About this report

This report outlines why operators should consider implementing a common virtualised radio access network (vRAN) cloud to support both the distributed vRAN architecture options that they are likely to need and the advanced enterprise (Industry 5.0) applications that are on the horizon.

It also provides recommendations for operators (traditional mobile network operators (MNOs) and new deployers of 5G) and, by implication, vRAN and cloud technology vendors.

It is based on several sources:

- Analysys Mason's internal research and operator survey
- interviews with stakeholders in the cloud RAN market.

KEY QUESTIONS ANSWERED IN THIS REPORT

- Why do operators need a single horizontal cloud for all vRAN functions?
- What are the challenges associated with building a vRAN cloud?
- How and where should vRAN be supported with edge cloud?
- What is the business case for vRAN cloud? Does it enhance operators' business case for other edge-based services?
- What are the technology considerations when building a vRAN cloud?

WHO SHOULD READ THIS REPORT

- Operator vRAN planning and procurement departments that need to understand the trade-offs of different vRAN splits and the benefits of horizontal cloud.
- Operator network cloud development and operations groups that need to understand the implications of running RAN functions on a cloud.
- vRAN function vendors that wish to understand operator thinking and business cases.
- Vendors of cloud stack technologies that want a view of the likely market for their products, and chip technology developers with focus on accelerators for vRAN.
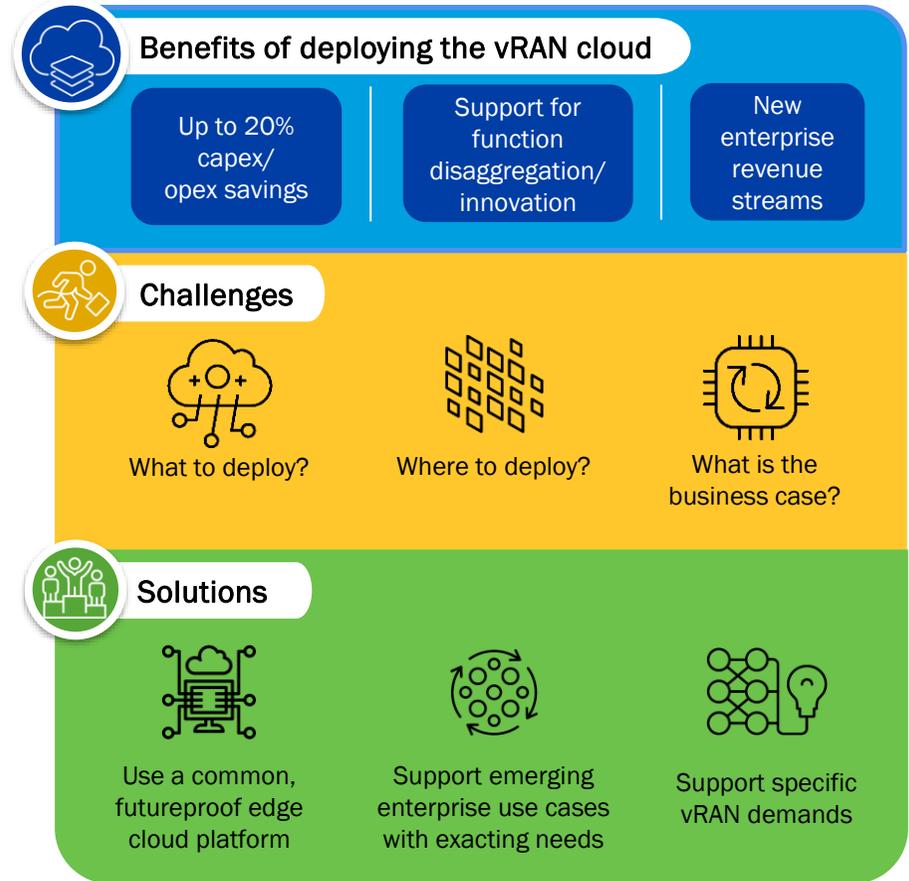
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Executive summary

Operators are putting their collective investment in RAN virtualisation (forecast to reach USD22 billion by 2025) at risk if they do not deploy a horizontal cloud for vRAN. Solving vRAN cloud challenges will open up a market for new enterprise applications, thereby maximising operator return on vRAN cloud investment.

