



Opportunities and threats for operators in the edge computing value chain



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About this report

This report provides a uniquely detailed map of the market landscape for operators that want to offer edge computing services. It outlines three roles that operators can choose from in the value chain, and provides recommendations for operators in each scenario, including the optimal technology investments and partnerships. The report will be valuable for senior strategists and decision makers focused on telco cloud or 5G markets.

The report is based on a rich variety of sources:

- Analysys Mason's internal research, including capex forecasts to 2025, and our survey of 78 operators (conducted in 2Q 2018 to understand their edge compute deployment plans and drivers).
- extensive interviews with stakeholders including vendors, service providers and industry alliances.

KEY QUESTIONS ANSWERED IN THIS REPORT

- Which use cases and industries will drive investment in edge compute, both in the near and longer term?
- How can operators leverage their physical assets to take a position in the edge value chain?
- What competitors and threats will operators face as edge-enabled services diversify?
- What are the roles that operators can play in the value chains associated with different edges, and what decisions do they need to make to assume those roles profitably?

GEOGRAPHICAL COVERAGE	CASE STUDIES
<ul style="list-style-type: none">▪ Worldwide	<ul style="list-style-type: none">▪ Akraino▪ C-Plane.ai▪ EdgeX Foundry▪ ETSI MEC▪ MobileEdgeX▪ OpenFog Consortium▪ Packet▪ Rafay Systems▪ Telstra▪ Vapor IO▪ Verizon

WHO SHOULD READ THIS REPORT

- Senior strategy or CTO executives within operators; enterprise and vertical division management; vendors of edge compute hardware and software enablers.

Executive summary

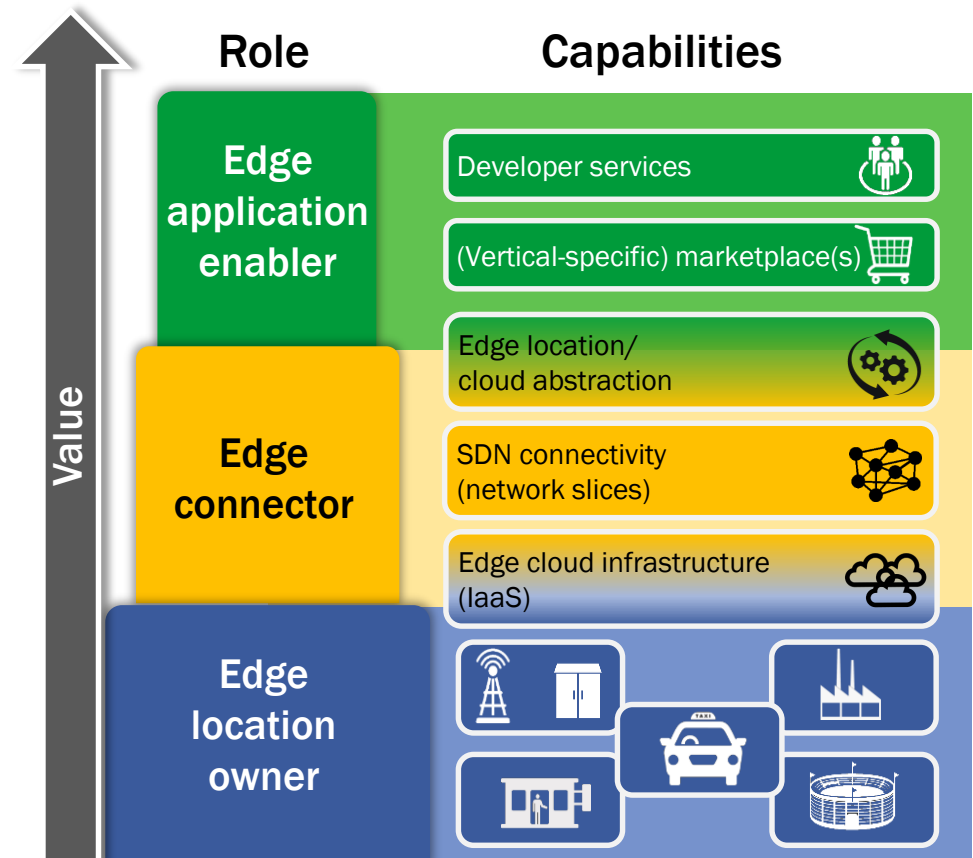
The edge is a set of network-connected cloud locations for content delivery and application processing deployed close to users (<20 milliseconds), spawning a new and complex value chain. Operators can play various roles in the value chain, each of which can expand to increase the scope of the addressable opportunity.

