Are You Ready for Profitable 5G Monetization?

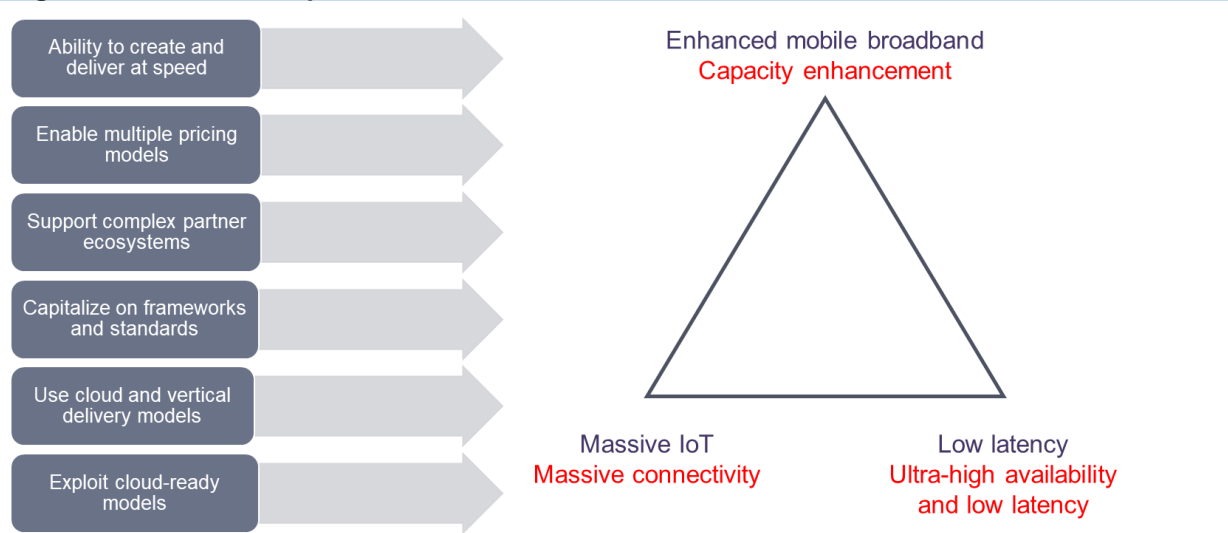Profitable 5G monetization will require a fundamental rethink of revenue management systems

Introduction

Finally, 5G is here. Its fundamentals promise communications service providers (CSPs) new sources of revenue, new opportunities, and new ways to delight their customers: 100× bandwidth, 10× throughput, 10× reduction in latency, 1000× partners. These are normally organized around three core services, known as enhanced mobile broadband (eMBB) and fixed-wireless access (FWA), ultra-high reliability and low latency (URLLC), and massive (IoT) connectivity (MTC).

Between now and the end of 2020, CSPs will need to gear up for the first phase of mass adoption. But are CSPs' monetization platforms ready to provision, enable, and charge for these new network performances and create a connecting tissue between CSPs and their partners? Ovum argues that CSPs need to carefully review their capabilities if they intend to make the most of what 5G can offer.

Figure 1: 5G service requirements

Ability to create and deliver at speed

Enable multiple pricing models

Support complex partner ecosystems

Capitalize on frameworks and standards

Use cloud and vertical delivery models

Exploit cloud-ready models

Enhanced mobile broadband
Capacity enhancement

Massive IoT
Massive connectivity

Low latency
Ultra-high availability and low latency

Source: Ovum

Specifically, CSPs will need to make platform and operations changes that enable them to create and deliver at speed, support multiple pricing models, operate entirely online, and foster complex partner ecosystems. But one-off solutions and platform changes are not sufficient in themselves. CSPs will also need to fundamentally change their operations models by adopting open APIs, DevOps, and microservices. Without such changes, it will not be possible to fully monetize 5G.

Particularly, 5G will benefit from an ever-expanding ecosystem of connected devices and services, but CSPs will only be able to monetize many of these services in partnership with web-scale players. These new opportunities will appear – and disappear – at a speed and scale typical of web-scale operators, thus threatening to outpace the CSPs. As such, CSPs need to implement a monetization environment that is agile at scale, cost-effective, and nimble.

Even eMBB, the simplest 5G service but the first and the biggest, will require a lot of effort. A combination of speed, latency, and reliability will be features of 5G pricing plans, which in turn will have to deal with application-specific and partner-specific requirements. When new 5G capabilities such as network slicing arrive after 2020, they will enable the creation of completely new B2B services. CSPs' monetization platforms will need to be ready. Ovum believes that those CSPs that

can foresee 5G opportunities, start now, and anticipate their monetization challenges will be the winners in the 5G game. Specifically, microservices-based architectures will offer CSPs several benefits, such as the ability to quickly roll out upgrades to targeted services and to support the complexity inherent in 5G use cases. CSPs will also need to adopt DevOps and continuous integration/continuous delivery (CI/CD) business delivery models before making the transition to microservices. Continuous innovation will be key in an environment where CSPs need to enable and monetize new services such as dedicated on-demand network slices.

It is this fundamental need for agility that will be a major driver of revenue management and operations systems change.

Summary

In brief

Ovum has assessed the main features of the B2C, B2B2x, and B2B services that will be supported by 5G; the changes in the partner ecosystem these new services will require; and consumer attitudes toward service usage and payment. The conclusion is that 5G services will be difficult for CSPs to profitably monetize using the current capabilities of their monetization platforms. Direct and indirect monetization of 5G network features such as ultra-reliable communication, ultra-low latency, guaranteed throughput, and reserved bandwidth will require CSPs to invest in, upgrade, and fundamentally rethink their systems.

Ovum view

- **Act now.** Market readiness for 5G has accelerated globally, with 2020 being a major deployment year, thus increasing the risk that CSPs will rush into supporting connections without being able to fully monetize the new services and features that 5G will enable.

- **Prepare for complexity.** B2C is the largest 5G segment, while B2B will introduce new revenue streams. Both segments will require CSPs to manage a much wider, complex, and rapidly changing ecosystem of partners requiring advanced network features.

- **Manage at scale.** CSPs must begin investing in a new set of agile monetization capabilities if they are to fully exploit the benefits of 5G. The 5G use cases described in this paper will only be possible if CSPs have the platforms and operations in place that can support and monetize varied B2C, B2B2x, and B2B business models and manage complex partner ecosystems. CSPs' current business support systems are unable to meet the new requirements of 5G.

