightly integrated and optimized architecture of radio and baseband hardware & software, along with a dedicated network management system.

Both architectures have the capabilities that CSPs need to drive their successful 5G network evolution and capture the commercial benefits of 5G features such as high bandwidth, low latency and security. We see that future radio access networks will be purpose-built, cloud-based, and a combination thereof, depending on the CSP needs and use-cases. The evolution towards Cloud RAN will need careful consideration and most commonly follow a stepwise approach.

In our collaborations with CSPs, we have seen different approaches to Cloud RAN, including:

- Early Cloud RAN adopters, who often choose to introduce Cloud RAN for 5G capacity expansions, for example through midband deployments or low band migration from 4G to 5G.
- Initial introduction of Cloud RAN for specific use-cases, e.g. enterprise deployments.
- Cloud RAN combined with a migration to a centralized RAN deployment.

Regardless of the approach and timing, the key will be to leverage the cloud paradigm in RAN for service development agility, deployment flexibility and scalability, while using purpose-built solutions for high performance and potential cost-efficiency. More importantly, introducing cloud-native principles into management and orchestration of both architectures will enable a common way to manage the Core, IT and RAN domains. This will be essential to reduce the complexity and deliver the expected benefits from both Cloud RAN and purpose-built, meeting CSPs' future business needs and end-users' expectations on service performance.

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01 Paving the way with Cloud RAN innovation and purpose-built evolution

Cloud RAN, at its most fundamental level, is a separation of the RAN baseband software and the RAN baseband hardware, where baseband RAN functionality is delivered as pure software. This software can run on any capable commercial-off-the-shelf (COTS) hardware, with or without integrated accelerators, using cloud-native tools and processes to manage both software and hardware.

If recent history tells us anything, it is that everything that can benefit from running in the cloud, will be running in the cloud. At Ericsson, we believe that in the long term, mobile radio access networks will also evolve in this direction. The networks will be highly automated with a common multi-vendor management system, allowing CSPs to choose different types of RAN deployments, where both Cloud RAN and purpose-built RAN will be relevant, serving different needs. The specific blend of architectures and timing of Cloud RAN introduction will depend on the business goals, starting point and strategy of each individual CSP.

However, the nature of radio access networks requires careful consideration as to when, how and where to use cloud technologies.

The RAN will always consist of purpose-built hardware such as radios, and antennas and the interworking between these and Cloud RAN components is important to get right. At the same time, the need for bandwidth, energy efficiency and spectrum management keep increasing, adding stringent demands on the hardware and its capability to deliver real-time processing. In certain scenarios and contexts, a purpose-built architecture will meet these demands in a better way while in others, Cloud RAN will be a better fit. There is not a single one-size-fits-all solution for all CSPs that will deliver on the future needs of consumers, enterprises and society in a robust and secure way.

Independent of the path chosen – whether a CSP pursues Cloud RAN in an all-in manner or wants to deploy it selectively where it sees the main benefits, it is a long-term process to reach the desired end state. This calls for highly effective solutions to support the network transformation, where purpose-built and Cloud RAN can coexist and interoperate with high network performance, reliability, security, and overall operability. There are a few questions that have to be considered and answered along the way when deploying Cloud RAN.

- What are the benefits that can be achieved by adopting Cloud RAN?
- When and where should Cloud RAN be considered?
- How to best leverage existing and future cloud infrastructure?
- How to efficiently operate Cloud RAN and purpose-built in the same network?

To support CSPs in each step of their network evolution journey, high-performing radio solutions that provide the flexibility and full support for both network architectures – Cloud RAN and purpose-built – are a prerequisite. The network design needs to allow for interoperability, cloud-native management and orchestration across RAN, Core and IT domains, and have a high degree of backwards and forward compatibility. This way, CSPs can evolve their networks in a cost-effective way while ensuring high performance.