- As **edge location owners**, operators can remain net-centric, aligning their edge strategies with their edge locations, such as central offices, and a multi-edge computing (MEC) world view.
- As **edge connectors**, operators can use network virtualisation (NFV and SDN) to provide connectivity to any edge, including those beyond their net-centric locations.
- As **edge application enablers**, operators can build edge application developer ecosystems to drive new service revenue.

KEY RECOMMENDATIONS

1. Operators should decide on their primary business driver for edge computing, which will determine the optimal role for them to play in the value chain.
2. Whichever role they aspire to, operators must explore edge cloud and vertical partnerships to protect their edge business from increasing competition and to drive new revenue.
3. Operators that have advanced virtualisation capabilities should leverage this advantage quickly to move up the value chain to become edge application enablers.

Figure 1: The three roles in the edge value chain build on one another and are based on digital infrastructure and automation capabilities



Source: Analysys Mason



Challenge: Operators need to position themselves to take advantage of an edge computing opportunity driven by 5G, IoT and new app development

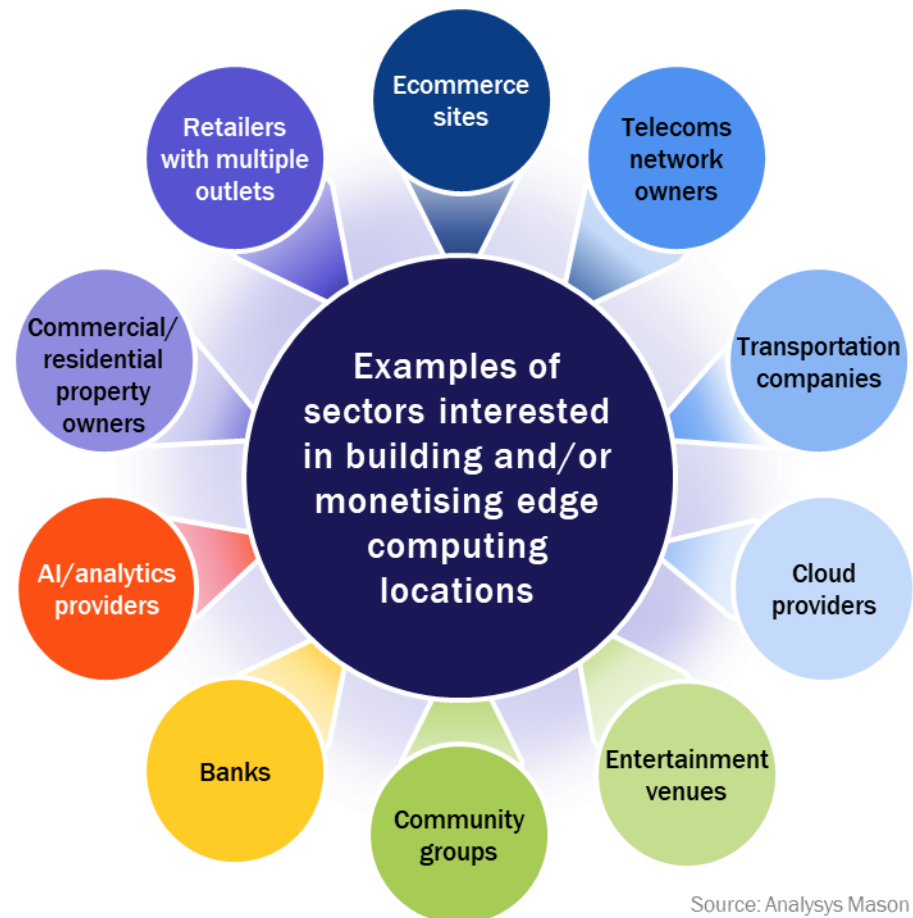
The 'edge' is a new and vast frontier in cloud computing and operators must establish how best to colonise this space using their existing network locations and virtualisation capabilities.