- **Enable rapid changes.** Operational systems that can handle speed, agility, and scale will be essential because of the vast number of 5G services being delivered on an experimental and fail-fast basis. Real-time order management, provisioning, rating, billing, and charging are only a starting point, as it will also be necessary to break down silos between support systems as well as streamline business architecture and processes. AI-driven automation will play an important role, as will the adoption of open APIs, DevOps, and microservices architectures.

Recommendations

- CSPs need to carefully evaluate the potential of 5G services and assess their readiness to profitably support crucial features of 5G. Ovum believes that many CSPs will be unprepared to monetize all services, especially those that require rapid and frequent changes at scale and involve the simultaneous management of multiple partners, network resources, and varying charging models.

- CSPs must invest in the platforms that will allow them to monetize new 5G business models including IoT services, network slicing-based services, and new types of services involving a wide variety of third parties. CSPs must invest with the future in mind, putting operational systems and revenue management platforms in place that do not block their ability to reach out to new verticals, to experiment, and to support complex multidimensional partner ecosystems.

- Online, flexible, and scalable deployment models will be essential to 5G success, which is where cloud-based systems will play a role. In the context of such a fast-moving environment, it may also make sense for CSPs to make use of new platforms focused on specific B2B or IoT use cases.

- To achieve the full benefits of scalability and business agility, operators will also need to adopt DevOps and CI/CD models as well as make the transition to microservices.

Time to money: 2019 will see 5G's consumer debut, paving the way for B2B opportunities

CSPs agree that a multitude of enterprise use cases will provide most of the new revenue opportunities enabled by 5G. However, these will come after the consumer proposition launches. The consumer proposition will be crucial in sustaining the network rollout and the development of appropriate IT. CSPs will need to enhance their existing monetization in consumer, especially in order to support B2B2x business models and new industry-specific products.

Table 1: CSPs' 5G services and monetization

Starting date	2018–19	2019	2019–20	2019–20	2021–22
Services	Fixed wireless access	Mobile hotspots	Portable devices, PCs, and tablets	Smartphones	Consumer and industrial IoT
Primary monetization area	Direct to consumer & enterprises	Direct to consumer & enterprises	Direct to consumer & enterprises, some wholesale	Direct to consumer & enterprises, some wholesale	Direct to consumer & enterprises, indirect
Main use cases	Indoor CSP, outdoor CPEs	Semi-stationary; semi-mobile	Fully mobile	Fully mobile	Ultra-mobile, semi-mobile, stationary

| Pricing & Proposition	Home-broadband-like pricing and proposition (e.g., speed-based tiers with unlimited data, content, and media/gaming hardware bundles)	Mobile-like and home broadband-like pricing and proposition. Minor emphasis on service bundling.	Mobile data bundles, service bundles (e.g., cloud-based services)	Subscriptions and content bundling High-end pricing strategies (e.g., unlimited data, device bundles, third-party content, applications and games, and service bundles)	Various and evolving. **Consumer:** part of the bundle. **Enterprise/ industrial:** Platform-based Connectivity-based Insight-based Outcome-based

Source: Ovum

5G monetization requires platforms able to support complex (B2B2x) partnership models from the outset

With 5G services will come more complex business models than anything the industry has witnessed so far. There are 100s of potential new use cases. Most are small when considered in isolation, but together they could change the scale – and possibly nature – of the telecommunications business. But what is the best course of action for CSPs? Should CSPs select "killer apps" and, if so, which ones? Ovum argues that CSPs should focus more on developing capabilities that help them and their partners monetize customers, directly or indirectly, and enhance the value of existing services rather than "pre-selecting" services or applications.

An example would be an emerging area of business for CSPs: analyzing big data generated by consumers' and business customers' devices. Insights are typically monetized using B2B2x partnership models – sometimes even B2B2B2x or more complicated – where CSPs provide results to companies that in turn sell to their customers. These customers pay for services from the CSP, which may also share revenue with the company using the data.

Figure 2: Indirect and in-partnership revenue models become even more prominent with 5G
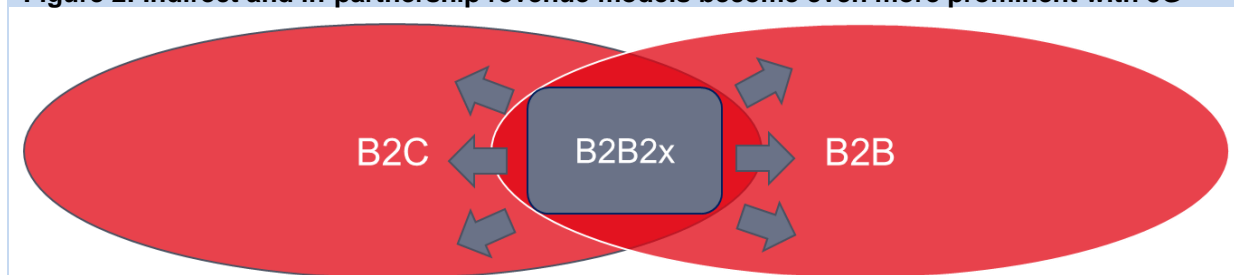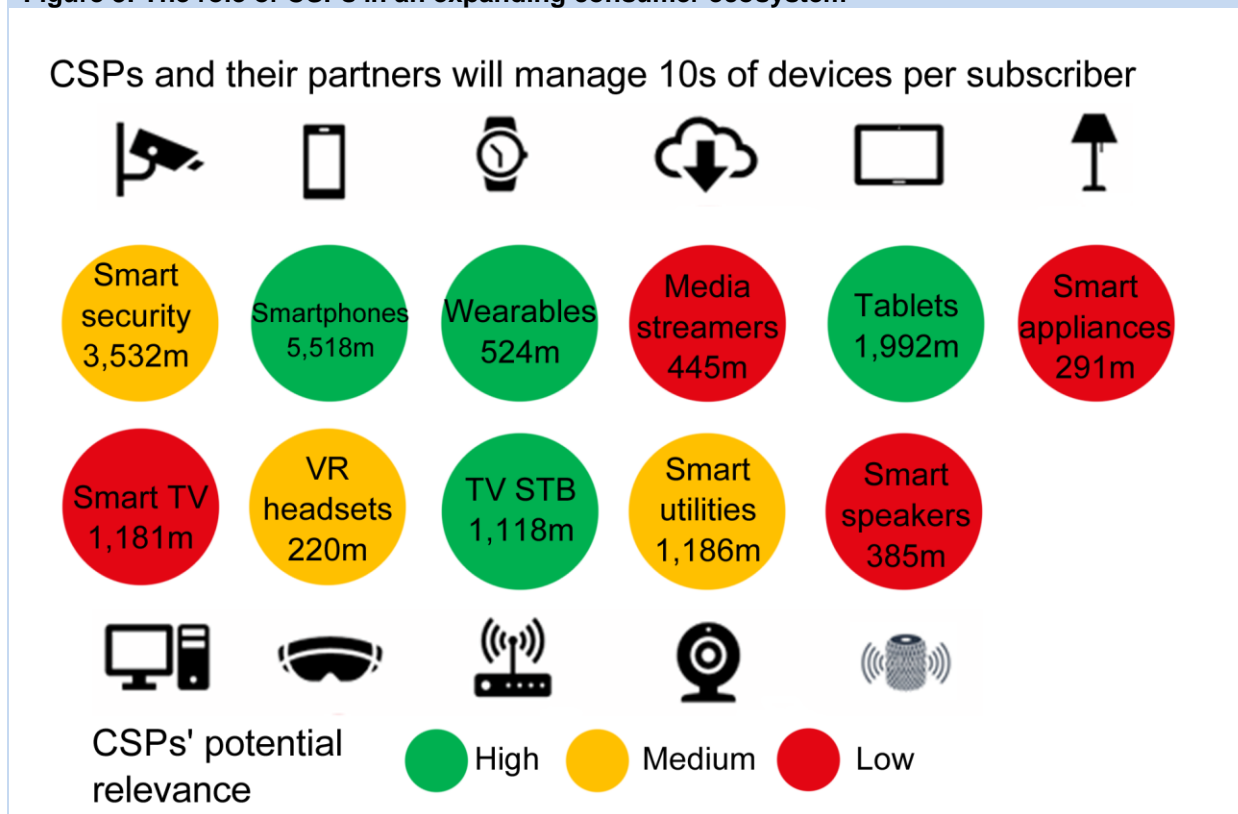