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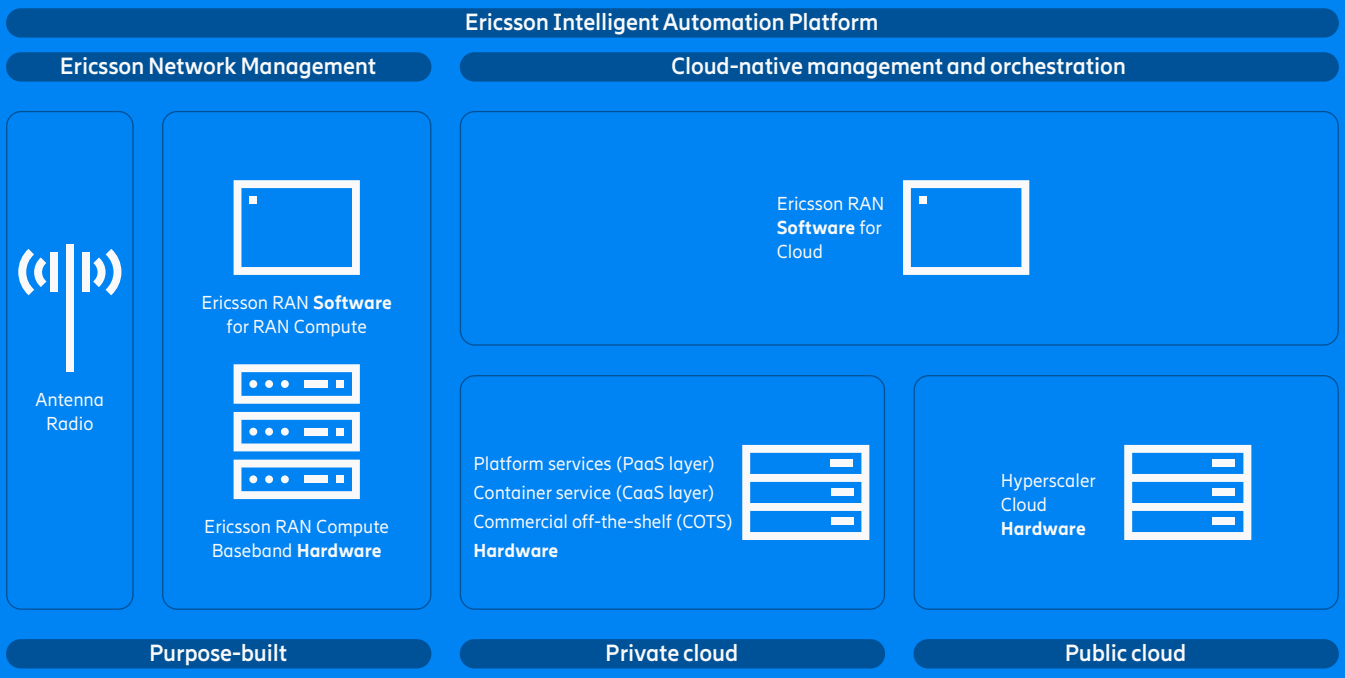
Key definitions before we dive in



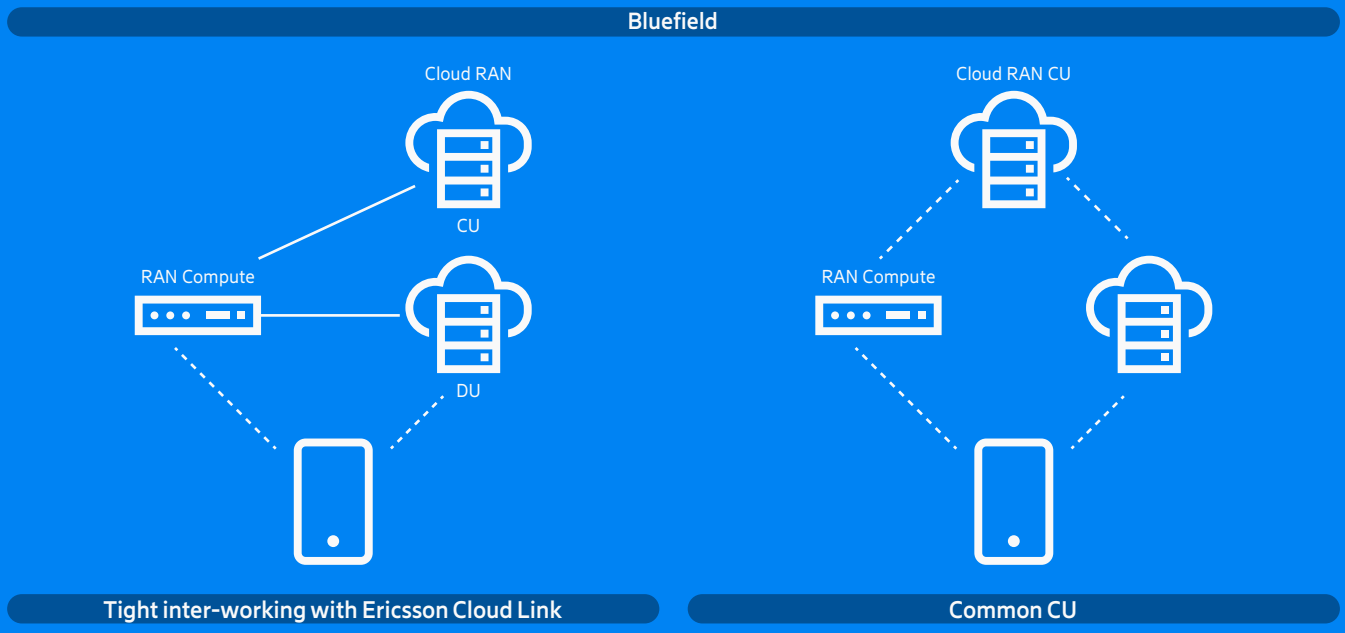
Cloud RAN – Cloud RAN is the separation of the RAN baseband software and the RAN baseband hardware. This baseband RAN software can run on any capable COTS hardware, with or without integrated accelerators, and cloud-native tools and processes to manage software and hardware. It means that baseband RAN software can, in principle, be deployed in several different ways – on cloud hardware on-site, in a CSP-owned data center, or even on a hyperscaler public cloud. However, different parts of the RAN software stack have different requirements of processing and time-criticality. Hence, it is important to carefully consider how to deploy the individual parts of the stack, both from a hardware perspective and where the processing is located in the network. The disaggregated Cloud RAN architecture will also bring new types of requirements to support, for example, end-to-end orchestration, assurance, and security.

