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White paper

The critical role of the sliceable platform in 5G monetisation

July 2020

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RESEARCH

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1. Executive summary

Many operators in developed mobile markets have started to deploy 5G networks commercially. However, the second phase of roll-outs will represent a critical juncture for operators' 5G business models. This phase includes the migration to 5G New Radio standalone (NR SA) networks, which will enable a far wider range of services, user experiences and pricing options than the current non-standalone (NSA) networks, which rely on the 4G core.

In contrast with previous mobile generations, the most critical element will not be the RAN itself, but a fully virtualised, sliceable 5G core, which can support a host of applications and industries in an agile way, thereby revolutionising an operator's 5G business opportunity. This will be the keystone of a 5G platform strategy and will recast the network as a set of configurable, programmable functions running on cloud infrastructure. This, together with a common, open framework of developer tools, services and application programming interfaces (APIs) will enable an endless variety of services to be launched as the market requires.

This core is so important that some operators are deploying it even before they upgrade the NSA network, and these early movers have the chance to make significant competitive gains. However, like any major architectural change, the migration also comes with significant risks.

These risks are technical, as operators migrate to radically different cloud-based architecture, but also organisational, since this architecture comes with new processes and skills requirements. They are commercial too, and this is particularly important. It will not be sufficient for 5G to support the enhancement of existing consumer services, though that does bring some incremental benefits. Instead, to justify the considerable investment in 5G deployment, operators in developed markets need to generate additional revenue from familiar user bases by offering new services or better experiences, and they need to expand into entirely new customer bases, mainly in the enterprise, industrial and IoT segments.

To achieve the optimal business outcomes, operators need to firm up several key strategies in parallel, and must decide on the timelines and partnerships to:

- maximise the ability of the first phase of 5G to improve familiar KPIs such as market share and average revenue per user
- lay the foundations for a fully cloud-based network by rethinking organisation, processes, skills, supply chains and partnerships
- harness existing channels and partnerships in specific vertical industries to identify low-hanging fruit for 5G enterprise services
- prepare the groundwork as soon as possible for a cloud-native 5G core, with support for advanced functionality such as slicing, and the flexibility to be a platform for services for a very wide range of customers, industries and use cases.

Putting pragmatic, step-by-step roadmaps in place now, while identifying the strongest use case priorities, will help operators to succeed during the challenging but critical second phase of 5G deployment.

2. Operators are moving to the critical second phase of 5G

History tells us that, while the first phase of deployment of a new technology may attract much of the attention and excitement, the critical period for an operator's business comes with the second phase. There are greater opportunities to transform the business model as the technology evolves, but there are also higher risks because the operator typically takes on greater architectural change and moves out of its service comfort zones.

This was true, for instance, when operators enhanced their 3G networks by adding HSPA. This will be even more true for 5G than for previous generations, because operators' business drivers are changing. Revenue growth for operators in mature economies is typically slowing as conventional mobile broadband and consumer markets become saturated. However, they need to keep upgrading and expanding their networks in order to meet the rising demands for data speeds and quality of experience.

This means that that 5G must deliver on two key commercial imperatives. It must:

- reduce the total cost of ownership so that conventional services can be delivered and upgraded at a lower cost per subscriber, thereby maintaining profit margins even if ARPU growth has stagnated
- support the diversification of revenue streams (including new consumer experiences such as advanced in-car services) by enabling a wide range of enterprise, industrial and IoT use cases to be targeted.

2.1 The first 5G phase brings some immediate but modest benefits

An analysis of the commercial 5G deployments since late 2018 shows that the first-phase networks will only deliver on these key objectives to a limited extent. The first wave of 5G build-outs rely on 5G NR NSA technology, which allows 5G base stations to be added to a 4G network and core. This has various advantages for the operator, including the following.

- 5G NR NSA is relatively simple to deploy, since there is no need to go through the complex migration to a cloud-based 5G core immediately.

- It can make use of many existing network assets such as the 4G site grid, while boosting capacity and data rates by adding new spectrum (mainly in the 3.5GHz band) in selected areas of high usage.

- There is no need to build nationwide 5G too rapidly since 4G continues to provide broad coverage; operators can align their build-out with areas of demand.

This fairly cautious upgrade strategy has immediate commercial benefits. The marketing associated with a 5G launch (along with new devices and faster headline speeds) can help to attract market share, especially for first movers in a market. The capacity boost can support new and/or improved user experiences in areas such as video streaming and augmented reality, which can also help with KPIs such as market share and churn reduction.

However, our research shows that these new capabilities have largely been delivered to improve services for existing target user bases, rather than to extend the business model significantly. As a result, the commercial impact has so far been limited.

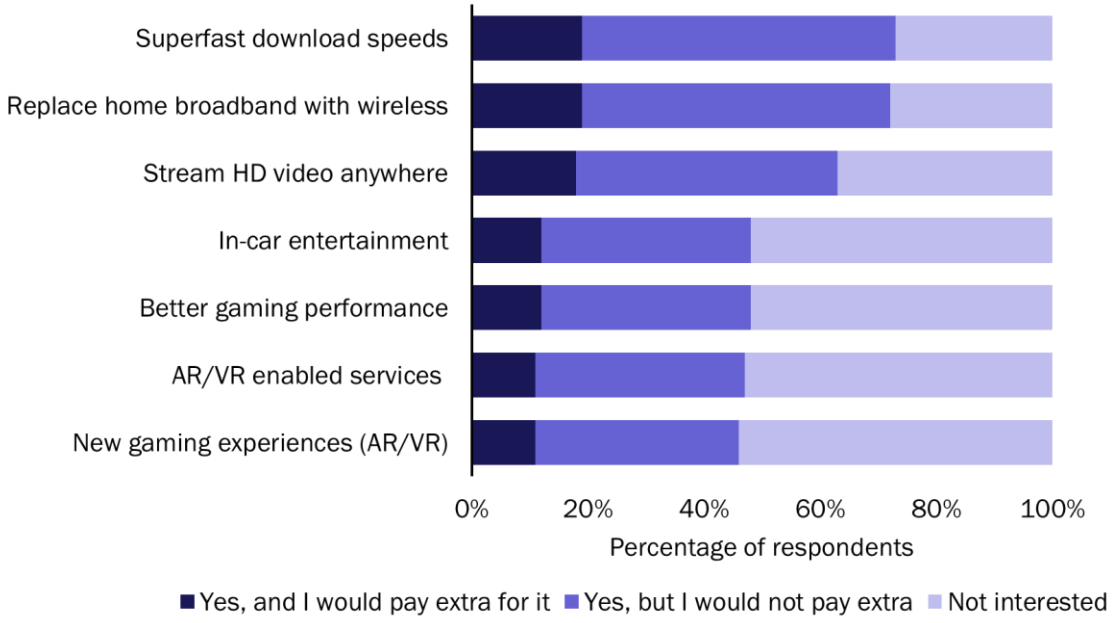
- The launch of brand new services and revenue streams enabled specifically by 5G has been rare in the first 18 months, with the exception of fixed wireless access (FWA) launches in some countries such as the USA.

- Some operators, such as AT&T, have reported reductions in the cost to deliver 1GB of data as a result of implementing 5G NR NSA, but lower network costs have often been offset by other costs associated with a 5G launch, such as marketing.

- A few operators have been able to increase tariffs following a 5G launch, at least while they remained the first 5G provider in the market (such as EE in the UK). However, in most cases there has been no 5G premium, and KPI improvement has come from higher usage levels that have driven consumers to higher pricing tiers (as was the case for T-Mobile Germany). SK Telecom in South Korea said that its ARPU rose by 1.7% in the first three quarters of offering 5G services, but its operating profits were down by 50% year-on-year in 2019, largely because of the costs of 5G build-out and marketing.

- Analysys Mason's global consumer survey indicates that the interest in 5G-enabled services is high, but the willingness to pay extra is limited (Figure 1).

Figure 1: Interest in 5G-enabled services according to our Connected Consumer Survey, Australia, Europe, New Zealand and the USA, 2019



Source: Analysys Mason, 2020

2.2 5G NSA must be just the start of a multi-phased monetisation journey

It is natural that the first 1–2 years following the launch of 5G will be characterised by high roll-out costs and a modest transformation of cost or revenue. However, it is essential that more-radical improvements can be delivered after 2 years of commercial services, and for that, operators will need to migrate to a 5G network that is capable of dramatically reducing the total cost of ownership (TCO), while enabling a wide range of options for extending the business model into new sectors and use cases.