Source: Ovum

These businesses already exist in 4G. In a 5G environment, though, the sheer volume of transactions and data will put a strain on existing capabilities. Are CSPs able to tell their partners in real time if there is enough network capacity to support a service sold on the spot? Are partners able to have frictionless access (e.g., using APIs) to the information they need?

5G monetization in B2C: CSPs must capitalize on an ever-expanding ecosystem of devices

CSPs will have a role to play in supporting new devices and services for consumers such as smart homes, wearables, and personal devices such as VR headsets, laptops, and tablets (Figure 3). Each of these categories will not only expand the ecosystem for CSPs but will also bring new partners and business models. Today, CSPs lack the agility and the nimbleness that is required to support so many devices, brought by so many partners, with so many diverse network and business model requirements. In many cases, such as smart home or security, CSPs will have only a marginal role in selling devices and services to the customer but will be supplying connectivity wholesale behind the scenes.

Figure 3: The role of CSPs in an expanding consumer ecosystem

CSPs and their partners will manage 10s of devices per subscriber

| Device	Subscribers
Smart security	3,532m
Smartphones	5,518m
Wearables	524m
Media streamers	445m
Tablets	1,992m
Smart appliances	291m
Smart TV	1,181m
VR headsets	220m
TV STB	1,118m
Smart utilities	1,186m
Smart speakers	385m

CSPs' potential relevance: ● High ● Medium ● Low

Source: Ovum

Results from Ovum's survey of 5,081 consumers show that 20–30% of customers plan to increase significantly or increase slightly their usage of many services, not just one. Online video is unsurprisingly the service that will benefit the most when customers are able to access faster, more responsive, and more reliable 5G mobile broadband connections (see Figure 4). Music, social media, and gaming will follow closely, while about 20% of respondents think they will make more use of VR and AR.

Customers differ dramatically, however, in how they prefer to pay for 5G, and CSPs need to be able to monetize every type of business model that emerges from consumer behavior. Most customers expect 5G to be provided with unlimited data, meaning that CSPs need to be able to monetize beyond

data bundles. As many customers are unwilling to pay extra for 5G, CSPs need to be able to monetize partners and introduce indirect monetization mechanisms (e.g., sponsored data and sponsored features such as ultra-low latency.)