The new cloud computing frontier is opening up as cloud-native applications are developed in an increasingly distributed way, with microservices that need to run very close to users to support optimal quality of experience or real-time transactions. IoT, AI/analytics, ecommerce, advertising and many other types of IT application are driving the demand for shared cloud compute locations that are closer to users than public cloud providers' massively centralised data centres.

The edge computing market is emerging in parallel with operators' own needs for edge locations, which correspond to network virtualisation developments (such as Cloud RAN and 5G core). 'Net-centric' operators are identifying edge locations for virtualised network functions (VNFs) based on owned real estate (such as towers and central offices). These operators plan to monetise the compute capability that they install in such locations by selling it to IT application developers. Operators will own a small subset of the total number of edge locations.

Network virtualisation enables 'app-centric' non-operators to install VNFs in – and provide connectivity from – their edge locations, which may be more convenient for IT application providers than the operator-owned edge. Operators must understand and mitigate the challenges that they face from alternative, SDN/NFV-enabled 'app-centric' edge computing players.

Figure 2: 'App-centric' potential edge location providers outnumber 'net-centric' operators



Source: Analysys Mason



Solution: Operators must decide which role they should play in edge computing and understand the implications of this choice

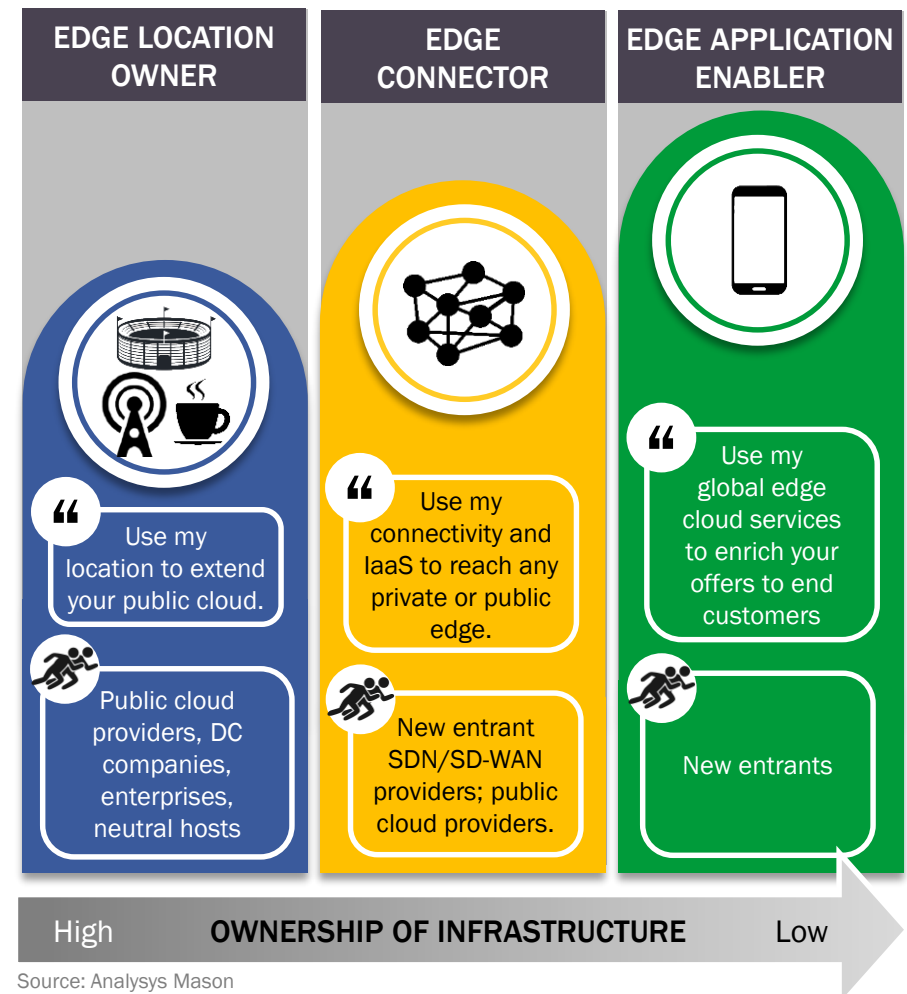
Operators should decide on a strategy for edge computing that suits their business model and virtualisation capabilities, bearing in mind the competitive threats inherent in each role.