This will only be achieved if 5G is deployed not just as a radio network upgrade that is able to harness new spectrum and deliver increased speeds, but as a completely re-architected, cloud-based platform. This platform

has the potential to enable a far greater diversity of revenue streams, vertical industry requirements, service providers and supply chains than 4G did.

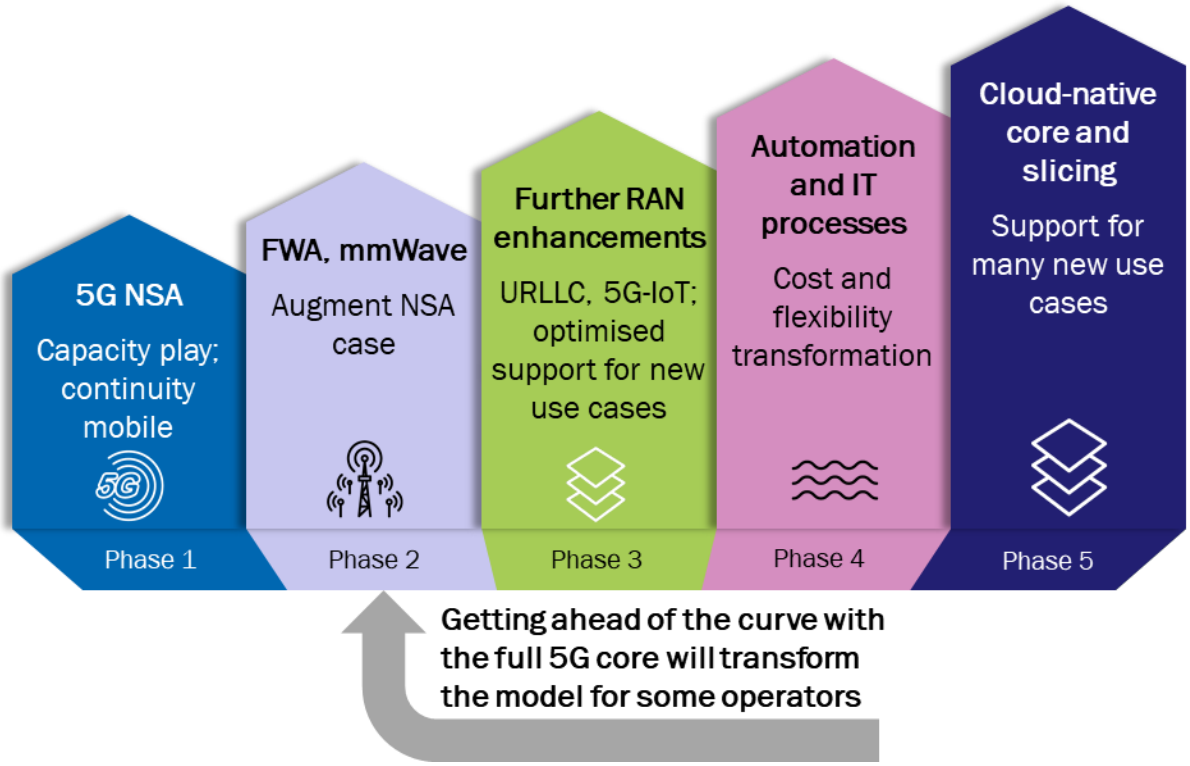
There are many stages in the complex 5G journey, which most operators will follow over the course of a decade. Every non-greenfield operator that has launched commercial 5G services so far has implemented 5G NR NSA first. What comes next, and the timing for the next phases of the 5G transformation, will determine the success of the business case. Three key changes must be made, each of which must have a clear, measurable impact on the operator's return on investment and the broader business case. Operators must:

- transform the RAN to support higher capacities and a lower TCO
- introduce a cloud-based network with high levels of automation and re-engineered processes based on IT norms
- deploy a cloud-native core and full services platform on top of those foundations, including slicing.

Ideally, these three major changes would be implemented in parallel, with clear interrelation in terms of the process transformation and return on investment (ROI) stages. In reality, Analysys Mason's most recent survey of the 5G strategies of Tier-1 and 2 mobile operators indicates that most established operators will adopt a sequential roadmap. In this detailed survey of 78 operators, we found that more than two thirds of respondents expect to implement the key phases of 5G in the sequence shown in Figure 2, although the exact timings will vary according to their specific commercial landscape.

However, this paper will argue that the operators that will achieve the greatest early success with 5G will be those that accelerate the deployment of the cloud-native core, network slicing and a full services platform. Together with early deployment of IT processes such as DevOps, this will also accelerate the realisation of commercial benefits in terms of cost and revenue transformation, and will help operators in competitive markets to gain an advantage over their rivals.

Figure 2: Typical key stages in a 5G deployment journey, and the benefits of an early 5G core deployment



Source: Analysys Mason, 2020

The rest of this paper will examine the three main elements of 5G migration (the RAN, the core and the broader cloud platform) and their impact on the 5G business case. In particular, it will outline how each of these elements alone delivers only some of the hoped-for benefits of 5G. Operators' commercial gains will be magnified when these elements are planned and deployed in a holistic way, with the early adoption of 5G core capabilities.

3. The 5G RAN without digital transformation will deliver only limited benefits

The foundation stones for a full 5G platform (that is, one that is capable of reducing TCO dramatically while enabling a diverse array of new use cases) are the RAN the 5G core and cloud infrastructure and associated processes. For most operators, the deployment of the 5G RAN in certain locations and applications will be the first step, as outlined above.

To maximise the impact of moving to 5G SA technology with the full 5G core, advanced operators will put cloud infrastructure in place as a precursor to virtualising the core and RAN. Such infrastructure will also allow operators to introduce new levels of automation at each layer of the network in order to make supporting a wide variety of 5G use cases simple and cost-effective. To maximise the impact of this digital transformation, operators will also need to introduce new skills, processes and organisational structures, and should adopt best practice from the IT and webscale worlds, such as DevOps.

3.1 Most operators focus on enhancing existing use cases in the first, NSA phase of 5G

The deployment of 5G NR NSA in the RAN cannot be called 'full 5G', as outlined above, though it does have some immediate benefits for the mobile model because it introduces new spectrum capacity and spectral efficiency, and allows operators to differentiate their offerings by improving the quality of experience and supporting enhanced applications.

Some of the earliest movers in terms of 5G NR NSA deployment were the three mobile operators in South Korea (KT, LGU+ and SK Telekom), which announced simultaneous 5G network launches on 3 April 2019. Operators in other countries, such as Rain (South Africa), Sunrise (Switzerland), Telstra (Australia) and Verizon (USA), quickly followed suit. There was at least one operator with a live 5G network in every continent by September 2019. 63 5G handsets had been announced by mid-December 2019.