Purpose-built RAN – Purpose-built is the current way of building a RAN network where software is tightly-bundled and co-designed with the baseband hardware and radios. Purpose-built or particularly for Ericsson, RAN Compute is a tightly-integrated and optimized deployment of radio, baseband hardware and software and operational tools that are optimized for performance, energy efficiency and size. The purpose-built architecture powers the vast majority of today's radio access networks, which predominantly consists of distributed deployments using IP backhaul to the base station site.

Cloud-native – Cloud-native is a collective term to explain how software, hardware, operations and life-cycle management work in a system built from the ground up for the cloud. Fundamental building blocks are container-based microservice architecture for software, container orchestration systems such as Kubernetes, continuous integration and continuous delivery (CI/CD) practices for software creation, deployment management and a high degree of automation (DevOps). Together, these are called cloud-native principles.

Centralized RAN vs. Distributed RAN – Centralized RAN, commonly referred to as CRAN, can sometimes be confused with Cloud RAN due to its abbreviation. Centralized RAN is an alternative to the most common deployment option, distributed RAN (DRAN). In DRAN, all RAN processing for each antenna site is done locally at the antenna site. In CRAN on the other hand, a large part of the RAN processing is done at a common CRAN hub for multiple antenna sites. This can be achieved both in a Cloud RAN or purpose-built architecture. While in DRAN, the transport segment from antenna site to core network is referred to as the backhaul, in CRAN, the interface between the antenna site and the CRAN hub is referred to as the fronthaul. Today, the fronthaul is typically based on dark fiber, a point-to-point connection between the CRAN hub and the antenna site to deliver on the strict latency, jitter and bandwidth requirements.[1]

1 Read more on: www.ericsson.com/en/blog/2021/5/exploring-new-centralized-ran-and-fronthaul-opportunities



Bluefield – A new way of approaching network evolution. Unlike brownfield deployments, in which we expand the capacity of an existing network, or greenfield, in which we deploy sites in a new network, bluefield rollouts represent a deployment middle ground – introducing new technology into an existing network.

How it works – Bluefield incorporates cloud elements into an existing network, which means it is not an overlay or a replacement of all the existing network architecture with a new one. It therefore gives CSPs the flexibility to gradually introduce Cloud RAN where needed, across all deployment scenarios – in existing sites using the Ericsson Radio System portfolio. With Ericsson Cloud Link, we enable value-add network technologies to operate across platforms with the best user experience and highest performance.

The benefits – Bluefield deployments have three key benefits:

- Leverage existing CAPEX investments by adding Cloud RAN into existing sites
- Achieve higher performance in the combined network architecture, purpose-built and Cloud RAN, compared to a pure overlay scenario
- Reduce complexity and have a common, cloud-native, way to manage both network architectures, delivering the expected benefits from both purpose-built and Cloud RAN

In a nutshell, bluefield deployments will keep purpose-built networks attractive over time, while enabling CSPs to seamlessly evolve towards cloud-native technologies and open network architectures to meet the demand for greater deployment flexibility.[2]

Open RAN – Open RAN is a concept for a more disaggregated RAN architecture built on top of 3GPP specifications. Open RAN has high potential, but to ensure its future success, improvements are needed, such as network performance, energy efficiency and security. Ericsson continues to drive Open RAN development and is a leading contributor to the O-RAN Alliance. The most transformative benefit of Open RAN is cloudification which paves the way for a larger ecosystem. It will also open up the possibility to even further automate mobile networks. Maintaining the benefits of global scale is critical for users and society at large, so we will continue driving the evolution of one global set of standards for future networks – with Ericsson Cloud RAN and the Ericsson Intelligent Automation Platform as key enablers for the emerging ecosystem.

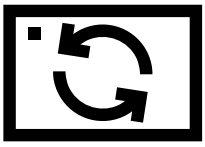
2 Read more on: www.ericsson.com/en/blog/2021/6/bluefield-cloudran-deployment

02 Cloud RAN – The rationale and drivers

There has been an increasing interest in extending the movement to the cloud from the IT and Core network domains to the RAN. There are three main drivers CSPs are looking for when considering Cloud RAN.