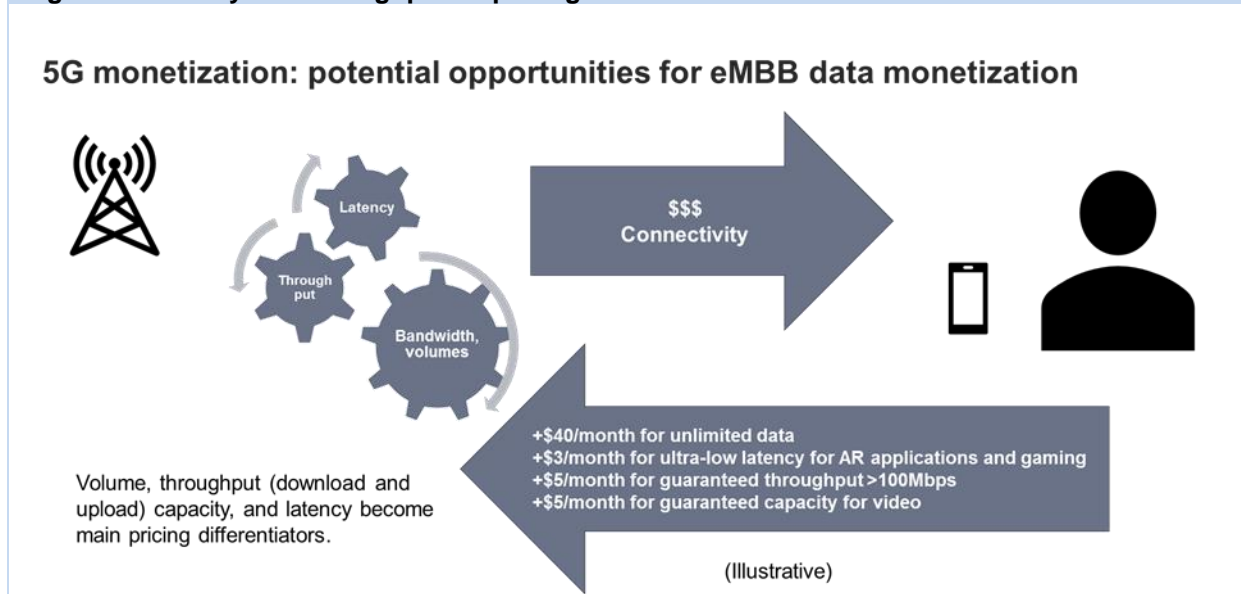**Figure 4: 5G-driven consumer attitude toward usage and willingness to pay**
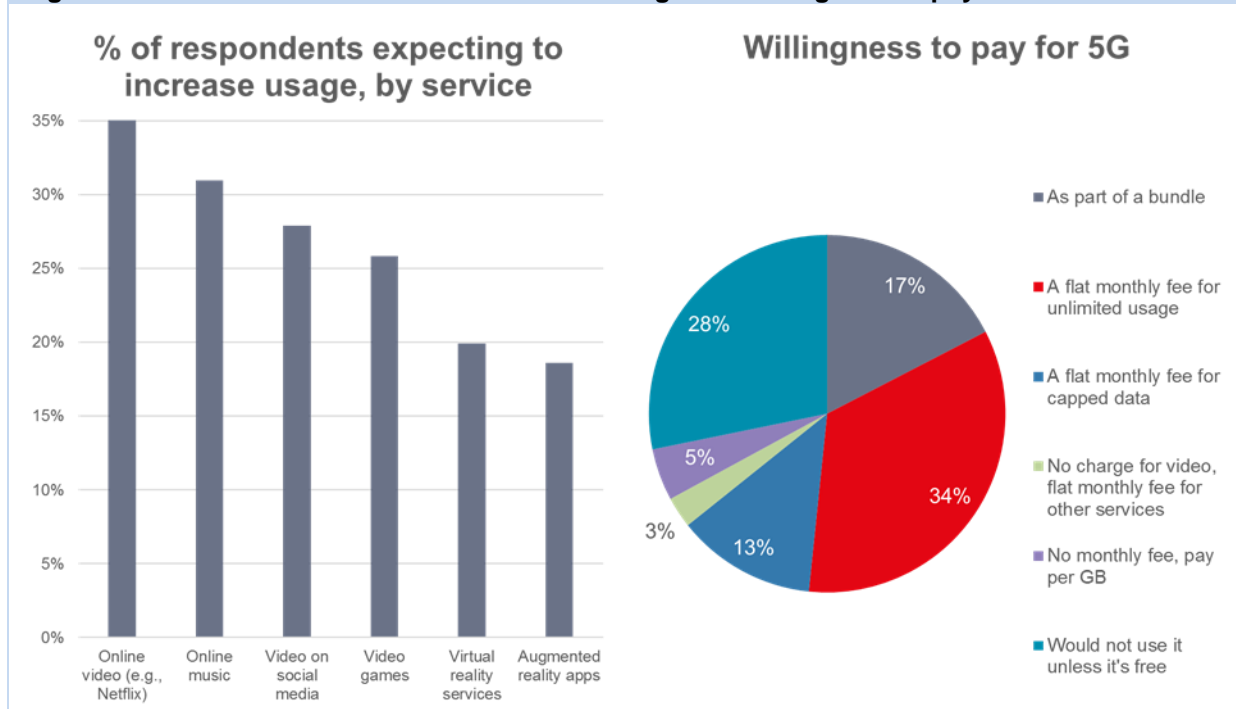
Enhancing the eMBB business model: beyond data

- CSPs' pricing strategies for 5G are converging toward unlimited data plans.
- CSPs need to implement new monetization levers that enable unlimited plans to differentiate and charge customers by throughput, latency, and bandwidth availability.
- These new capabilities are required for direct monetization (e.g., subscriptions) and indirect monetization (e.g., cloud-based content partners).

When consumer mobile price plans turn to unlimited data, which is the natural trajectory for most markets, the eMBB business will have to be equipped with additional monetization levers. Some of these will be direct to consumer, but many will be indirect or hybrid B2B2x business models.

- **Direct monetization.** Enhancements to paid-for connectivity will include pricing levers such as guaranteed throughput (e.g., download speed >1Gbps) or guaranteed latency (e.g., latency <5ms). Rather than a bundle of data, voice, and messaging, future price plans will be differentiated by a combination of data – often unlimited – and guaranteed levels of throughput and latency for specific applications.
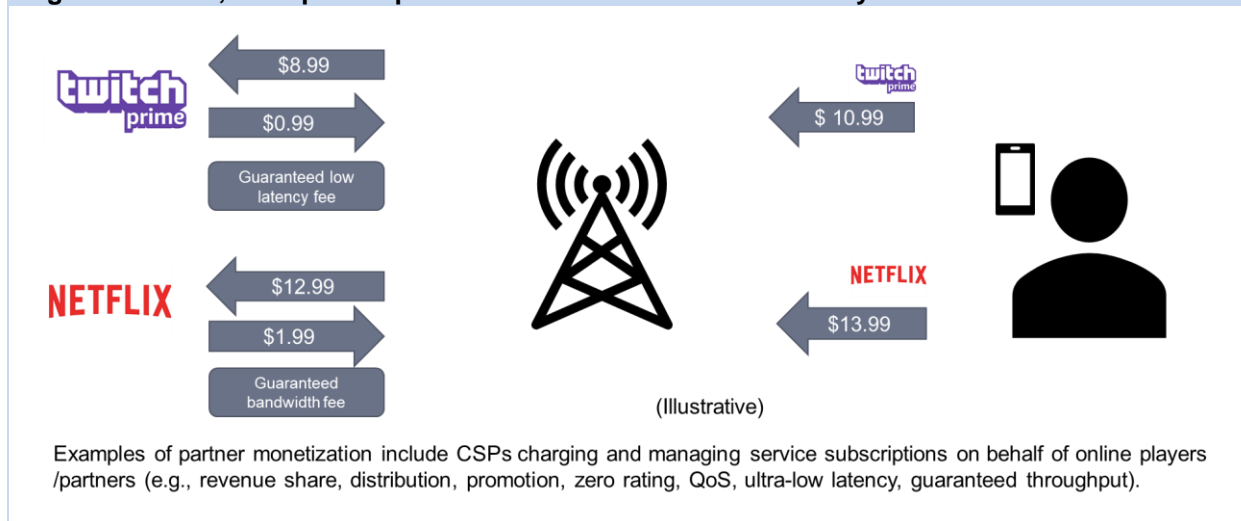
Figure 5: Latency and throughput as pricing levers for eMBB monetization

5G monetization: potential opportunities for eMBB data monetization

$$$ Connectivity

+$40/month for unlimited data
+$3/month for ultra-low latency for AR applications and gaming
+$5/month for guaranteed throughput >100Mbps
+$5/month for guaranteed capacity for video

Volume, throughput (download and upload) capacity, and latency become main pricing differentiators.