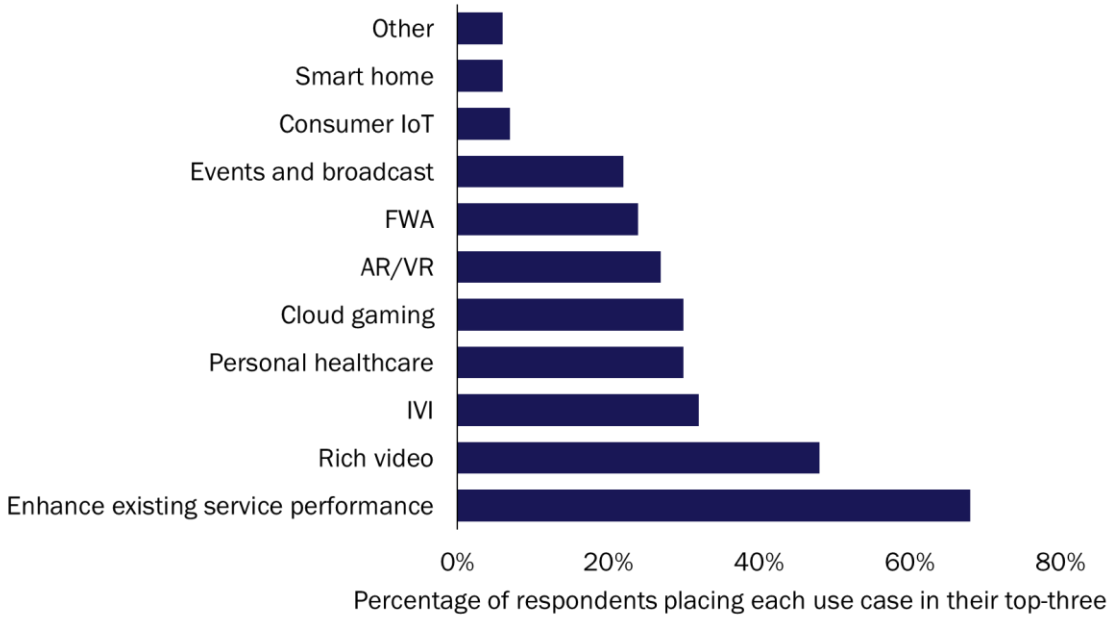
73 operators in 41 countries have launched commercial 5G as of the start of April 2020. In most cases, they have not yet moved onto subsequent deployment phases of 5G. Only just over one third of the operators with commercial 5G services say that they have already implemented telco cloud infrastructure and processes that are capable of supporting a 5G core and RAN. Only a few select operators (such as Telstra) have a commercial 5G core in place (about 5% of the total).

The business cases of these relatively modest 5G implementations remain primarily focused on enhancing mobile broadband (MBB) services for established target user bases, improving the cost-efficiency of delivering

these enhanced services and driving customer adoption with the availability of new devices and improved speeds and quality of experience (QoE).

Figure 3 shows the commercial priorities, in terms of use cases, for the typical operator's first stage of 5G deployment. A panel of 78 Tier-1 and 2 operators were asked to name the three most important use cases that they would support with their 5G NR NSA network in years 1–3 of commercial availability. One of the top-three priorities for two thirds of respondents was simply to enhance the performance and quality of existing applications, for instance by increasing headline data rates to support faster video downloads or better-quality streaming.

Figure 3: Top-three use cases for the first phase of 5G deployment in terms of their importance to the 5G business case, Tier-1 and 2 operators in developed economies, 2Q 2020



Source: Analysys Mason, 2020

Most of the other use cases that were heavily prioritised are extensions of existing services. For instance, almost half of the respondents believe that it will be commercially important not just to improve video speeds, but to add rich video effects such as greater immersiveness, in order to drive customer usage, satisfaction and stickiness.

Other important use cases enabled by the first stage of 5G deployment include services for in-vehicle infotainment (IVI), personal healthcare and fitness, cloud gaming and augmented reality/virtual reality (AR/VR). In many cases, operators are already offering these applications on 4G (and continue to do so), but they can be greatly enhanced for 5G users. For example, about 70% of respondents are already supporting some AR applications on 4G, and two thirds of those expect to add 5G-enabled enhancements in the first year of their 5G roll-out, though only 27% of all respondents rate AR/VR as a top-three commercial opportunity for 5G NR NSA.

This rating will change significantly with the introduction of the 5G core, as we will see in the next chapter; at that stage, almost half of all operators will consider AR/VR to be a top-three opportunity. This highlights the greater potential that operators will have to build on 5G capabilities and monetise them effectively once they have a 5G core.

3.2 Some new revenue opportunities will emerge at this early stage

There are a few use cases that were only rarely supported on 4G, and which will therefore represent new revenue streams during the first phase of 5G deployment. The most heavily supported examples are fixed wireless access (FWA) and live events/broadcasting. The latter has been stimulated by the COVID-19 pandemic as a way to stream events such as sports games to homes, and has been deployed by operators such as the UK's BT/EE.

About one third of the surveyed operators plan to support some FWA in their 5G networks, though often in fairly limited locations. Almost one quarter cite FWA as a top-three commercial opportunity for the first phase of 5G.

Supporting FWA can lead to the following outcomes.

- It can extend the reach of an FTTx network for a converged operator. The most radical example of this is Verizon Wireless, which has deployed an FWA network using its millimetre-wave spectrum.

- It can enable a mobile-only operator to compete in the fixed broadband market, particularly for home services such as high-speed access, TV and multi-play services, while reducing its reliance on the infrastructure of a wholesale fibre network operator. Three UK is an example of an operator that is following this strategy: it launched FWA services before supporting full mobility and so offers fixed broadband while bypassing national FTTx provider OpenReach.

3.3 An IT approach can help an operator to save costs, right from the start

Rolling out an NSA 5G RAN provides operators with a reasonably quick way to put a stake in the 5G ground in order to enhance their competitive position and upgrade selected services, while making heavy use of existing assets such as the 4G cores, sites and application partners.

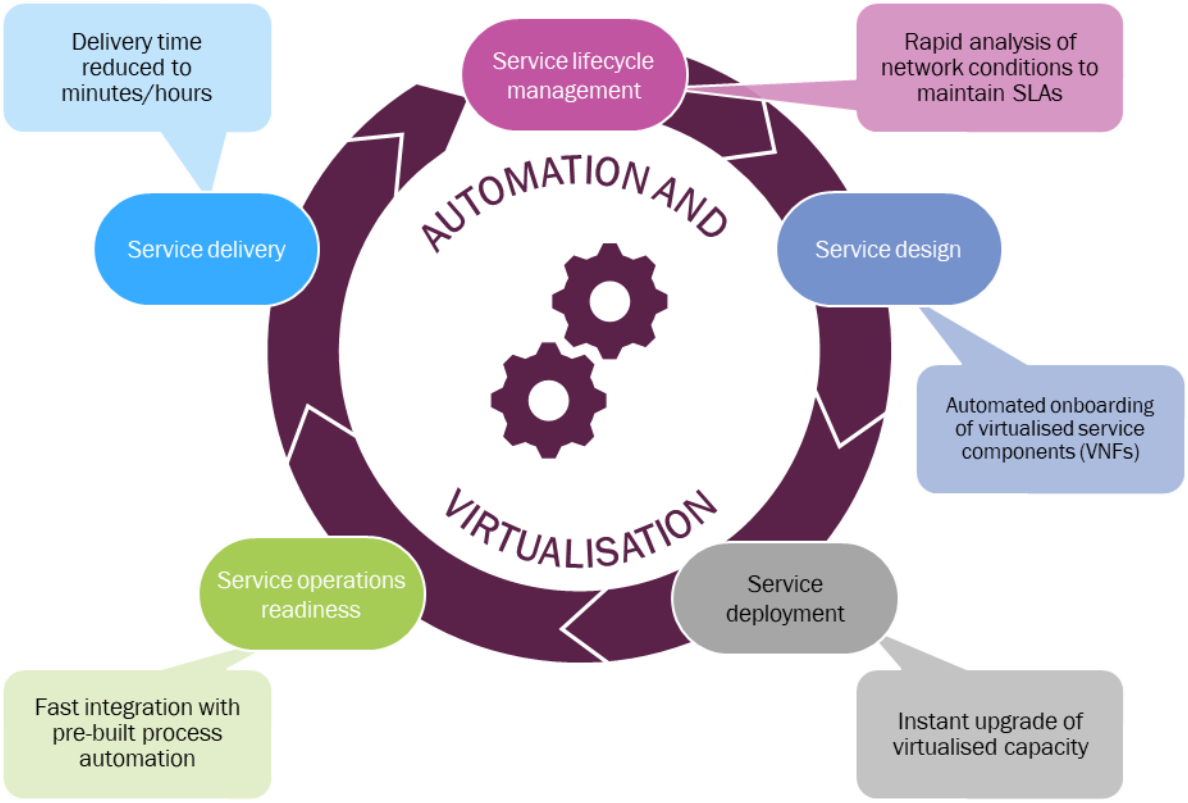
However, it is essential that operators that want to move beyond their established user bases and use cases prepare for the next stages of the 5G journey as soon as possible. This means that they must lay the groundwork for a cloud-native, sliceable core and 5G SA network, well before they actually deploy these technologies commercially and at scale, or else they risk losing out on the full potential benefits. For example, cloud-native deployments will be more successful if an operator has already introduced IT best practices such as DevOps to its internal teams, and if it has identified trusted partners to help manage the transition of skills and applications to a cloud environment.