Cloud economics – Scaling, flexibility, and pooling

Cloud RAN allows for flexibility in deployment options and scalability of compute resources due to the separation of baseband software and hardware. As a result, CSPs have the option to choose the hardware and cloud infrastructure that fits them best. The RAN functions can be placed in a distributed deployment or moved into their existing data centers, either centrally or at the edge, where CSPs can scale compute resources as needed and share capacity with other types of applications. Additionally, cloud economics can also come from moving from high upfront costs to only paying for used resources and from freeing up IT staff from hardware maintenance work.



Common, unified and automated network operations

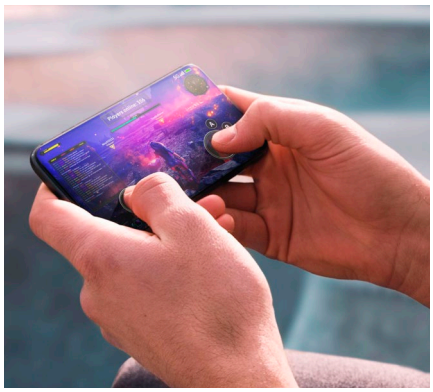
With Cloud RAN, CSPs can create a more unified and common operations model across all network elements and vendors, built on cloud-native principles and with an increased level of automation of network operations. Such a common operations model will help CSPs to improve operational efficiency and give them the capabilities to manage growing network complexity through the use of artificial intelligence (AI) and automation, both embedded in cloud-native ways of working. Here, the subscription model provided by Cloud RAN also plays an important role in terms of CI/CD – since Cloud RAN is based on open-source SW, it can be extremely vulnerable to exploits if not regularly patched.

Enable development of new enterprise business

Cloud RAN will also help CSPs to expand their offering to enterprises and industries, with solutions for private networks as well as cost optimized 5G indoor coverage. Since Cloud RAN has the potential to run on the same type of hardware and use operational processes that enterprises already use, it becomes a good fit for these types of services. Enterprises will be able to flexibly decide how to operate such a network - either on their own, with a third party or together with a CSP. For cases where data security, sovereignty and low latency are important, the 5G core network can also run locally on the same "on-premises" infrastructure as the RAN software.

03 Key considerations for a successful mobile network evolution

Each CSP has a unique journey in their evolution towards Cloud RAN. Depending on their starting point, cloud strategy and overarching business goals, different considerations need to be assessed and evaluated. By being early in this space, collaborating with frontrunner customers, we have identified three categories of CSPs and defined the most important actions and considerations for each on the next steps of their 5G network evolution. All three would have the end goal of achieving optimal balance between performance, efficiency, cost and relation to business intents.



Cloud-native telcos – these CSPs are early-adopters who are willing to take the necessary steps in terms of investments in research and development (R&D), operational tools, organizational setup and skillset to rapidly adopt Cloud RAN and stay ahead of the curve. The end goal is to become cloud-native, but since this is a long-term journey, they will be in a bluefield environment, with both architectures in their network, for some time. These CSPs understand cloud native is not yet another technology, but a wider process of change management, in order to set the baseline for a more efficient business and operating model.

The curious explorers – these CSPs want to selectively deploy Cloud RAN where it is most beneficial for them and their customers, while keeping purpose-built as their main choice of architecture. Even though their end goal is different from the cloud-native telcos, they will also be in a bluefield deployment, capturing the benefits of what they already have installed while adding new, cloud-based technologies. These CSPs are exploring and assessing the change management process in order to identify the best potential setup for their business. They want to proceed with caution on the required changes for an optimal business environment.

Purpose-built optimizers – these CSPs have the main focus of evolving the purpose-built RAN, optimizing network performance and operational efficiency with an increasing degree of automation. Additionally, they are looking to efficiently leverage the installed base, while adding capacity as traffic grows and more spectrum is deployed.

Below is an outline of what each type of CSP will have to consider across the areas of infrastructure, network automation and organization to evolve according to the specific path chosen.