The disaggregation of RAN functions will increase deployment flexibility and broaden the pool of RAN vendors. Operators must develop a cloud strategy at the edge of their networks in order to implement the vRAN; this is a greenfield area for cloud and has stringent requirements that present significant risks, but also large rewards if operators can meet them. The rewards include access to a market for enterprise services for the far edge that will be worth USD23.5 billion by 2030.

KEY RECOMMENDATIONS

1. Operators should plan for a common, multi-vendor edge cloud that will run all disaggregated RAN functions.

2. Operators should push the market to create a cloud platform that is capable of supporting the stringent, unique requirements of a vRAN.

3. Operators should collaborate with the right partners to accelerate the development of the advanced enterprise use cases that will benefit from vRAN edge cloud.

Figure 1: Overview of the benefits of deploying the vRAN cloud, plus the challenges and how operators can overcome them

Benefits of deploying the vRAN cloud

Up to 20% capex/opex savings

Support for function disaggregation/innovation

New enterprise revenue streams

Challenges

What to deploy?

Where to deploy?

What is the business case?

Solutions

Use a common, futureproof edge cloud platform

Support emerging enterprise use cases with exacting needs

Support specific vRAN demands

Source: Analysys Mason

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Challenge: operators will struggle to reap the benefits of their collective investment in RAN virtualisation without a vRAN cloud that is fit for purpose

Operators that want to cloudify and disaggregate the RAN to reduce costs and boost vendor innovation will struggle to apply IT technologies that have been developed for centralised, best-effort processing to address the specialised needs of the RAN.

Operators' vRAN capex is at stake (totalling over USD19 billion cumulatively by 2025). This sum will include USD8 billion of spending on the vRAN cloud. To deliver a full return on investment, the vRAN cloud must:

- be flexible enough to accommodate RAN functions from multiple vendors (and potentially enterprise applications)

- be highly distributed, potentially to many thousands of edge locations; this is a departure from centralised clouds today

- support the very demanding processing requirements of the 5G RAN's real-time functions, such as beamforming

- be based on heterogeneous architecture with multiple accelerators, but retain openness and programmability

- be highly automated to achieve vRAN cost efficiency targets

- be horizontal to support many functions in addition to vRAN.

Horizontal cloud enables scalability and modern software design and automation to be applied to a high-cost, highly proprietary area of the network, but it will be disruptive to deploy and will require significant investment early on.

Figure 2: Spending on network edge cloud for vRAN (excluding services), worldwide, 2019–2025[1]

Source: Analysys Mason
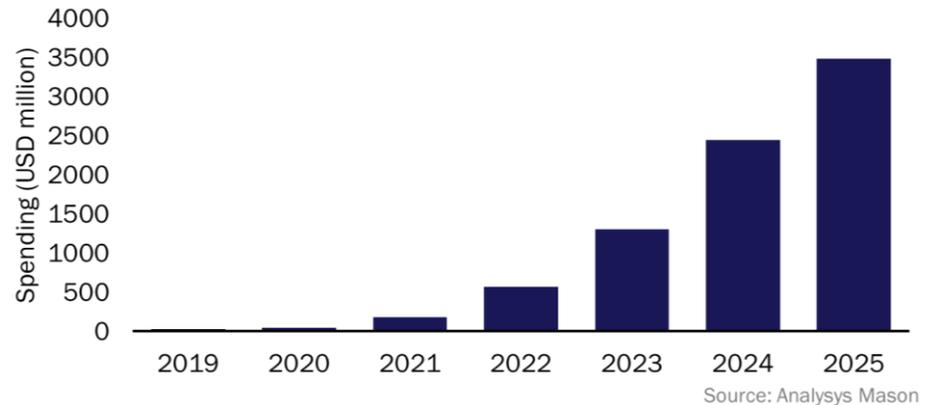
Figure 3: vRAN capex, worldwide, 2019–2025[2]

Source: Analysys Mason

[1] For more information, see Analysys Mason's Network cloud infrastructure: worldwide forecast 2020–2025.
[2] For more information, see Analysys Mason's Telecoms capex: worldwide trends and forecast 2017–2026.