Analysys Mason believes that it is best practice for operators to transform their underlying platforms and skills in parallel with deploying 5G NSA, so that they optimise their ability to monetise 5G SA and the 5G core as soon as these elements are introduced. A framework (consisting of tools, data services, application programming interfaces (APIs) and cloud services) is established when following a platform approach, and this can be used to enable any application or service, as required. This evolution will allow an operator to become 'agile' in multiple dimensions, and so make the most of 5G's capabilities. Rather than building a network for a specific use case, usually mobile broadband, the operator can identify a business requirement and immediately configure a network slice that is optimised for the needs of that application or industry.

Digitalisation will enable operators to bring new products and features to market in days or weeks instead of months or years, and to provision new services in minutes or hours, not weeks or months. Service agility is predicated on the 'softwareisation' of the network and the associated ability to automate operations.

Network function virtualisation (NFV) and software-defined networking (SDN) allow operators to manipulate the network flexibly and programmatically at speeds far surpassing those of manual interactions with physical boxes. Installing or upgrading a piece of network software, even in a remote location, requires the execution of a few lines of code, and the automation is replicable across hundreds and thousands of installations with minimal overheads and delays. This approach is summarised in Figure 4.

Figure 4: Automation and virtualisation enables operators to maximise the agility of their 5G networks



Source: Analysys Mason, 2020

This transformation is not something to be undertaken lightly. Operators in the vanguard of digitalisation, such as AT&T, Telefónica and Telstra, have recognised the scale of the challenge and have developed ambitious, multi-year programmes to introduce cloud platforms, digitalisation and IT-centric processes to their networks. These operators are likely to be well-prepared to take advantage of the capabilities of 5G from day one because they will have already transformed their infrastructure, processes and service delivery. Their programmes consider 5G to be an important future element and a way to maximise the impact of the new platforms.

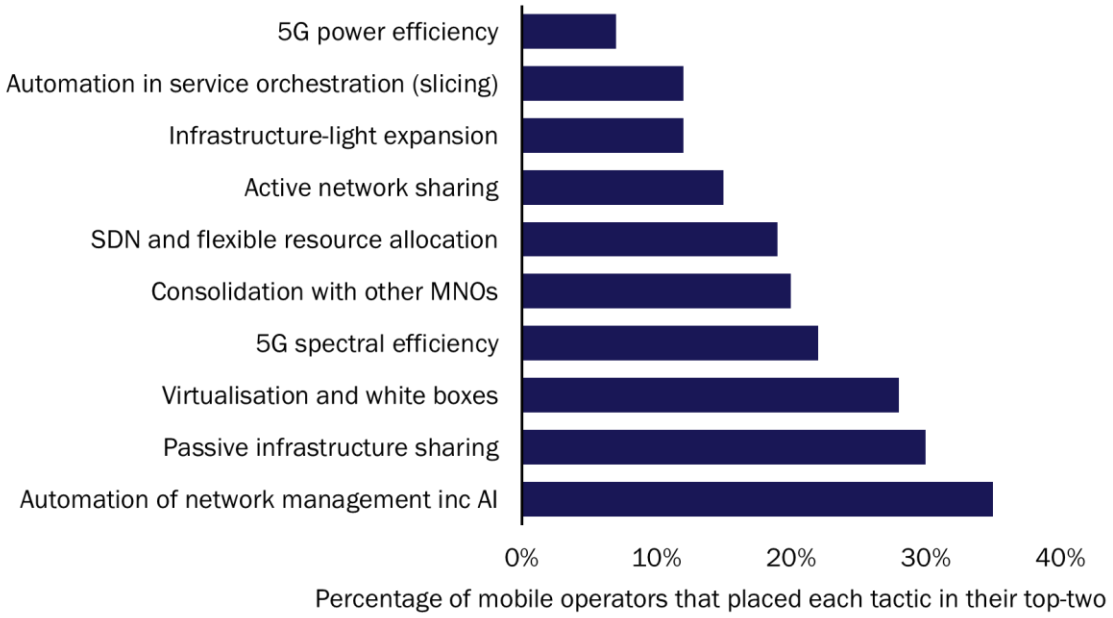
However, it is not too late for smaller or less-ambitious operators (or those with longer timelines for 5G) to lay the foundations for an automated, cloud-based and IT-centric network. Some of the strategic decisions are technological, such as the choice of virtualisation infrastructure, while others are commercial, such as whether to deploy certain capabilities on an in-house telco cloud or a third-party platform.

Some of the most difficult decisions relate to organisational structure and skills. As single-purpose, vertically integrated appliances are replaced with virtual network functions (VNFs), and increasingly, with cloud-native network functions (CNFs), the specialist engineering and network operations skills of the past will gradually be replaced with methods and expertise that come from the cloud and data centre world. For example, DevOps-based techniques are being enhanced by AIOps solutions to deliver more-advanced continuous integration and

continuous development (CI/CD) techniques. AIOps enhances older techniques to support more-automated development, thereby helping to automate the development of automations.

The combination of these IT-centric strategies will have a significant impact on TCO, even for a pre-5G operator, and will create the conditions required to derive the maximum efficiencies when 5G is fully deployed. Figure 5 shows that four of the top-ten contributors to reducing network operating costs (according to Analysys Mason's survey of mobile operators) relate to automation and virtualisation. Indeed, the single biggest contribution is expected to come from automating significant elements of the planning, optimisation and maintenance of the end-to-end network, while enabling it to adapt dynamically to changing service requirements and traffic conditions.

Figure 5: Most important contributors to reducing operating costs in the 5G era, 2019



Source: Analysys Mason, 2020

3.4 Operators may have more suppliers to choose from as they move towards fully virtualised networks

The shift to cloud-based networks and the convergence of the network and IT operations can also accelerate the change in an operator's 5G supply chain. When networks consist of disaggregated software functions run on commodity cloud servers, the ecosystem is closer to that of the enterprise IT market than a traditional telecoms ecosystem. This opens the door for suppliers from that IT market (from COTS server vendors and chip providers to specialist VNF developers) to extend their reach into the telecoms industry.

It also introduces cloud economics to the network. For example, Facebook initiated the Open Compute Project (OCP) to drive the development of common designs for cloud infrastructure, which could be adopted at massive scale, thereby resulting in low costs and a broad ecosystem. It then set up the Telecom Infra Project (TIP) to introduce the same thinking to networks, including 5G. The result of these projects, together with the work done by other groups such as the O-RAN Alliance, is an emerging set of open interfaces, VNFs and reference designs that could open up the 5G supply chain and enable multi-vendor virtualised platforms, if commercially proven in large-scale networks.

The most radical attempt to follow these principles so far has been Rakuten Mobile's 4G (soon to be 5G) deployment in Japan, in which over 25 suppliers were involved, including traditional mobile vendors, vendors from the IT world and new start-ups.

4. A platform approach and the 5G core will be needed to maximise the monetisation of 5G

As argued in the previous chapters, deploying an NSA 5G RAN and moving towards IT-based platforms and processes can deliver significant commercial benefits in terms of reduced TCO and improved performance regarding core KPIs (such as market share, customer retention, Net Promoter Scores and, in some cases, ARPU) in an operator's established markets.

However, only 12% of the mobile operators in our survey believe that these business benefits will be sufficient to justify the huge investment in 5G and digital migration, if additional returns are not achieved within 3–5 years of launch. These additional returns fall into three main categories:

- brand new revenue streams in the enterprise, industrial and IoT markets
- a second, intensified wave of TCO reduction, enabled by further automation and digitalisation
- significant new revenue opportunities from the enhancement of current services.

The first of these three categories will have the most dramatic impact on the return on investment from 5G because if achieved, it will enable an operator to access new sectors and ecosystems, thereby significantly extending their addressable market. Importantly, the continued evolution of digital platforms will also enable operators to target a wider variety of use cases and industries than was available for 4G, with a far lower cost of entry per market.