	Cloud-native telcos Make the R&D, operational and skillset investments to adopt Cloud RAN early on	Curious explorer Selectively deploy Cloud RAN where it is most beneficial	Purpose-built optimizer Continue with and evolve purpose-built RAN
Infrastructure	Define objectives and targets with the migration and overall timeline Choose the right Cloud RAN infrastructure to realize key use cases and deployment scenarios Have the right systems and capabilities in place Identify potential partnerships with hyperscale cloud providers	Evaluate technology options for private and public cloud deployments Assess business cases and timing for a potential broader Cloud RAN deployment Define how to best introduce Cloud RAN stepwise in the network, for instance in a new frequency band or with the centralized unit (CU)	Invest in flexible architecture that optimizes the total cost of ownership and performance for different deployments and RAN architecture, while supporting a seamless network evolution Aggregate more spectrum in low, mid, and high band Gradually shift capacity towards 4G and 5G
Network automation	Implement a complete transformation of the legacy approach to network operations through automation Evolve to a common operational model that can stitch purpose-built and Cloud RAN together Define a stepwise automation plan	Start evolving to a common operational model for both purpose-built and Cloud RAN Consider introducing automation to the existing purpose-built network while preparing for future Cloud RAN needs for end-to-end orchestration	Leverage Intelligent Automation in RAN Exploit artificial intelligence (AI) and machine learning (ML) in RAN, for automation and performance Optimize processes and tools for streamlined network operations
Organization	Have the expertise needed to procure and manage a disaggregated system Deliver pre-verified solutions and solid network evolution capabilities and skills Invest in training and organizational setup for new ways of working, especially operationally	Use trials and PoCs to build up competence to be ready for later Cloud RAN introduction at scale Learn from the experiences of Cloud RAN frontrunners globally Explore/evaluate how to best transform to new ways of working	Move from traditional operations to automated processes leveraging AI/ML Leverage cloud-native ways of working such as continuous deployment (CD) processes for a faster and more efficient rollout of new RAN software releases

Regardless of the path chosen, careful considerations are needed for each key area – organisation, network automation and infrastructure – in order to achieve a successful network evolution.

04 Scenarios and benefits from both Cloud RAN and purpose-built

To understand where a Cloud RAN introduction would make sense, let's have a look into a few examples of common network evolution scenarios and explore the different benefits from both a Cloud RAN and purpose-built perspective in each.

Distributed deployment of radios
As 5G adoption picks up globally, deployment of radios is key. With beamforming capable radios, it is possible to achieve both extended coverage as well as increased capacity to provide the superior experience we aim for with 5G. In many cases, IP backhaul to sites is sufficient, and purpose-built distributed RAN will be the most cost-effective solution thanks to the low incremental cost of deployment, energy efficiency and form factor tailored to fit existing base station sites.

For this reason, the majority of CSPs following the **curious explorer or the purpose-built optimizer** paths will continue with a purpose-built network architecture in this scenario.

However, CSPs that seek a **cloud-native** path could deploy Cloud RAN with distributed DU and centralized CU. This will deliver high network performance – albeit at the expense of, for example, a somewhat decreased energy efficiency when compared to purpose-built, while adding an increased system integration complexity. The key potential benefit in this case would be having a more unified operational model.

Centralized RAN deployment
In a Centralized RAN (CRAN) deployment, the RAN compute or Cloud RAN DU function is deployed at a central location, such as "central offices", using packetized fronthaul connectivity.

For both purpose-built and Cloud RAN architectures, at the cost of adding the fronthaul connectivity, there are benefits in terms of scalability of compute resources – dimensioning-wise over time, to dynamically handle peak traffic loads and to achieve pooling gains across a large number of (low load) cells. This translates into cost efficiency, since there is a reduced need for spare capacity in cell sites to handle peak loads. Additionally, capacity can easily be added with fewer and less costly site visits for the network operations team.

In addition to the general CRAN benefits, the Cloud RAN architecture fits very well with such a "far edge" data center deployment. Besides the scalability of server capacity, cloud infrastructure resilience and software upgrade mechanisms can be exploited for a high network reliability as well as the possibility to deploy the Cloud RAN CU with local or geographical redundancy. The CSP can also choose to leverage the far edge data center for other types of network functions or applications, for instance to achieve a very low latency, and the location of DU and CU functions can be separated so that CU is deployed on even more central (edge) data centers.

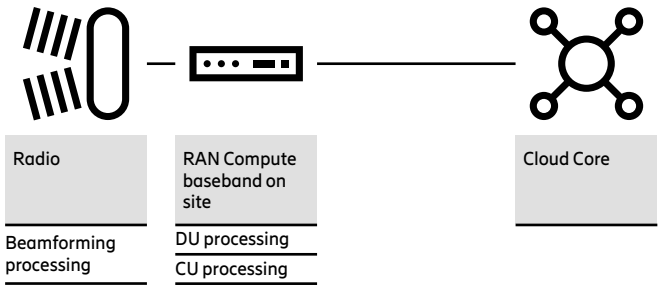
For this reason, many CSPs in the **cloud-native** and **curious explorer** path will implement Cloud RAN architecture in this scenario.

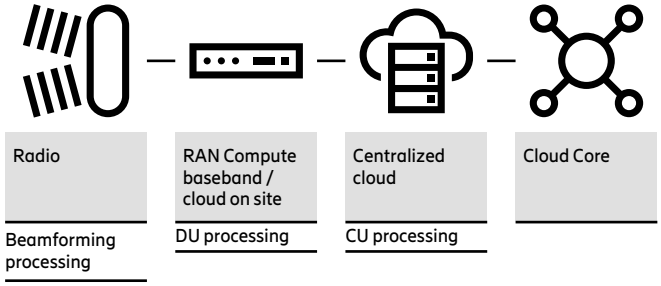
For CSPs taking the **purpose-built optimizer** path, the improved capacity and interoperability of purpose-built basebands can be realized through a CRAN deployment to deliver reduced site rental, energy consumption and site visit costs, making it an interesting solution to explore for CSPs deploying purpose-built hardware.