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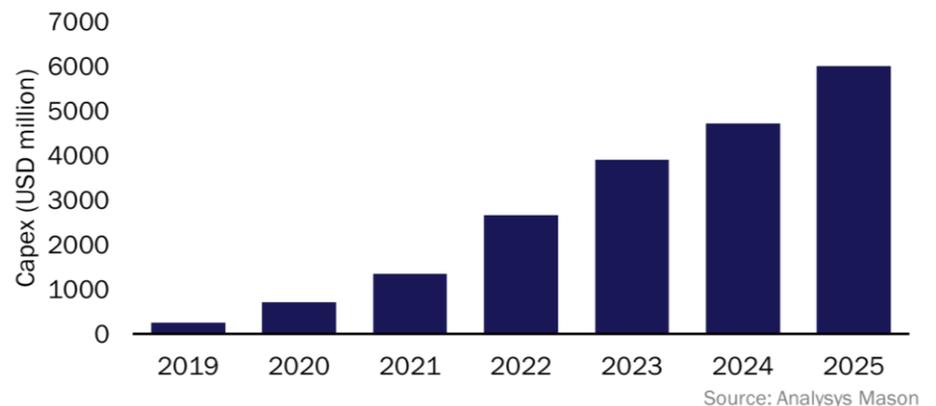
Solution: operators need to start planning, at this early stage in the vRAN market, for a horizontal edge cloud that delivers cost benefits now and revenue in the future

Operators should futureproof themselves by deploying a horizontal edge cloud that is independent of RAN functions for scalability and cost reasons. Such a cloud should also support enterprise use cases in order to improve ROI.

Operators will gain the greatest benefits from the cloud-based disaggregation of RAN functions if they plan for an edge cloud fabric that can be flexibly and easily rolled out to all the required locations in both the near term and the future. We expect that the vRAN will be largely centralised in the near term, but it will become increasingly distributed in the longer term as more RAN functions become virtualised close to the cell site.

vRAN will need a cloud that is different to those that have been deployed to support centralised network functions so far as vRAN components become more distributed and antenna and spectrum requirements more demanding. Operators need to push the market to resolve the challenges facing vRAN cloud.

vRAN cloud will be difficult and expensive to develop, so operators should align it with the emerging enterprise demand for an edge cloud to run new operational technology (OT) use cases that revolutionise the customer experience and/or shorten business decision times. Enterprises want an edge cloud that can support industrial applications with low latency and security needs that are similar to those of vRAN functions. Operators can mitigate vRAN cloud build-out costs by tapping into the enterprise market for far edge cloud services (worth USD24.5 billion by 2030).