Traditional operators that wish to leverage physical assets by adding compute to existing network locations can play the role of an **edge location owner**. This option opens up these locations to customers such as web-scalers, as well as third-party edge computing providers. The revenue opportunities for this approach are limited because operator locations will only align with a subset of demand, but this is a good starting point since operators need such edge computing locations for their own purposes.

Operators with SDN expertise can become **edge connectors** by providing a platform that connects private edge locations to their own and/or third-party public (shared) edge computing locations. These operators will need to partner for ubiquity and scale. New entrants are currently proving to be nimble in developing SDN-based platforms that span multiple operators and connect any edge location anywhere.

Operators that have a mastery of network virtualisation, as well as ambitions as digital service providers (DSPs), can become **edge application enablers** by building developer ecosystems and marketplaces that create new service revenue. Edge application enablers will need sophisticated orchestration/SDN capabilities to place applications on appropriate edge locations. Only a few companies will be able to play this difficult role, and early entrants will have a massive first-mover advantage.

Figure 3: Operator roles and competitors in the edge ecosystem



Source: Analysys Mason

Recommendations



1

Operators should decide on their primary business driver for edge computing, which will determine the optimal role for them to play in the value chain.

For some operators, the choice of role to play in the edge computing market will be decided by their existing physical assets, software capabilities and customer profiles. However, operators should be aware of the limitations of this role and consider developing a more-proactive strategy for the future. This strategy may include targeting growth by investing in new locations (for example, indoors) or in new services enabled by virtualisation and microservices.



2

Whichever role they aspire to, operators must explore edge cloud and vertical partnerships to protect their edge business from rising competition and to drive new revenue.

Only a few operators will have all the locations that a strategic partner (such as Netflix) will need. An operator can greatly increase its reach and value by using virtualised connectivity to integrate many third-party edge locations to offer a more-flexible network to support many use cases with different edges. A rich web of partnerships – with edge cloud providers and with key vertical market players – will be essential.



3

Operators that build the ability to orchestrate applications across many edge computing locations should leverage this advantage quickly to move up the value chain to become edge application enablers.

Operators with advanced orchestration capabilities should build revenue-generating services for the edge to add further value before competitors catch up. Operators can occupy pole position in many value chains by becoming 'app-driven' edge-application enablers. In this role, they can serve multiple vertical sectors by aggregating and dynamically orchestrating services across many edges, without necessarily owning any edge locations themselves.