Enterprise and industry location
As mentioned, Cloud RAN is well-suited for on-premises network deployments or private capacity networks where a 5G network is dedicated for an enterprise customer. The 5G RAN functions can run on the same type of infrastructure that the enterprise customer already uses, which gives them the flexibility to operate it the way they prefer. Enterprises can add servers if they need to increase capacity and, if the Cloud RAN is deployed in their IT environment, they can easily spin up another compute instance in the data centers. In addition to the scenario above, the network Core could also be deployed on-premises, which makes it possible to secure sensitive and sovereign data locally and cater for low-latency use-cases.

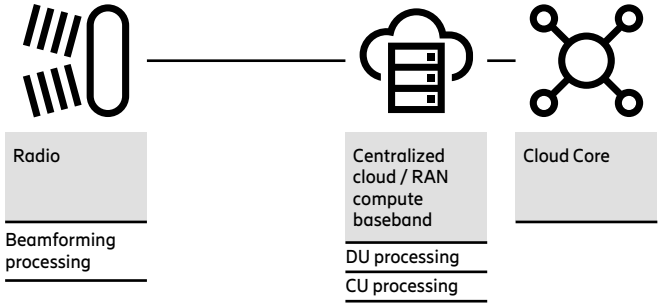
For this reason, CSPs in the **cloud-native** and **curious explorer** path can use this scenario as a way to explore new enterprise and industry business opportunities based on Cloud RAN. For CSPs taking the **purpose-built optimizer** path, enterprise and industry solutions can continue to be addressed with purpose-built, as a combination of macro network coverage complemented with indoor solutions leveraging purpose-built hardware to add local capacity and coverage.

Distributed deployment of radios

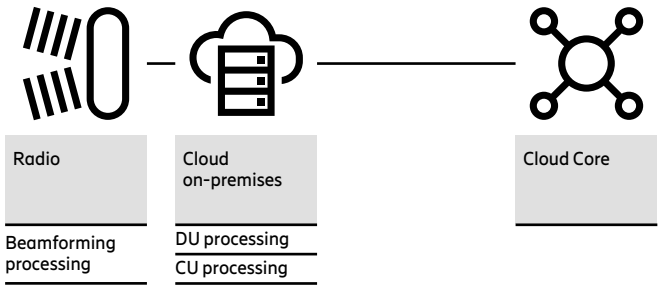




Centralized RAN deployment



Enterprise and industry location



To understand the scenarios and how Cloud RAN is practically deployed, let's take a look at the different RAN functions that are needed to run in a mobile radio network. In a Cloud RAN deployment, these can be placed in different locations depending on context and situation.

RAN Radio Unit (RU)

The RU is located close to the antenna and hosts the radio functions, such as beamforming for massive MIMO. The RU requires significant processing resources and is very time-critical; it needs purpose-built hardware and close proximity to the antenna.

RAN Digital Unit (DU)

The digital unit handles radio link control, medium access protocol and the physical layer. The RAN DU requires high-performing hardware, especially when carrier bandwidth is increased.

RAN Centralized Unit (CU)

RAN CU handles the control and user plane. The processing need scales with the number of users and the user throughput, and is not as time and performance critical as other parts of the RAN functionality.

In these scenarios, the different functions are processed on different types of hardware and at different locations.

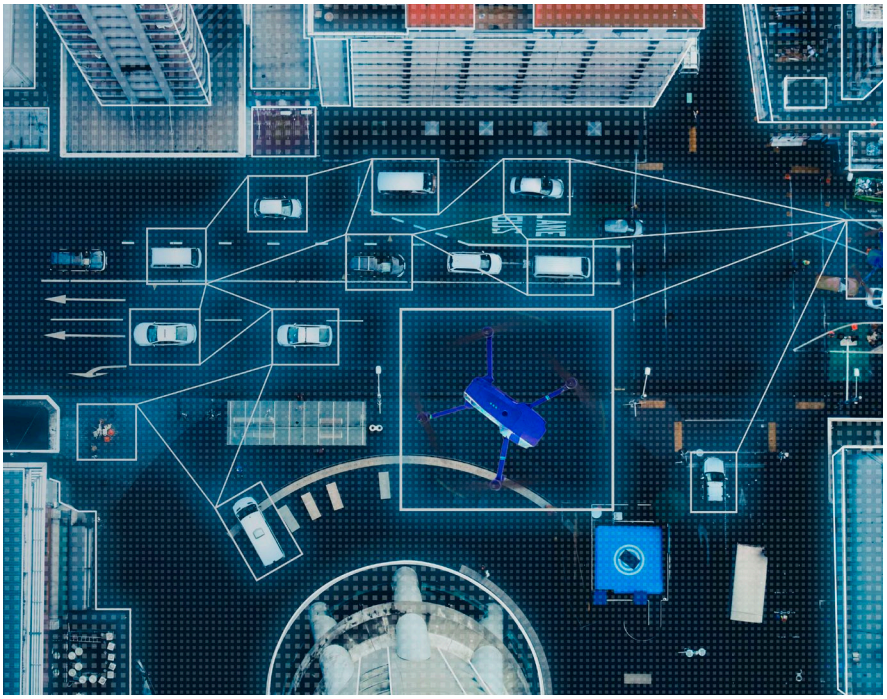
Cloud RAN as an enabler of future use-cases and revenue streams