(Illustrative)

Source: Ovum

- **Partner monetization (B2B2x).** Monetizing partners is not new, but in the 5G context it will take on new dimensions, in terms of both the opportunity size and the number of potential partners. As an example, CSPs can distribute Twitch prime subscriptions and charge end users the full retail price of $10.99 through direct carrier billing. They would retain $2 per subscriber but also receive $0.99 per subscriber from Twitch for guaranteed ultra-low latency during a live e-sports event.

Figure 6: eMBB, examples of partner monetization with low latency and bandwidth

twitch prime $8.99
$0.99
Guaranteed low latency fee

twitch prime $10.99

NETFLIX $12.99
$1.99
Guaranteed bandwidth fee

NETFLIX $13.99

(Illustrative)

Examples of partner monetization include CSPs charging and managing service subscriptions on behalf of online players /partners (e.g., revenue share, distribution, promotion, zero rating, QoS, ultra-low latency, guaranteed throughput).

Source: Ovum

The FWA business model: beyond fixed broadband access

- Monetization of wireless broadband for the home will require CSPs to be able to rapidly manage a vast number of partners. Capabilities such as touchless (e.g., API-based) integration of hardware and software services will be essential.

- Business models evolve rapidly and frequently require a combination of B2B, B2C, and B2B2x capabilities.
- Monetizing partners requires CSPs to be able to charge for bandwidth, reserved capacity, and low latency as required by providers of services.

Fixed-wireless access is exactly what it says it is, 5G broadband connectivity as a replacement for fixed connectivity. Alternatively, it has been offered as a redundant second link in case the primary link is unavailable, especially for services such as security. Smart home scenarios are likely to be an opportunity for CSPs to add value to the basic service, paid for either by direct customers or by partners that need to provide additional network features to their end users. Therefore, even this apparently simple product is likely to need B2B2x support.

Unlike eMBB, partners in FWA will not be web-scale operators but rather companies that are modernizing a portfolio of traditional products. For example, CSPs could play a crucial role in allowing companies such as Yale to sell subscription services as well as locks.

The evolution of business models for connected-home services will see CSPs selling, supporting, and enabling third-party services but also providing paid-for connectivity on demand. In some cases, such connectivity will be partially paid for by connected-home partners, in others entirely by consumers, and, in yet other cases, subsidized by partners for a specific set of applications with a specific set of network features.

Figure 7: Examples of FWA monetization options
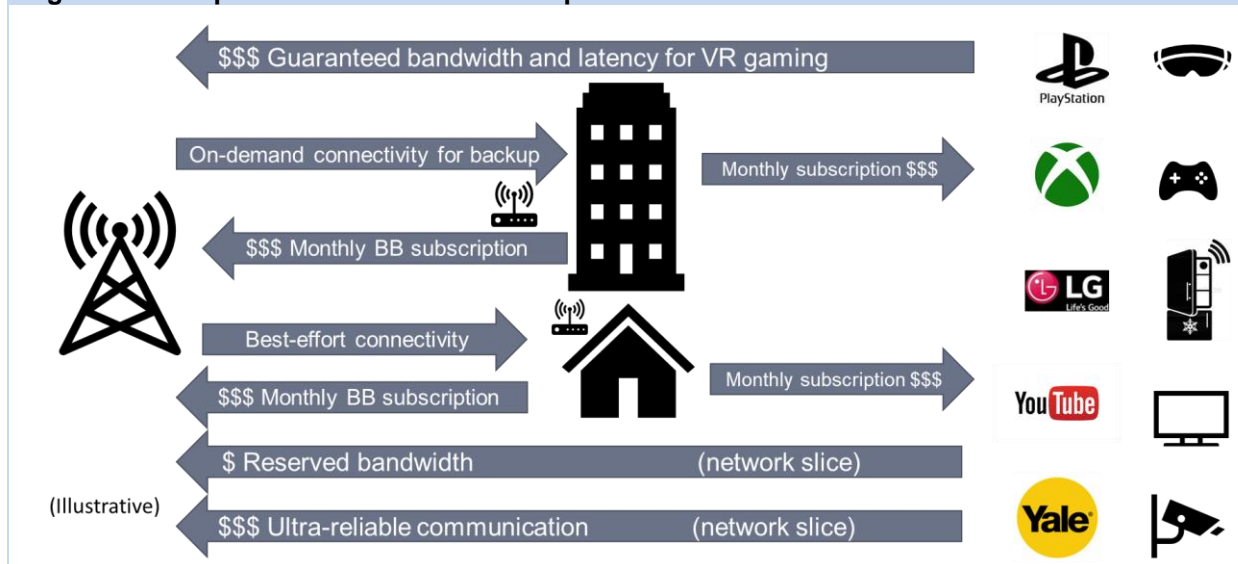
Source: Ovum

5G monetization in B2B: CSPs will not be able to identify all winning use cases

Virtually every sector of society and the economy has been named as the driver for 5G. But the reality is that use cases are far from mature and neither is operators' role beyond connectivity. A range of stereotype use cases has emerged, largely because they are eye-catching and relatively easy to

demonstrate. These are not, however, driven by demand from the vertical industries but rather by a technology push from the telecoms sector.

Ovum thinks it is crucial to keep in mind the lessons from the development of the internet and the smartphone ecosystem. Industrial customers, vendors of their capital equipment, independent software developers, and others need scope to define 5G for themselves. The idea of "verticals" is seductive precisely because it gets rid of the diversity and complexity of the industries themselves. It is at least as likely that a horizontal strategy will work – concentrating on the common requirements that span different industries, processes, size classes, and geographical markets.

A horizontal strategy permits CSPs to apply the 5G core capabilities at scale

This section aims to discuss and highlight four main enterprise use cases. Each case is designed to demonstrate horizontal capabilities that could apply to diverse industrial companies, in the context of a specific vertical. The horizonal approach is intended to highlight how CSPs can achieve scale by focusing on 5G capabilities that are common to multiple verticals, while the vertical context is included to help visualize each use case. As we go down the list, we will engage more capabilities and move up the value chain:

- Wireless bandwidth on demand for retail.
- Hybrid MVNO for logistics.
- Private wireless for Industry 4.0.
- Campus network for healthcare.