4.1 5G monetisation will require migration to the cloud-native core

All three of the additional returns listed in the previous section will require a migration to 5G SA, and in particular to a cloud-native, sliceable, converged core network. We believe that operators that accelerate their deployments of the sliceable core, even if that involves a certain level of risk due to being an early adopter, will have the greatest success with 5G. The risk due to being an early adopter will be offset by the ability to offer a wide range of new services at an earlier stage than their competitors, as long as they prepare well and work with trusted partners.

The benefits of the sliceable core, combined with upcoming updates to the 3GPP standards (Releases 16 and 17), include the following.

- Full automation with an agile, dynamic response to changing user requirements and traffic patterns in order to improve the user experience while boosting resource efficiency for the operator.

- Support for additional connectivity capabilities, enabled in Releases 16 and 17, including ultra-low latency (ULL), massive device and sensor density, large-scale carrier aggregation (including unlicensed spectrum)

and 5G-IoT. These allow for the optimised support of a wide range of new or emerging use cases, especially in industrial and IoT environments.

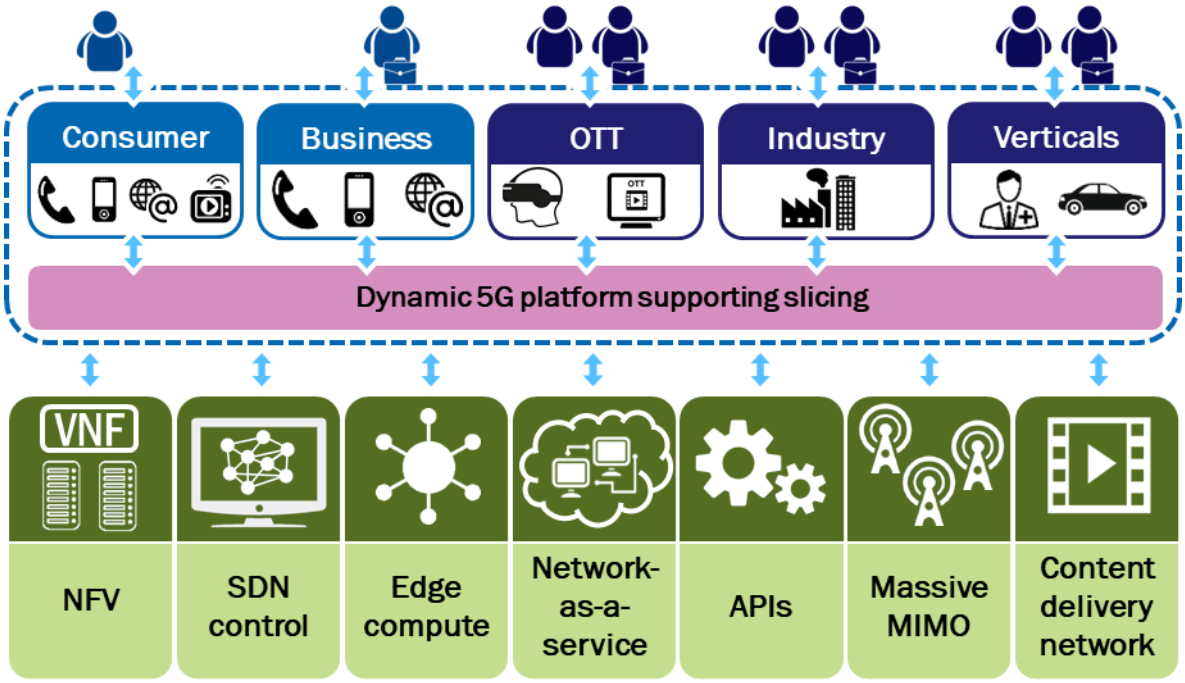
- The ability to carve out a virtual slice of the network for a particular use case, industry or, eventually, individual customer. This can be configured on-demand with the capabilities that each particular use case requires (for instance, a combination of high bandwidth and low latency), and the connectivity can be associated with other functions such as edge computing. This allows operators to support a very wide range of use cases and enterprises from a single platform, thereby improving scalability, flexibility and cost-effectiveness.

- Automated and scalable aggregation of many resources. The wider platform that operators will build around their 5G core and RAN will enable them to include other in-house or third-party resources (such as edge compute nodes) into their slices and to on-board a wide range of developers and other partners to provide the richest offerings possible from a single platform.

These capabilities greatly improve the business case for operators to address a wide range of enterprise markets. In the past, operators would have needed to build and run a dedicated network to meet the challenging demands of a customer such as a public safety agency, whose requirements for critical availability would be impossible to guarantee on a shared public network. Operators also needed to build channels to market, partnerships and ecosystems for each vertical industry, which was rarely justified by the amount of additional revenue available.

In the 5G era, many industries want to use 5G for more-strategic, high-value purposes than just mobile communications between staff, and they include the technology as part of their own digital transformations. The addressable market for 5G services will grow significantly throughout the 2020s, and operators will be better equipped to take advantage of this if they can support huge numbers of use cases, specialist network requirements and partners from a single automated platform. Figure 6 illustrates the power of this sliceable platform.

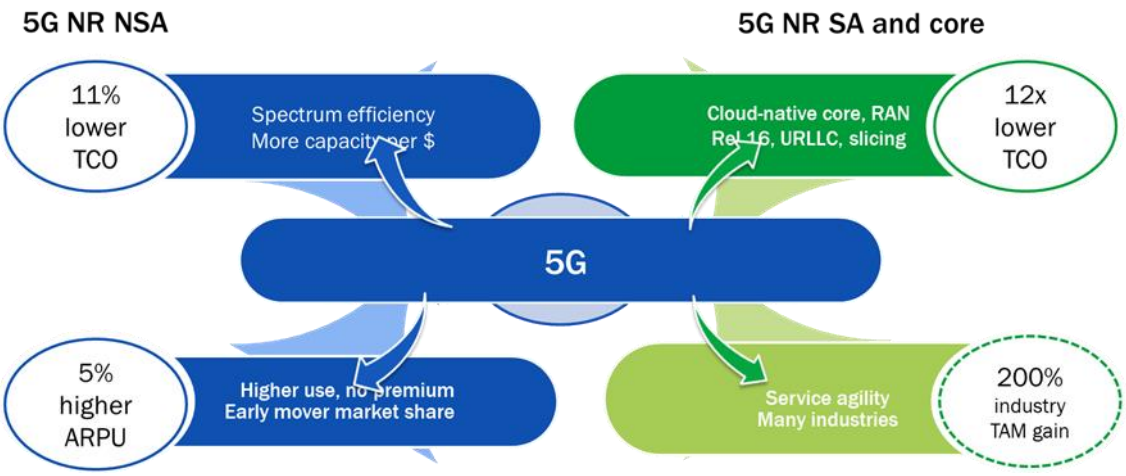
Figure 6: Overview of a programmable, sliceable 5G network in which key technology enablers are brought together to support a wide range of industries and use cases



Source: Analysys Mason, 2020

Figure 7 shows how the operators in our survey believe that the scope of their ambitions will grow as they deploy the SA network and cloud-native core. This migration will be far more challenging than that to NSA, and so operators require far greater returns to justify it. However, the maximum revenue and transformation potential of 5G will only be realised with the full 5G SA platform.

Figure 7: Sample consensus KPI targets for the first and second phases of 5G, according to our survey of 78 mobile operators, 2019



Source: Analysys Mason, 2020

The survey results show that operators typically expect that 5G NSA will bring lower TCO (mainly achieved with spectral efficiency) and modest increases in ARPU. Operators expect that 5G SA will bring a further wave of TCO reduction enabled by cloud automation, but most importantly, they anticipate that their addressable

market will double (on average, in terms of revenue), mainly due to the ability to expand in an agile way into new enterprise, industrial and IoT segments.