Figure 4: Far edge enterprise service revenue, worldwide, 2019–2030

2019–2030 CAGR: 104%
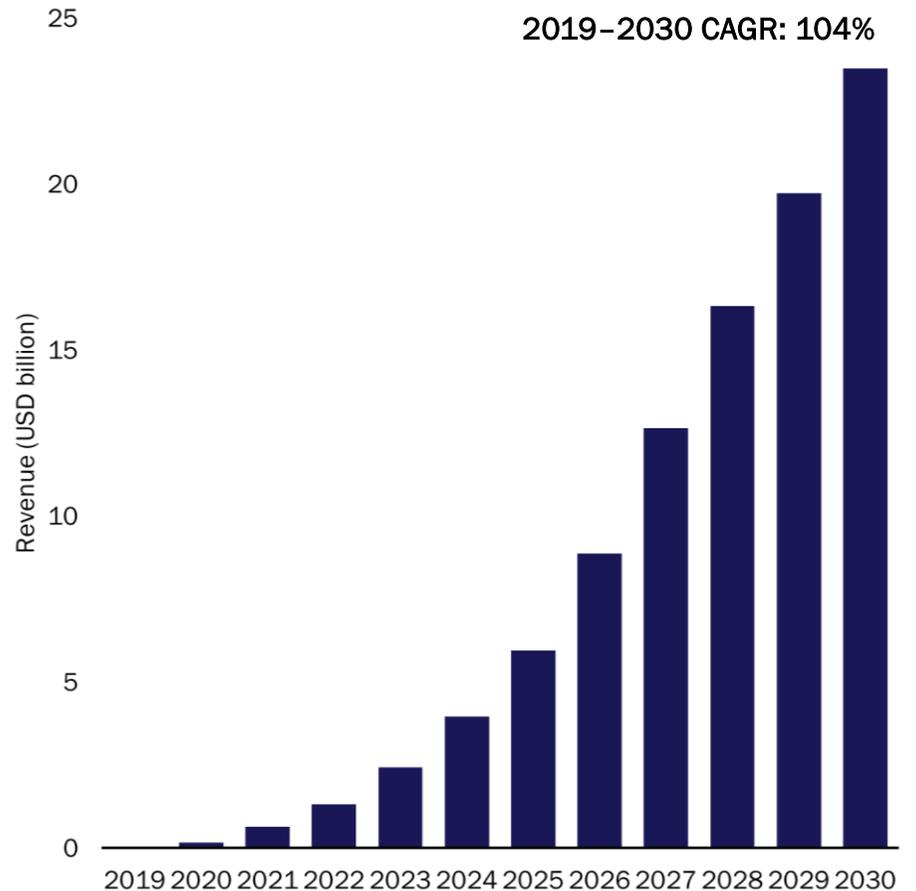
Source: Analysys Mason

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Recommendations

1

Operators should plan for a common, multi-vendor edge cloud that will run all disaggregated RAN functions.

Operators are aiming to reduce their RAN cost of ownership by 26% after 5 years of virtualisation, but to achieve this, they must implement edge cloud architecture that has the potential to scale up (and down) and to support the full range of RAN network deployment models (3GPP functional splits). The latter will demand a greater distribution of RAN functions across network locations over time, as well as the opening up of the RAN vendor ecosystem.

2

Operators should push the market to create a cloud platform that is capable of supporting the stringent, unique requirements of a vRAN.

The cloud cannot yet support the highly distributed, ultra-low-latency and demanding network processing needs of a vRAN. Operators must seek changes at every level of the cloud stack. For example, they should demand cloud support for hardware acceleration technologies and bare metal, orchestration approaches for real-time workload scheduling in constrained edge locations and real-time versions of key cloud-native technologies.

3

Operators should collaborate with the right partners to accelerate the development of the advanced enterprise use cases that will benefit from vRAN edge cloud.

Many of the monetisation opportunities that justify the difficult transformation to vRAN are only just emerging in the enterprise sector to support new Industry 5.0 use cases. Our enterprise edge research has highlighted how much these investments are focused on entirely new applications, but to take a key role in enabling them, operators will need to collaborate with strong partners with the right vertical and/or platform experience.