Figure 8: A horizontal strategy permits CSPs to apply the 5G core capabilities at scale
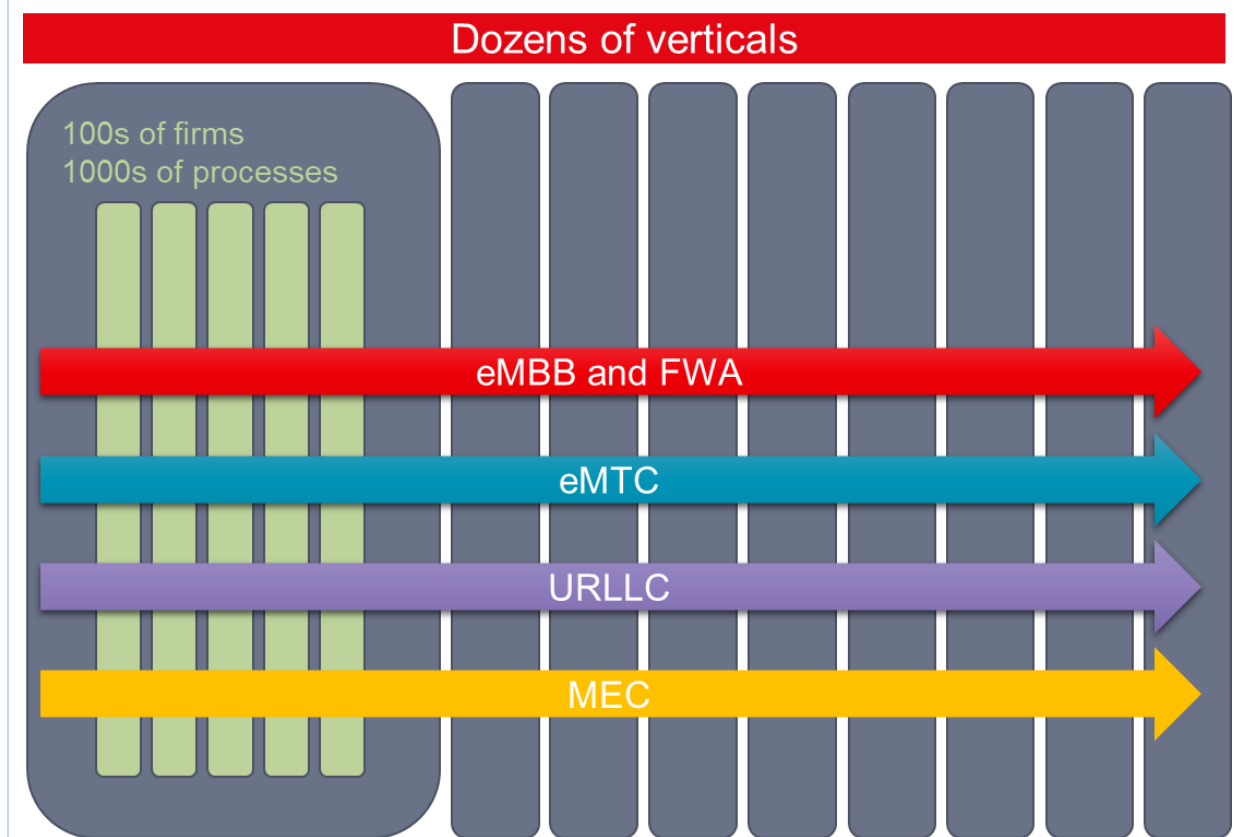
Source: Ovum

Use case: bandwidth on demand for retail

- Even this simple use case requires enhancements to the core capability of the monetization platform, such as on-demand provisioning, a strong API, and support for managing large groups or fleets of connections.
- Money flows from customers to CSPs, either direct or via the MVNO channel.
- Instant service is a unique selling point against fixed options.

The first use case is relatively simple and connectivity focused. A CSP provides mobile broadband connectivity – whether FWA or eMBB – to business customers that are billed on a normal volume basis. The unique selling points here are first that 5G can offer fiber-like speeds up to 1Gbps and second, being wireless, it can deliver a service as soon as the equipment is delivered to the customer. This is valuable for businesses that need to open new locations with branch-office connectivity regularly, that need to support special events, or that are growing fast. An example would be a retailer that regularly opens "pop-up" stores.

As well as supporting point-of-sale, stock-keeping, and general productivity applications, such a customer might also use CCTV and security technology, guest and employee Wi-Fi, telephony, and various kinds of media such as video walls, music, or perhaps AR/VR or gaming experiences, and might use quite a lot of bandwidth. It is not unlikely that provisioning an internet service from a fixed operator might be the slowest, rate-limiting step in its rollout.

In this case, the revenue model is not much different from anything we saw with 4G. Payments flow from enterprise customers to CSPs in exchange for service, whether on a postpaid or a prepaid basis. (Some 4G operators provide very large prepaid bundles for applications such as newsgathering and film production.) CSPs might, and probably should, choose to offer additional cloud services or software applications as part of a bundle, but this is not qualitatively different from enterprise service marketplace offerings that are common today.

Table 2: Bandwidth-on-demand business model

	Business model type	Revenue model (who pays)	CSP provides	Key monetization challenges	Adjacent opportunities	Potential scale
Bandwidth on demand	B2B	Customer (direct)	eMBB and FWA	Create and deliver at speed Complex groups and hierarchies	Apps and cloud service bundling	High (but relatively low value per customer)

Source: Ovum

From a platform perspective, though, the value is in the ability to switch service provision on and off quickly and programmatically. This will require enhancements to the core capability of the monetization platform, as this is crucial to the entire use case. Expectations are likely to be set by the performance of cloud computing providers and some IoT players, which can provide service close to instantly online. Carriers such as AT&T and Colt have had considerable success in the fixed domain with on-demand Ethernet services, but only after investing substantially in network automation.

Use case: hybrid MVNO for logistics

- CSPs must be able to price new services such as eMTC and positioning, compute third-party contributions or revenue shares, and set up bundles automatically.
- Revenue from the customer is shared by the CSP and a wholesale partner.
- Revenue management must support complex, tailored business models.
- The use case offers combined IoT and enterprise mobility.

Our second use case concerns a customer that needs to track assets and support specialized applications across wide areas but also within its own facilities, which may be very high density – possibly a giant distribution warehouse – or else isolated – possibly a remote oil and gas production site – and therefore needs some infrastructure of its own. The customer here is in the logistics industry, but similar scenarios exist in the energy and mining sectors.

The customer needs IoT support but also services more like enterprise mobility, and it may need international roaming. The CSP provides an enhanced MVNO service providing for this. In this case, eMBB and IoT support are required, as is network slicing, and the CSP's operational IT will have to make this possible.

Product definition, charging, and both business and operating models are likely to be an order of magnitude more complex. The use case derives much of its value from the high degree of control it gives the customer, which has consequences for the monetization platform. Both customers and service agents or channel partners will have to be able to compose services within the CSP's systems. This also means that the CSP will have to be able to price the individual services, including new elements such as eMTC connectivity and positioning, and compute any bundling premium,

discount, third-party contribution, or revenue share automatically at the time of setup. Support for large fleets of enterprise users is even more important.