4.2 Operators will first make use of their existing strengths to target new markets

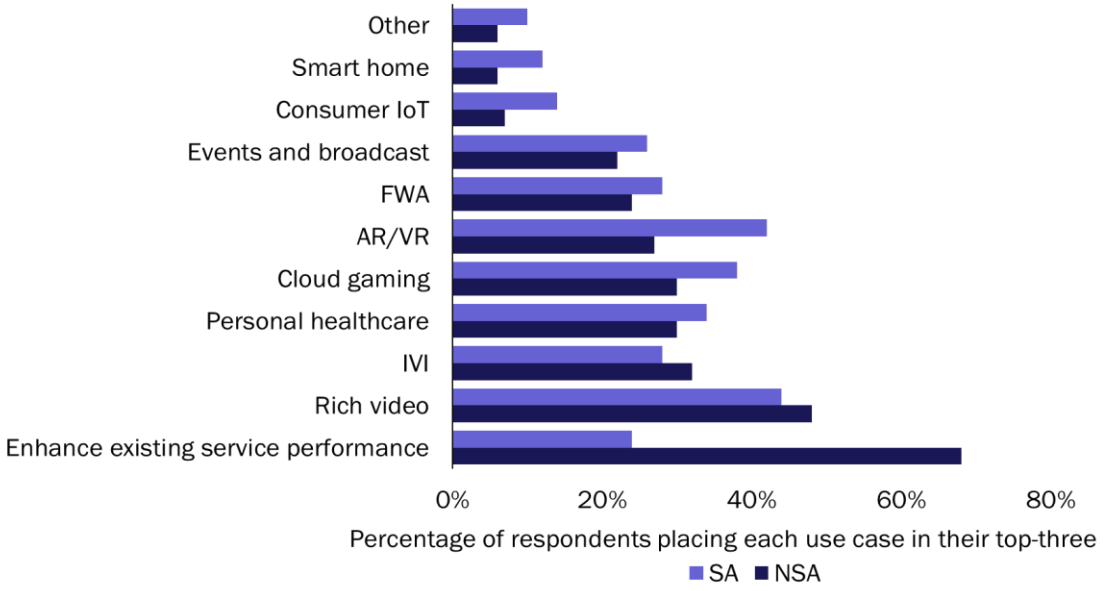
As operators start to plan or deploy their 5G SA networks, they will prioritise the use cases and sectors where they can reap the most immediate gains. In many cases, they will initially focus on building on existing strengths. For example, an operator may already have established partners and relationships in a certain industry (such as automotive), or it may have a strong implementation of a technology (such as augmented reality) that could be applied to new use cases in adjacent industries.

The variety of applications that can be delivered to these existing or adjacent user bases will be increased once an SA network with a cloud-based core and the full range of connectivity capabilities are deployed. This can improve the business case, even for operators that do not venture far into new enterprise markets. They can generate higher levels of usage and adoption by enhancing consumer services with capabilities such as virtual reality.

There will be short-term benefits from harnessing the 5G capabilities that can support use cases in both consumer and industrial environments for those operators that do extend their reach significantly. For example, augmented reality can support consumer applications such as physical/digital shopping, as well as industrial use cases such as digital twins. Some applications that have been developed for a consumer base, such as live events broadcasting, can also be used with a B2B base, such as content providers.

There is a marked contrast between operators' top use case priorities for 5G NSA (Figure 3) and those for 5G SA (Figure 8). Operators were asked to select their top-three commercial opportunities for the 5G SA era among the same core set of services. Unsurprisingly, merely enhancing the overall MBB experience was a strategic opportunity for far fewer operators (24%). Richer video experiences remained central; they were placed in the top-three by the largest number of respondents (44%). However, in terms of new opportunities, the biggest increase in interest was seen in improved support for AR/VR, cloud gaming and broadcasting (sometimes optimised by dedicated slices).

Figure 8: Top-three use cases for the first (NSA) and second (SA) phases of 5G deployment in terms of their importance to the 5G business case, Tier-1 and 2 operators in developed economies, 2Q 2020



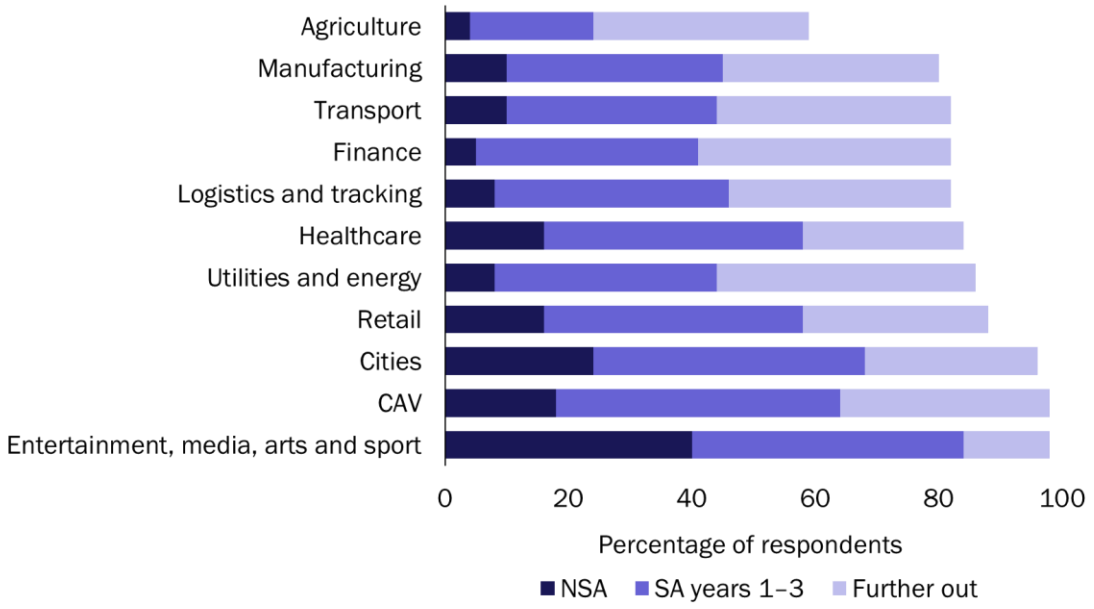
Source: Analysys Mason, 2020

4.3 Operators are currently making key decisions about the low hanging fruit for B2B 5G services

The biggest gains from the deployment of a full 5G platform will come from the ability to diversify into many industries. Operators vary significantly in terms of the industries that they plan to address and their timelines to do so. Many commercial factors will influence their decision, such as the presence of other competitors, the level of demand for 5G in a given market and their established relationships with partners and potential customers.

Figure 9 highlights this diversity; respondents of our survey were asked whether they planned to address each of 11 selected B2B verticals with 5G services, and if so, in which phase of their deployment they anticipated doing so. As seen in the previous chapter, the verticals that will be commonly targeted in the NSA phase tend to be B2B extensions of consumer-facing markets that are already familiar to many operators (for example, entertainment providers and healthcare professionals).

Figure 9: Percentage of respondents planning to target selected B2B verticals with 5G services, at the three phases of 5G commercial roll-out, 2020