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Why vRAN cloud will be hard to achieve

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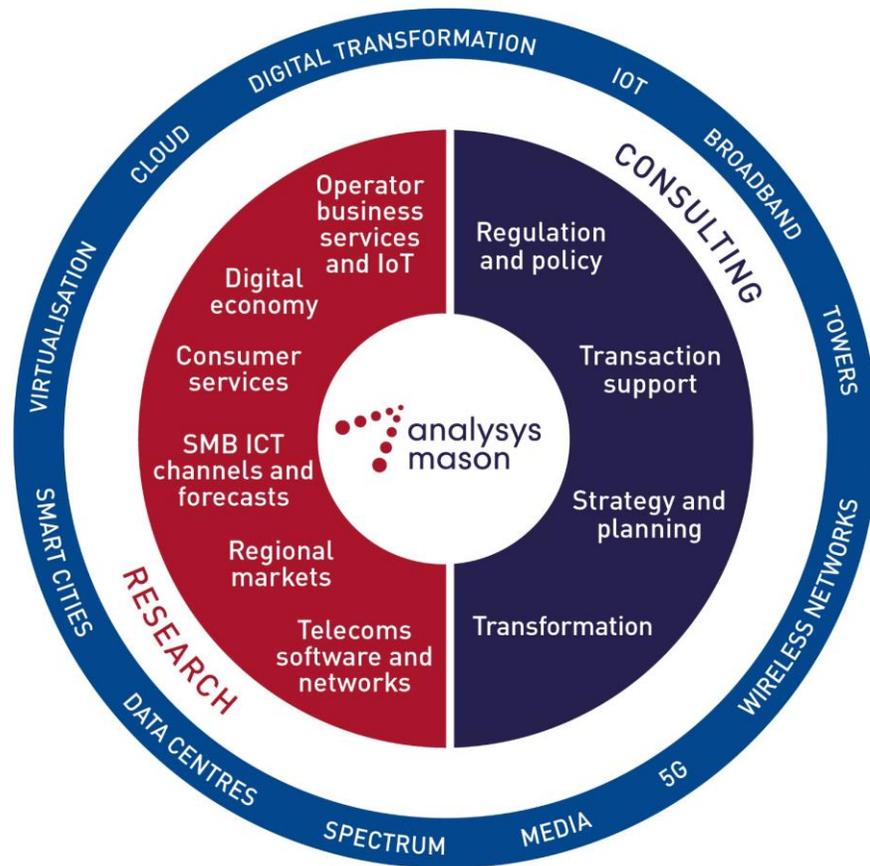
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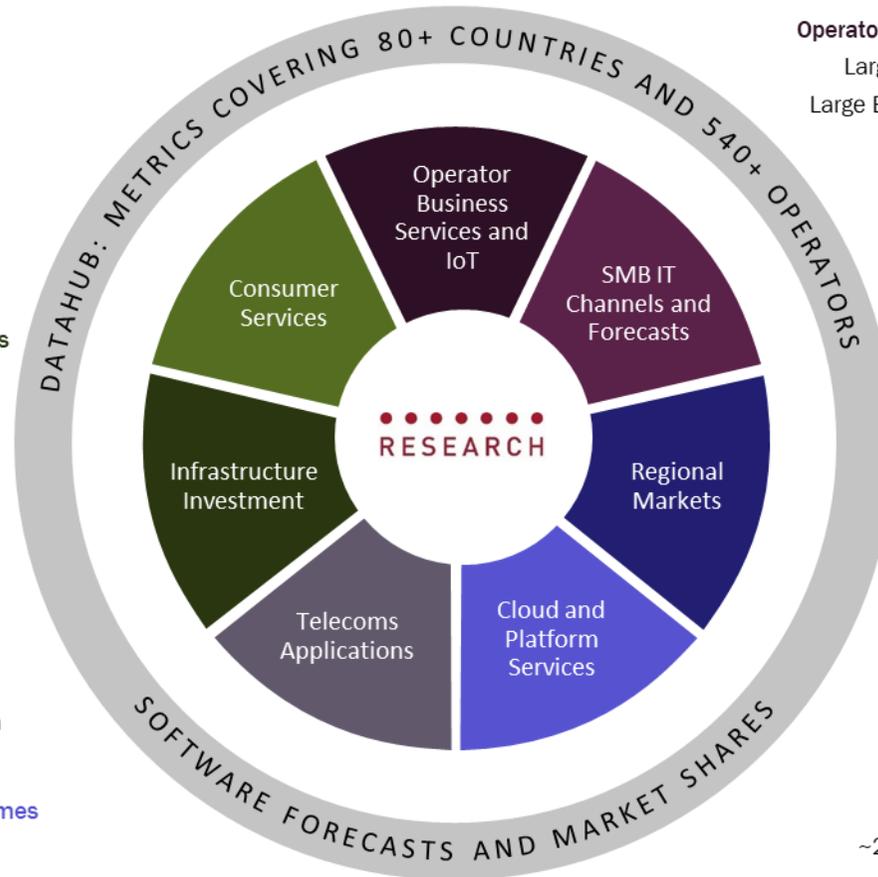
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Large Enterprise Emerging Service Opportunities
SME Strategies
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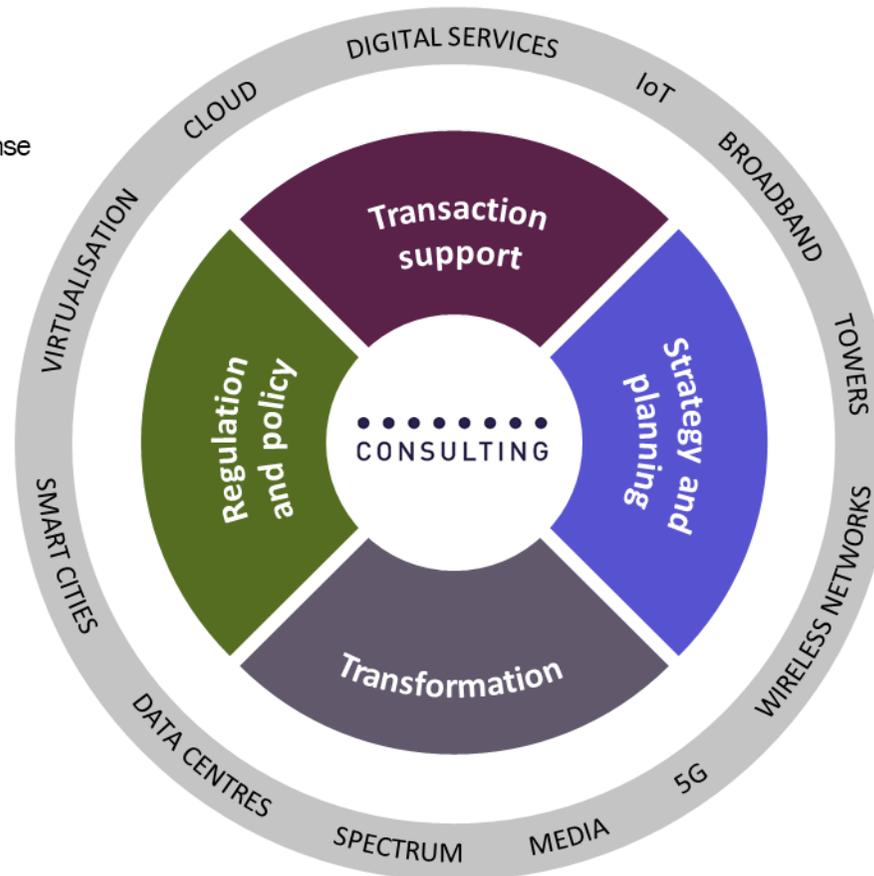**Regulation and policy**

Policy development and response

Ex-ante market reviews, remedies, costing…

Universal Service Obligation (USO)

Scarce resources: radio spectrum management, auction support, numbering…

Ex-post / abuse of dominance

Postal sector

Transformation

Transformation programmes

Assurance

Implementation

Delivery

Transaction support

Commercial and technical due diligence, buy-side and sell-side

Initial public offerings (IPOs)

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Debt financing

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Commercial expertise

Technology optimisation

New digital frontiers

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