Table 3: Hybrid MVNO business model

	Business model type	Revenue model (who pays)	CSP provides	Key monetization challenges	Adjacent opportunities	Potential scale
Hybrid MVNO+	B2B	Wholesale	MTC, eMBB Network slicing	Create and deliver at speed Complex groups and hierarchies	Enterprise mobility	High (medium value per customer)
		Revenue sharing		Partner ecosystem		

Source: Ovum

Use case: private wireless for Industry 4.0

- The customer may own some or all of the infrastructure and may control the spectrum involved. This degree of tailored service will be unprecedentedly challenging for the operational platform.
- Time-sensitive, multiprotocol networking is required for industrial applications.
- Onsite infrastructure and integration between local and wide-area networking become important.
- Revenue management needs to support managed services, cloud resources, and outcomes-based business models.

In a more complex industrial setting – something like an automotive plant or potentially a container port or an oil refinery – the density of IoT devices, human users, and computing systems may rise to the level where a local high-speed network is needed. Autonomous vehicles and other robots are more likely to succeed in such a relatively closed environment. With a challenging RF environment, multiple network protocols, and time-sensitive safety-critical applications, there is a need for private connectivity with infrastructure set up on site.

Such a customer is also likely to be interested in compute as well as communications, bringing the multi-access edge computing (MEC) element of 5G into play as well as its IoT and low-latency capabilities. In this case, the customer may own some or all of the infrastructure, and may even control the spectrum involved. This degree of tailored service will be unprecedentedly challenging for the operational platform.

Table 4: Private wireless business model

	Business model type	Revenue model (who pays)	CSP provides	Key monetization challenges	Adjacent opportunities	Potential scale
Private wireless	B2B	Customer	MTC, eMBB Network slicing URLLC MEC	Create and deliver at speed Complex groups and hierarchies Cloud ready Vertical business models	Enterprise mobility Cloud computing Wide-area IoT	Small (but high value)

B2B2x	Revenue sharing	Managed infrastructure	Partner ecosystem		
B2B2x		Outcome-based pricing	Multiple pricing models	Charging and rating for outcome-based models	Professional services Upfront financing

Source: Ovum

Use case: campus network

- This use case requires the ability to bill for quality-of-service parameters such as low latency and jitter, cloud computing resources in MEC, and support for infrastructure deployed on user premises.
- It offers a Wi-Fi competitor for sites with a high density of high-bandwidth users (humans rather than machines).
- Revenue management must support billing for quality as well as volume.

Our final, campus network, use case is similar, with a different balance between mobility and IoT on one hand and fixed-wireless, video, and perhaps AR/VR on the other. We see this as the sort of thing that might appeal to a major healthcare facility – hospitals have been accumulating a wide variety of operational technology on disparate networks. However, it could also be an enterprise HQ campus.

Like the previous use case, it is both highly valuable and very challenging for the operational IT platform. These use cases strongly require the ability to bill for quality-of-service parameters such as low latency and jitter, cloud computing resources in MEC, and support for infrastructure deployed on user premises.

A wider range of revenue models is also possible. In the energy industry and in the IT outsourcing sector, outcome-based pricing lets providers share the productivity gains from a project with the customer. The ability to capture some of the productivity gain for the CSP while financing the upfront deployment costs could be very valuable as a driver of adoption.

Table 5: Campus network business model

	Business model type	Revenue model (who pays)	CSP provides	Key monetization challenges	Adjacent opportunities	Potential scale
Campus network	B2B	Customer	eMBB Network slicing URLLC MEC	Create and deliver at speed Complex groups and hierarchies Cloud ready	Enterprise mobility Cloud computing Wide-area IoT WLAN replacement	Small (but high value)
	B2B	Outcome-based pricing Partnership with vertical specialists	Total solution	Multiple pricing models Partner ecosystems Rating for outcome-based pricing	Professional services Upfront financing	

Source: Ovum

The crucial point, though, is that outstanding operational support – including revenue management but also service creation, provisioning, and automation – is a requirement for all four use cases and a

foundational challenge for the whole project of 5G. In an important way, the operations platform is the fourth element of 5G next to eMBB, URLLC, and MTC.

Figure 9: The use cases and the 5G key capabilities

Colored squares show which capabilities are relevant to each use case

Source: Ovum

Enabling platform and operations changes required for 5G monetization

Monetization platforms will need to support multiple scenarios

In the first phase of 5G deployment, the operations and revenue management challenge is likely to be very similar to that for 4G, with enhancements for on-demand provisioning and better partner monetization. As advanced capabilities flow into the network, though, use cases will become more complicated and the challenge will increasingly be one of "composing" 5G capabilities into either products or else bespoke solutions for individual customers in B2B. The flow of money may also be different from what we are used to. This requires the combination of network automation in the back-end, the integration of service creation and customer service/e-commerce systems, and the creation of robust APIs, all as part of a common business layer.

Table 6: Monetization capabilities for 5G in phases 1, 2, and beyond

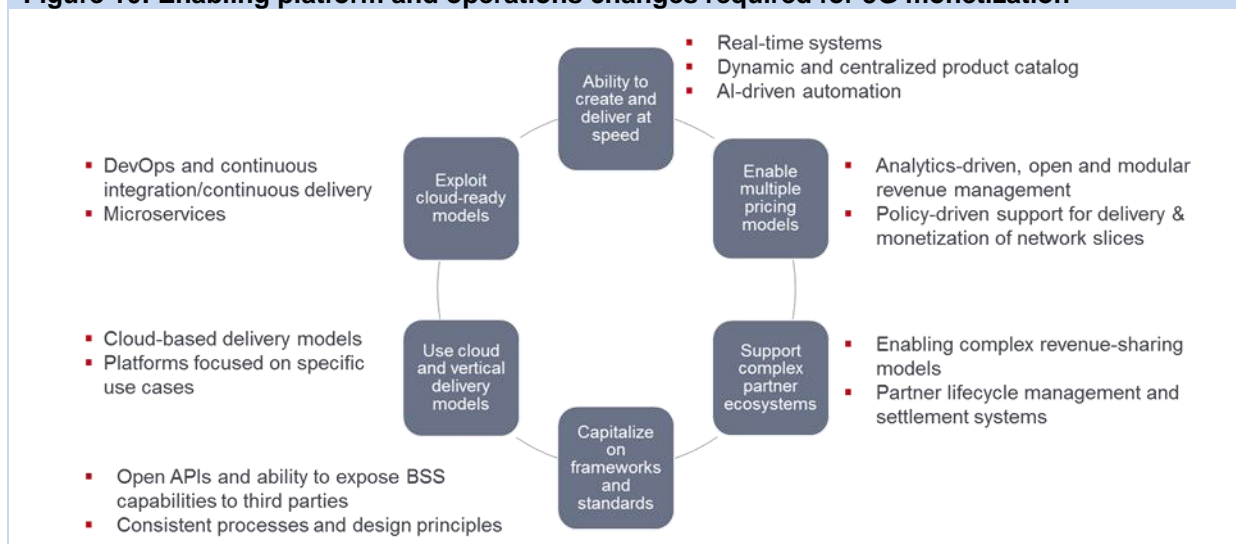|	Create and deliver complex services at speed	Complex partner ecosystems	Multiple pricing model	Cloud ready	Supports vertical business models
Retail bandwidth on demand	Crucial	Out of scope	Out of scope	Preferable	Preferable
Hybrid MVNO for logistics	Crucial	Out of scope	Crucial	Crucial	Crucial
Private wireless for Industry 4.0	Crucial	Preferable	Crucial	Crucial	Crucial
Campus network for healthcare	Crucial	Out of scope	Crucial	Crucial	Preferable