Source: Analysys Mason, 2020

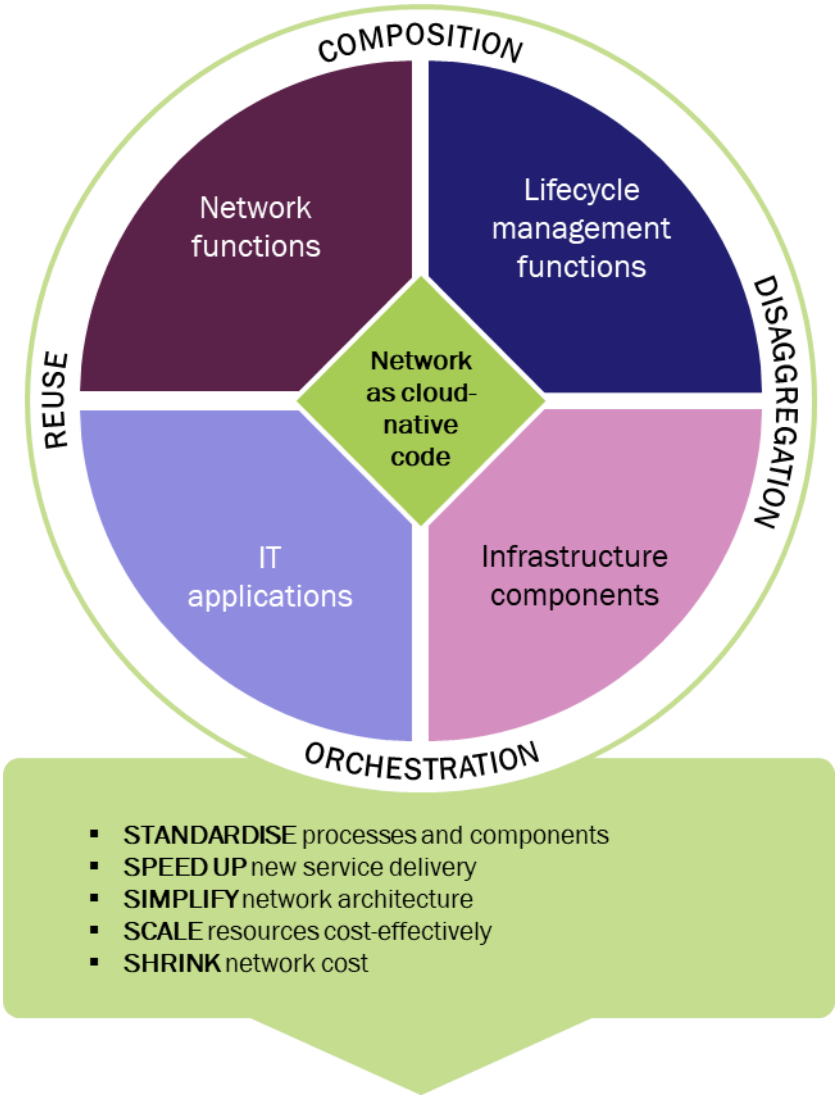
Across the whole 5G era, the sectors that will be addressed by the highest percentage of operators do tend to have a consumer-facing aspect: the leaders are entertainment, media, arts and sport, connected and automated vehicles (CAV), smart cities and retail. More-industrial sectors, which may have less-penetrable ecosystems for operators, will be of very high value to the operators that succeed in building a business there, but will be targeted by a smaller percentage. These sectors include financial services, transportation, utilities, manufacturing and agriculture, all of which will be targeted mainly when an operator has already established a 5G core, often with slicing capabilities.

4.4 The greatest revenue and TCO benefits will come from taking a platform approach that can support an extreme diversity of use cases

It is very early days for 5G within the telecoms sector, so there is an even less-mature understanding of exactly how 5G will impact transformation and which use cases will deliver the greatest returns in other industries. This is why advanced operators are looking to adopt a digital platform approach that can quickly and flexibly accommodate any number of new applications, connectivity variations, partners and users. Our operator survey demonstrates that there is a high level of awareness among Tier-1 and 2 operators of how the 5G monetisation opportunities are expanded by a programmable core and the flexible service delivery platform that it supports.

Figure 10 outlines the key elements of a cloud-native platform approach. In such an approach, the network is recast as a set of components that can be variously combined and recombined according to the requirements of a particular service. Network functions and applications run on common cloud infrastructure and support open APIs, development frameworks and interfaces so that new services can be created on the fly. This results in what Analysys Mason labels the “five ‘S’s”: standardise, speed up, simplify, scale and shrink.

Figure 10: The five 'S's from recasting the network as a composable set of cloud-native components



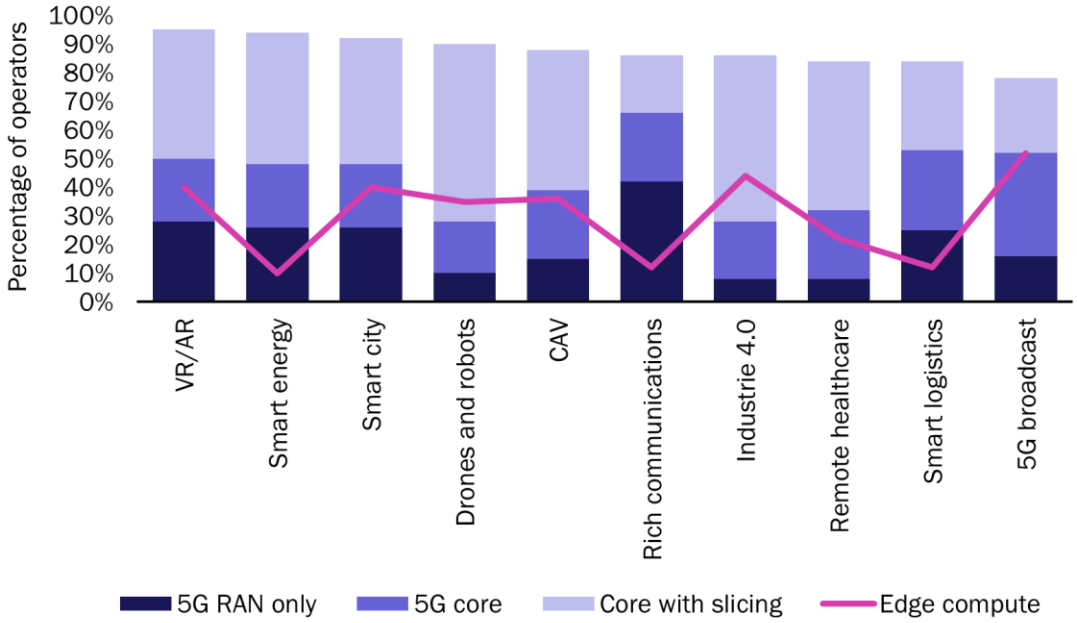
Source: Analysys Mason, 2020

Operators are also increasingly interested in incorporating edge computing into their 5G models. This can enhance the enterprise 5G proposition by supporting some customer organisations' requirements for key applications to be run locally, on a public or on-premises edge cloud node, rather than in the central public cloud. Enterprises' reasons to adopt edge-centric services include a requirement for the local management of their traffic, full control of data security and privacy and a low-latency response for certain use cases such as robotics or rapid big data analysis.

In our survey, operators were asked to list all the use case categories in which they considered there to be a commercial opportunity for 5G during the 2020s. A list of the 10 most-cited categories was then compiled, and operators were asked whether they aimed to support these use cases, and if so, which elements of 5G technology would be the minimum essential to enable a profitable business case (NSA RAN only, a virtualised 5G core or a full cloud-native core with slicing). They were additionally asked whether edge computing, though separate from the 5G network, would be a significant enhancement to the business case when integrated with 5G.

Figure 11 illustrates that the majority of operators believe that a sliceable core will be essential to achieve the quality and reliability that will be needed for commercial success in three of the top ten use case categories (drones and robots, Industrie 4.0 and remote healthcare). Almost half think the same about the three most-popular use case categories (VR/AR, smart energy and smart cities). At least 40% of operators think that edge computing will be an essential enabler for a successful model based on the broadcast, Industrie 4.0, smart city, AR/VR and CAV use cases.

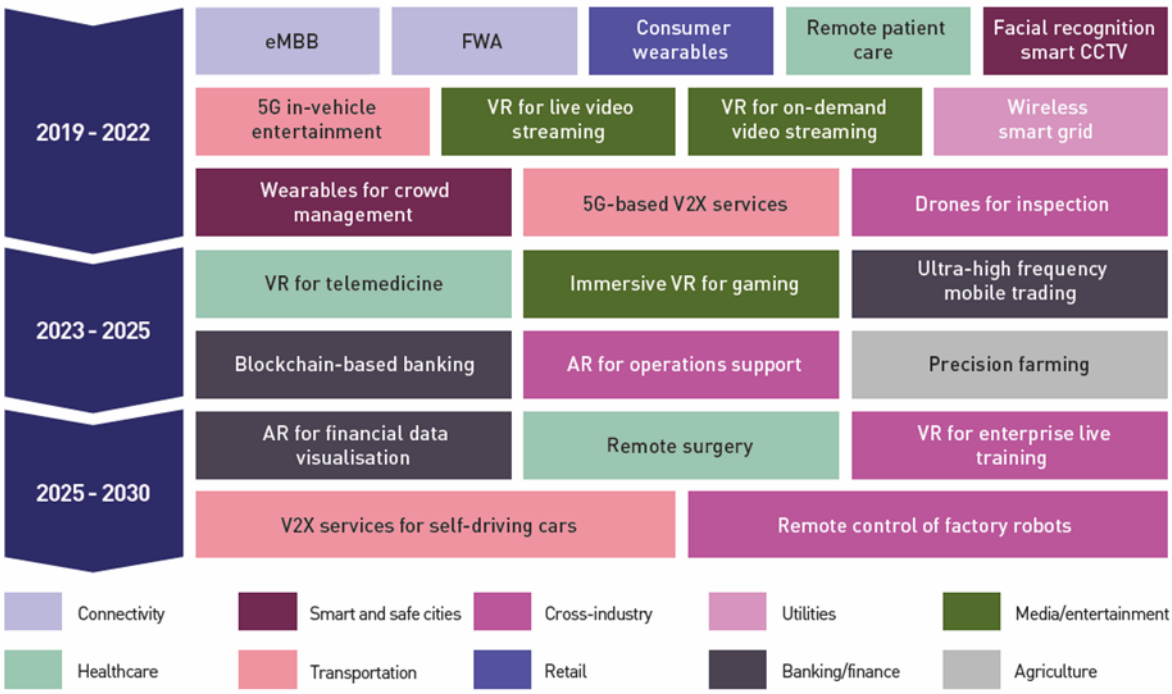
Figure 11: Percentage of operators intending to support the ten most-cited 5G use case categories, the required enabling 5G network technology for each and the additional importance of edge compute