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About the authors



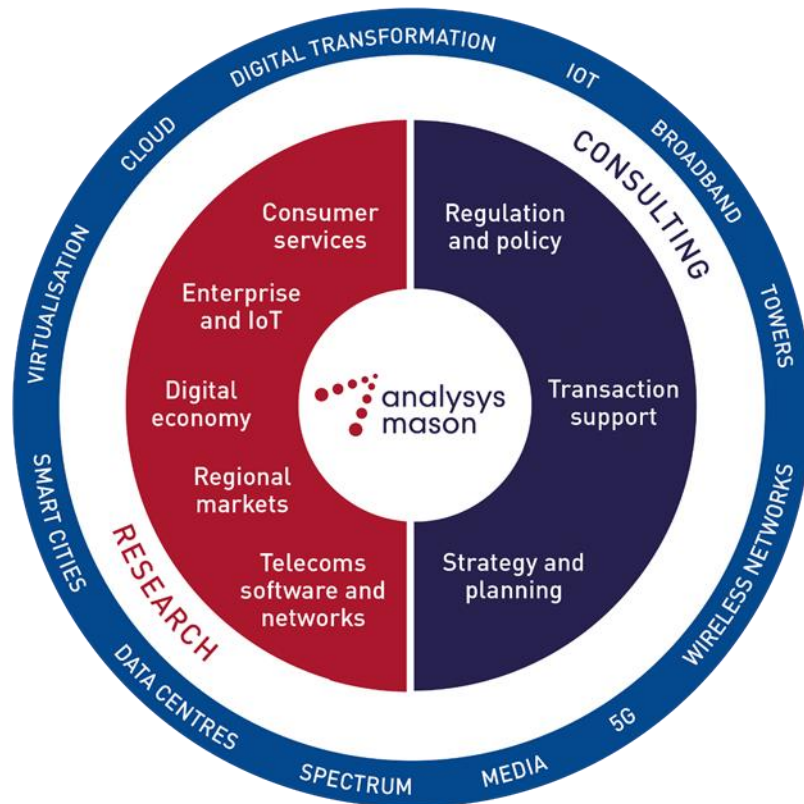
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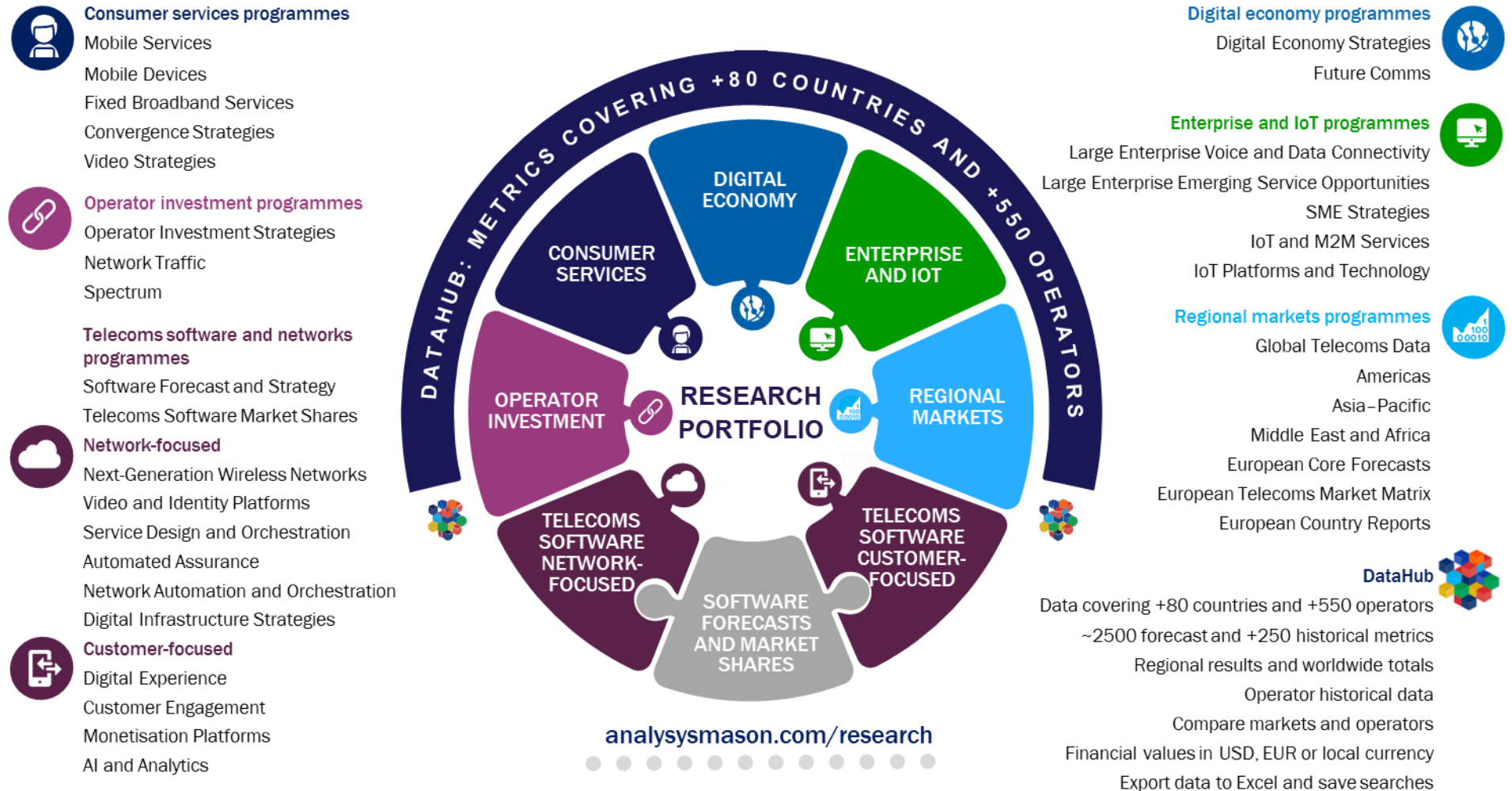
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