Beyond R16, the monetization challenge becomes much more complex, needing greater service composability, support for network slices and groups of slices with separate pricing, and most of all, delegating control to users through the API.

Operations changes required to support 5G monetization

The 5G use cases described in this paper will only be possible if CSPs have the platforms and operations in place that can support and monetize complex B2C, B2B2x, and B2B business models. There are two main layers of complexity that need to be addressed. First, there are the multiple business objectives that need to be aligned if CSPs are to generate real benefits from 5G. The second layer is the sheer variety of changes to the platforms that enable 5G monetization that need to be put in place to support these business objectives (see Figure 10). In the following section we will highlight the complexity of the undertaking and the need to put in place platforms and operational changes and to align these with business objectives.

Figure 10: Enabling platform and operations changes required for 5G monetization

Ability to create and deliver at speed

The requirement to deliver services at speed is not just a function of the technology; it is also a business imperative. To make money from 5G, CSPs will need to launch more services, faster, on a fail-fast basis. The capabilities required for real-time delivery of services, features, and price plans include real-time order management, provisioning, and configuration. It will also be essential that rating, billing, and charging of services do not lag behind. CSPs will need to break down existing silos between business support systems, including

- revenue and customer management systems
- charging and policy
- partner management and settlement
- product catalog and e-commerce.

To effectively deliver and monetize 5G services, CSPs will need to have a consolidated and simplified catalog. CSPs will also need to improve automation. For example, with the private wireless for Industry 4.0 use case described earlier, it is impossible to envisage efficient revenue management without an extremely high level of AI-driven automation.

Capabilities to enable complex use cases and multiple pricing models

In an environment where multiple business and charging models will be clamoring for attention, it will be essential that rating, billing, and charging systems are flexible enough to support a wide range of pricing models. They will be required to be flexible and online to support low latency and dynamic scaling, converged services, or IoT services that involve charging for very small amounts, often at enormous scale. These systems will also be required to support B2B use cases with large group-sharing arrangements, often with complex hierarchies.

Services based on network-slicing models will be particularly challenging for operations systems to support. For example, with the healthcare campus use case described earlier, there will be a need to bill for quality-of-service parameters such as low latency and jitter and for cloud computing resources in MEC. To monetize these network slices, CSPs will need to dynamically provision, assure, and charge for services incredibly quickly, ideally in a matter of minutes. Policy control will play a major role in monetizing network slices.

Supporting complex partner ecosystems

One of the core transformative aspects of 5G is the fact that it will enable CSPs to create and monetize new partner ecosystems and to monetize long B2B2x supply chains. The hybrid MVNO for logistics use case described earlier provides an example of a situation where the revenue management system needs to support revenue share and third-party contributions.

Partner management systems capable of supporting such models will need capabilities that include onboarding, dynamic product catalog, charging, and settlement as well as customer care portals, policy-driven marketing, and real-time analytics. CSPs will also need comprehensive partner lifecycle management and integrated settlement systems.

Capitalizing on underlying frameworks and standards

Industry frameworks and standards are an important component of the 5G operations and something that CSPs need to take seriously. The 3GPP charging standards work has made progress, with Release 15 defining a new charging architecture for 5G and specifying charging services within a service-based architecture. Release 16 is producing specifications for network slice charging, network exposure charging, and other types of charging.

In parallel, there are also common industry initiatives looking to support open capabilities in this space. An example of this is the work the TM Forum has been doing around its suite of 50+ REST-based open APIs. Common APIs are crucial to the partner monetization opportunity in 5G. However, it is not enough to just make APIs available; there is also the need to have the processes and design principles in place that allow for rapid standardized API creation and composition.

Using cloud and vertical delivery models

Flexible and scalable deployment models are an essential part of the 5G operations story. These are the key selling points of cloud-enabled BSS. IoT business models, especially, are likely to be very sensitive to support systems costs due to their structurally low ARPU, while use cases such as retail bandwidth on demand will require operations systems to scale up and down easily and inexpensively. Hence the appeal of cloud.

There are benefits to having centralized BSS platforms capable of supporting multiple business models, but for many CSPs a major transformation project is a daunting and costly undertaking. For

this reason, it may make more sense for CSPs to make use of vertical solutions, where new platforms are focused on specific B2B, B2B2x, or IoT use cases. Timelines are likely to be an issue as well because of CSPs' existing enterprise platforms being in urgent need of modernization. In such situations, CSPs may wish to consider deploying dedicated platforms that are tailored to the needs of specific industry verticals or use cases.

Exploiting cloud-ready models

CSPs can gain agility and save cost by moving to a cloud environment, but to achieve the full benefits of scalability and increased business agility, CSPs need to invest in next-generation cloud technologies such as microservices.

Microservices-based architectures will offer CSPs several benefits such as the ability to quickly roll out upgrades to targeted services and to support the complexity inherent in 5G use cases. CSPs will also need to adopt DevOps and continuous integration/continuous delivery (CI/CD) business delivery models before making the transition to microservices. Continuous innovation will be key in an environment where CSPs need to enable and monetize new services such as dedicated on-demand network slices.

It is this fundamental need for agility that will be a major driver of revenue management and operations systems change. One-off solutions and quick fixes will not be sufficient to support this fast-moving 5G service environment. This is why, if they are to fully monetize 5G opportunities, CSPs need a fundamental shake-up of their revenue management and operations systems.

Appendix

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