The benefits in the scenarios above provide strong arguments and compelling deployment use-cases to consider Cloud RAN in the short- to mid-term. Going forward, with a trend towards more distributed cloud infrastructure, private networks, and indoor 5G deployments, new opportunities and use-cases that benefit from low latency and processing at the edge will emerge.

With a Cloud RAN architecture in place, CSPs have opportunities to further expand their offering and create a range of new services, primarily for enterprises – on-premises and network wide. By combining RAN, core and the enterprise applications in a joint solution, CSPs can offer highly secure, robust and low latency services to the enterprises, either on their own private cloud or in partnership with hyperscale cloud providers (HCPs). The CSP could offer this infrastructure to the enterprise as a service, enabling local breakout and orchestrating the performance of both the local network and the applications, creating a whole new type of revenue stream in addition to the traditional mobile broadband offerings.

05 Success factors for network evolution

Independent of the path chosen, a successful network evolution will need to deliver best-in-class user experience while achieving efficiency, reliability, and security for CSPs. For most CSPs, this means that they will evolve their purpose-built architecture while complementing it with a Cloud RAN architecture and ensuring they work together seamlessly.



These are the key building blocks we believe are needed to make the network evolution successful:

Future-proof and compatible portfolio
Going forward, it is crucial for CSPs to reduce the need to rip and replace existing technology, for CSPs, both for sustainability and cost reasons. To ensure this, their radios must work with both Cloud RAN and purpose-built architecture, have equal performance on both and deliver capabilities such as 5G mid-band, 5G standalone, network slicing and service exposure. This, in practice, means that the installed radios can also be leveraged if the RAN architecture changes, for example from DRAN to CRAN, or from purpose-built to Cloud RAN.

Deep interworking
To make bluefield deployments a reality, CSPs will need tight interworking between the different 5G network architectures – Cloud RAN and purpose-built. For example, it is important that features such as carrier aggregation and dynamic spectrum sharing work seamlessly across both architectures to ensure maximum network performance.

Common operations and automation
Regardless of Cloud RAN or purpose-built, intelligent automation and integration is imperative to deliver high performance and customer experience. The explosion of use-cases, data hungry applications, diverse devices and new security demands creates a complex landscape that requires automation and integration at scale.

Having a common, cloud-native management system across the RAN, Core and IT domains will be key for CSPs to keep operating expenses (OPEX) in check as they transition towards Cloud RAN. Here, cloud-native will enable the introduction of, for example, automated software management of software and AI for network operations, common security monitoring and compliance management.

In addition to that, with a move to Cloud RAN, CSPs also need to secure the required expertise, invest in employee training and education, and either establish an independent organizational setup to manage the cloud infrastructure or outsource it. In this area, learning from the experiences of Cloud RAN frontrunners globally, as well as from cloud-native Core and IT deployments, could be beneficial for a successful transformation.

06 The part Ericsson plays

Ericsson recognizes the diversity of network evolution paths that CSPs may follow and is constantly working to support them and ensure their success. We have therefore introduced Ericsson Cloud RAN to bring cloud-native innovation to our portfolio and complement the proven and highly-optimized purpose-built RAN Compute portfolio. Ericsson Cloud RAN is built to work seamlessly with our RAN Compute portfolio, and is designed to provide the same quality, features and performance that CSPs expect from us in the purpose-built area. In addition to that, we are also introducing pre-integrated solutions – for example, system-verified, validated on – that allow for easier and faster deployment as well as functionality, resilience and even performance guarantees in certain configurations.