Source: Analysys Mason, 2020

Within these broad categories of use cases, a sliceable platform will provide the versatility to support huge numbers of individual applications for each vertical, many with contrasting connectivity requirements. Figure 12 provides just a sample of the applications that were highlighted in the survey, split by industry and the expected timeline for deployment.

Figure 12: Applications commonly prioritised to enhance the B2B 5G model, by industry and expected timeline for mass deployment, 2020



Source: Analysys Mason, 2020

5. Conclusion: operators need to decide on their optimal role in the 5G value chain

This paper focuses on the daunting list of important strategic decisions that operators face when considering their 5G business models for the 2020s. These relate to technology, organisation and skills, target markets and priority use cases. All of these aspects will be best-addressed in the context of a broad, programmable 5G platform, as defined in Figure 10, in which open developer frameworks and APIs are combined with fully cloud-native networks running on common cloud infrastructure

A further set of decisions (which will influence all of the others) relate to the role in the value chain that an operator should play to deliver the best commercial outcome. In these cases too, a platform strategy will help to maximise returns and mitigate risks by providing the highest level of agility to embrace opportunities (even unforeseen ones) as they arise.

The mobile value chain changed between the 2G era and the 4G era; it evolved from the provision of simple voice connectivity to a mobile internet market in which revenue was shared with over-the-top providers. The cloud ecosystem will be an important additional element in the 5G era, and there will be a wide range of partners and competitors in each industry and use case category. For example, the development of AR/VR will introduce new ecosystem players on a horizontal basis, but an industry such as manufacturing or mining will introduce its own specialised set of providers on a vertical basis.

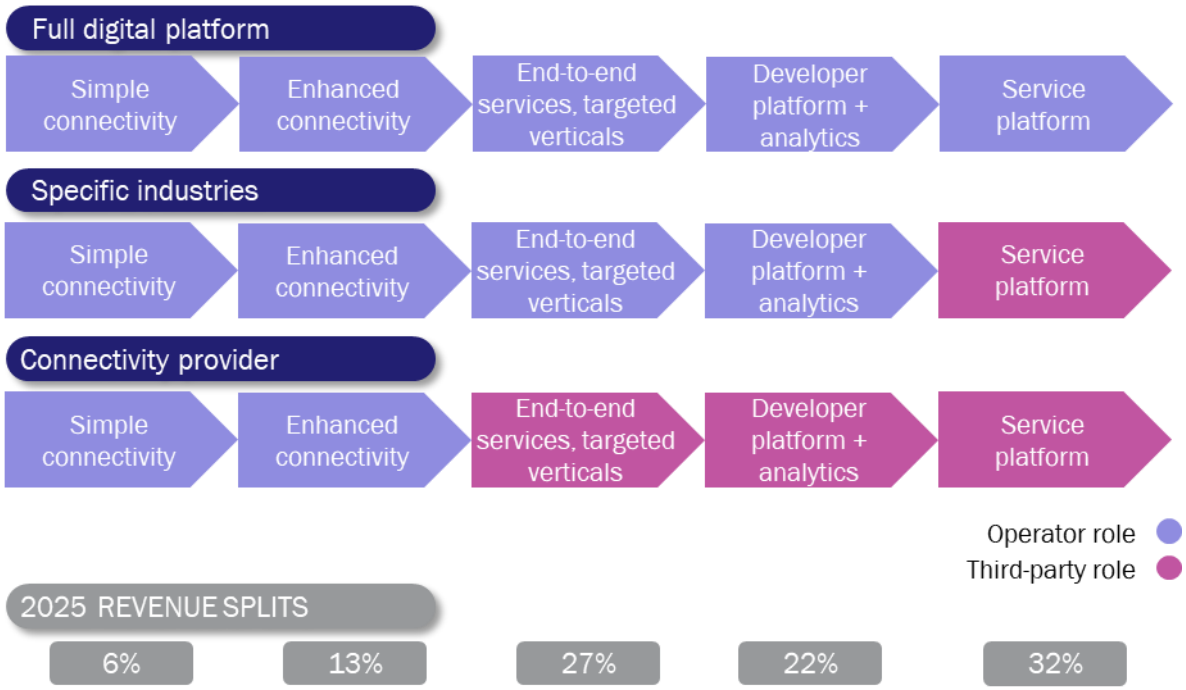
Most operators plan to play a pivotal role in a few value chains (either horizontal or vertical) in which they believe they have particular advantages. The automotive and entertainment verticals, and the AR/VR horizontal, are the most-commonly cited. However, building an ecosystem or securing a high-value role in an existing one requires a considerable investment of effort and resources in order to cultivate partners and support developers. Operators need a platform that will allow them to support the full range of partners, developers and ecosystem players, for any given use case or market, if they are to address a wide variety of industries, and so maximise the monetisation potential of 5G.

This will enable them to address the entire value chain, and Analysys Mason estimates that 50% of the revenue in that chain in a developed mobile market in Europe, North America or Australia will potentially be available to operators (the rest will be divided between players such as developers and cloud partners).

The roles that are typically available to operators in an enterprise value chain are visualised in Figure 13, for each of three common business models. The main options are to offer:

- basic and enhanced connectivity (the latter including, for instance, added-value network-based services such as security, or special capabilities such as ULL)
- vertical-specific end-to-end network services such as robot operations
- an applications and analytics platform to support many developers
- a full service platform that supports all players in the value chain from a common, flexible foundation.

Figure 13: B2B 5G value chain roles that are open to operators for three different business model scenarios, and the 2025 revenue split for each link in the chain



Source: Analysys Mason, 2020

This leads us to make the following key recommendations for operators in developed markets as they make their next critical decisions about their 5G business models.

- Operators should deploy the cloud-native core and network slicing early to achieve the strongest differentiation.
- Operators should form strong partnerships in the 5G enterprise value chain, even if this diminishes their role.
- Operators should change their investment priorities to protect their margins. Co-investment, digital skills and ‘brutal automation’ are key.

6. About the author

Caroline Gabriel (Principal Analyst) leads Analysys Mason's wireless research. She contributes to our Next-Generation Wireless Networks, Operator Investment Strategies and Spectrum research programmes and works directly with our research clients to advise them on wireless network trends and market developments. She has been engaged in technology analysis, research and consulting for 30 years, and has focused entirely on mobile and wireless since 2002.

As co-founder and research director of Rethink Technology Research, Caroline developed a research base and forecast methodology based around deep contacts with mobile and converged operators worldwide. Her focus is on critical issues and trends related to mobile and wireless infrastructure, particularly operator deployment intentions for 4G, 5G, cloud-RAN and other technologies.

She has led research and consulting projects with a wide range of clients, including mobile infrastructure vendors, large and start-up operators, regulators, trade bodies, government agencies and financial institutions.

Prior to setting up Rethink, Caroline held various executive positions at VNU Business Publishing, then Europe's largest producer of technology-related B2B reports and publications. She holds an MA from the University of Oxford.

This whitepaper was commissioned by Amdocs. Analysys Mason does not endorse any of the vendor's products or services.

Published by Analysys Mason Limited • Bush House • North West Wing • Aldwych • London • WC2B 4PJ • UK
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