Innovation with the Ericsson Cloud RAN portfolio

The Ericsson Cloud RAN portfolio is world-class with high performance, flexibility and scalability, enabling service providers to evolve towards cloud-native technologies and open network architectures. Our Cloud RAN solutions are designed according to cloud- native principles and to run on any cloud environment, allowing for increased deployment flexibility. Ericsson also has a full suite of supplementary, intelligence-powered network services that will assist the CSP throughout the entire Cloud RAN journey, covering everything from site design and engineering to continuous pre-emptive support and network optimization. These aim to facilitate onboarding onto the service provider's cloud infrastructure of choice. Our key differentiators and their benefits include:

- **Backward compatibility with the installed base of 5G radios** – With a large installed base of 5G radios, we acknowledge the importance of backward compatibility, which is a fundamental principle in our Cloud RAN development. The Ericsson Cloud RAN portfolio supports 5G on both classic low-band and new 5G bands (e.g., mid-band) deployments, including Ericsson's industry leading Massive MIMO radios with Ericsson Uplink Booster for increased 5G performance. Additional to this, Ericsson's packet fronthaul products include the conversion of Ericsson CPRI to Ericsson eCPRI to further enable the reuse of the installed base of 5G radios.
- **Greater scalability, pooling, and faster time to market** – Our solutions are built as fully **cloud-native software**, bringing greater scalability, pooling, and faster time to market for new services.
- **Controlled operational costs (OPEX) while migrating to Cloud RAN** – The **Ericsson Intelligent Automation Platform**[3] brings AI-powered automation to the network across both Cloud RAN and purpose-built. With a common system for both architectures and strong automation capabilities, we help CSPs to keep OPEX in check as they transition towards Cloud RAN.
- **The best out of both RAN worlds** – With **Ericsson Cloud Link**, we bring the worlds of purpose-built and Cloud RAN together. It makes features such as Ericsson Carrier Aggregation and Ericsson Spectrum Sharing work across both architectures. As a result, there is no need to choose between the deployment flexibility of Cloud RAN and continuing to leverage the purpose-built installed base.
- Cloud RAN is inherently open, which calls for a broader **ecosystem approach** with partnerships and collaborations to bring maximum benefits to our customers. Openness also requires new considerations for security, and while Cloud RAN has built-in security functions, CSPs will also have the opportunity to use the security functions in the cloud platform where beneficial. Ericsson joins forces with **multiple leading cloud technology partners** and is actively engaging and collaborating in **open-source initiatives** to shape the Cloud RAN technology roadmap, server solutions, and cloud software platforms. Together, our strong partner ecosystem will drive and shape the best technology solutions in terms of security, standardization and integration, while giving customers the option to select from a wide range of hardware options.

3 Read more on: www.ericsson.com/en/ran/intelligent-ran-automation/intelligent-automation-platform

Evolution of purpose-built into the future

Ericsson's vision for RAN Compute is to deliver products that enable CSPs to build best-in-class performance networks with the smallest footprint and lowest power consumption, coupled with a high level of automation in operations. Our key differentiators and their benefits include:

- **Faster and more energy efficient RAN** – Our RAN Compute portfolio is powered by our custom-made **Ericsson Silicon**, a System on a Chip solution that handles the massive compute load that comes from 5G. The tight co-design of Ericsson Silicon with hardware and software enables the creation of high-performing, energy-efficient and light-weight products for a **wide range of deployment scenarios**, today and in the future. Ericsson Silicon is **40–50% faster than industry average and between 20–25% more energy efficient**. In addition to this, we continue to invest in R&D and leverage our expertise in designing purpose-built telecom solutions to deliver best-in-class products and services that seek to break the energy curve.
- **Suitable for most deployment scenarios** – The breadth of the RAN Compute portfolio makes it one of the most **comprehensive** on the market, suitable for **most deployment scenarios** that our customers will encounter, regardless if it is a matter of capacity, coverage or footprint on existing sites. Its modular architecture makes it possible to fit every site's needs.
- **Secure from the ground up** – Security is built-in at the heart and from the start in our RAN Compute portfolio. Starting from our custom silicon, the RAN Compute is secure from the ground up. Electronic fuses (eFuses) prevent tampering and access to the crypto keys. At the same time, the security algorithms forge an unbroken chain of trust to mitigate risk of unauthorized access to sensitive information and data.

Key conclusions

The network evolution journey is unique for every CSP, and so is the optimal pace of transformation. When looking into the RAN, both Cloud RAN and purpose-built provide the means needed to evolve the 5G networks and enable new 5G use cases and applications. Finding the right combination between the two architectures and getting the most out of each, is the main challenge to overcome and master. It is key to understand where, how and why these architectures can be used to evolve CSPs networks to support and drive their business objectives.

Ericsson supports CSPs' 5G network evolution with the introduction of Cloud RAN in parallel with the continued evolution of the purpose-built architecture. Having both architecture choices at hand, and with seamless interworking using Ericsson Cloud Link, CSPs can ensure a gradual network evolution. With this flexibility there is no need to disregard already made investments in your installed base. Optimize your purpose-built, selectively deploy Cloud RAN or go all-in on Cloud RAN, while using the same cloud-native management and orchestration across Core, IT and RAN. Re-invent purpose-built and innovate with Cloud RAN with Ericsson as a partner in your 5G network evolution journey.

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