

A young woman with voluminous curly brown hair is smiling and looking down at a smartphone in her hands. She is wearing large white over-ear headphones and a plaid shirt over an orange turtleneck. The background is a blurred city street scene.

From Bit Pipe Provider to Taking Centre Stage in the 5G SA Digital Value Chain

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Device Support for 5G SA

Each year Apple roll out the latest version of iOS. At the recent Apple WWDC (Worldwide Developers Conference) in June, Apple announced that iOS 17 will be available to the public in mid-September. iOS 17 will be the first major release of Apple's operating system to support 5G SA. Apple has provided 5G SA support on its beta version of iOS 16.4, which was launched in March 2023, giving a view of what was to come.

Apple have announced that iOS 17 supports 5G network slicing. This means that Apple Devices running iOS17 will be able to offer organisations the ability to assign specific network slices to managed apps on their CSP's 5G SA

network. Once assigned a slice on the Mobile Device Management (MDM) app network traffic for a designated managed apps (e.g. ERP, on-line meetings app) will be routed to the slice identified by a specified Data Network Name (DNN).

With a 30.44% share of the global smartphone market, (source: Obrelo, May 2023) Apple is the world's leading supplier of mobile phones. The support for 5G SA is significant as it now means that iPhone users can experience the speeds that 5G SA can provide when their CSPs roll out 5G SA. As an example, in the US T-Mobile announced in March 2023 that they had reached download speeds of up to 3.3Gbps on 5G SA and followed this up by announcing in May that they had reached uplink speed of up to 200Mbps. Apple's support for 5G SA in iOS 17, plus 5G SA support in Android 12 and 13 can help speed up roll out and 5G SA adoption.

With several CSPs announcing significant cost control measures in light of falling ARPUs and commoditisation of their key service (data connectivity), the opportunities that will come with 5G SA couldn't come at a better time for CSPs, to enable them to accelerate change and transform how they do business.



5G SA Value Chain

HOW CSPs CAN SELL ASSURANCE TO CUSTOMERS AND PARTNERS

With 5G SA CSPs can take a more central role in the digital economy and serve consumers and enterprise customers with a wider range of services. The move to sell more services ‘beyond connectivity’ can be accelerated with 5G SA, as CSPs can now control and manage the level of network service quality and the customers’ experience.

Network slicing is a central component of 5G SA and this enables CSPs to allocate specific quality of service, bitrate throughput and latency for specific services, devices, customers and partners. This means that CSPs can go from selling data to selling experiences and assurance. With 4G and 5G NSA (non-stand-alone) data speeds (and therefore the customer network experience) could not be guaranteed. Despite massive investment in 5G RAN (radio access networks) and spectrum CSPs struggled to charge a premium for 5G NSA. 5G SA offers the opportunity for CSPs to move from commoditised pricing to value-based pricing and increase revenues.

As can be seen in figure 1 below in the current 4G / 5G NSA value chain the CSP is often reduced to providing a commoditised delivery channel for digital content providers. End user customers pay a fixed amount per month to the CSP for all you can eat data. In many countries mobile APRUs are falling making it difficult for CSPs to operate profitably using the existing model.

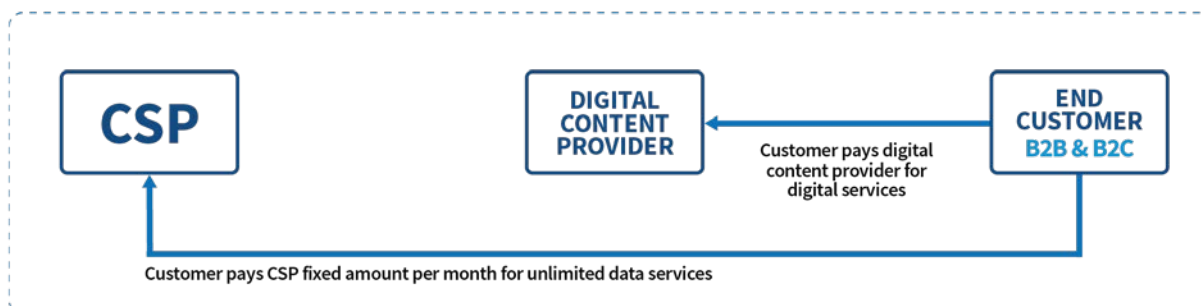


Figure 1: Typical 4G / 5G NSA Value Chain

In 5G SA the CSP can be more active in the value chain. As well as getting connectivity revenues they can sell and assure the delivery of 3rd party digital content to end customers (see figure 2). In addition to bundling content, CSPs may also sell slices to guarantee quality of service (low latency, high speed) to customers to ensure the right experience when using all bandwidth-hungry services (e.g. HD video, gaming). Here the CSP is the 2nd B in the B2B2X model. This model is set to be a significant driver for 5G revenues, as a recent [Nokia survey](#) found that 60% of 5G revenues will come through the B2B2X business model.

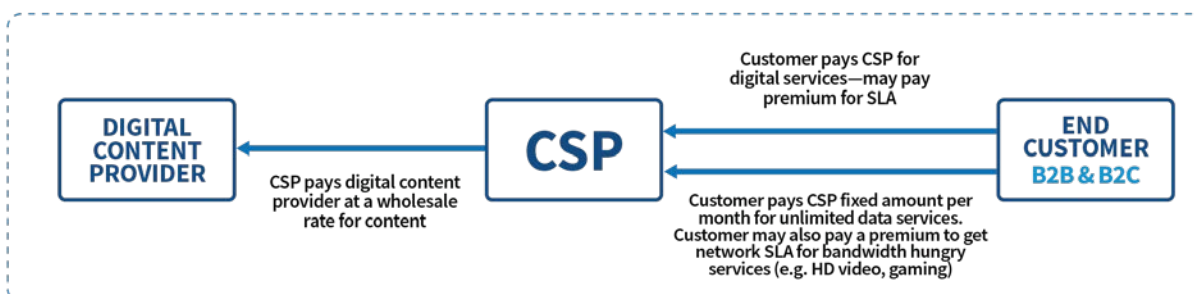


Figure 2: 5G SA B2B2X Value Chain - CSP Selling 3rd Party Content Direct

We can illustrate this by giving an example using mobile gaming which can represent a lucrative opportunity for CSPs, as gamers are a target group who are willing to pay for premium mobile connectivity for an enhanced gaming experience. According to the data.ai report [State of Mobile 2023](#) consumer spend on mobile games jumped from \$86bn in 2019 to \$100bn in 2022. Downloads of mobile games jumped from 68bn to 90bn in the same time period. The data.ai report highlighted the success of the adoption of mobile games and rise in in-app purchases from leading games due to the fact that “mobile games are now capable of offering console-like graphics and gameplay experiences”. This focus on quality and delivering the best gaming experience for customers augurs well for gaming companies and CSPs looking to grow revenues in this segment.

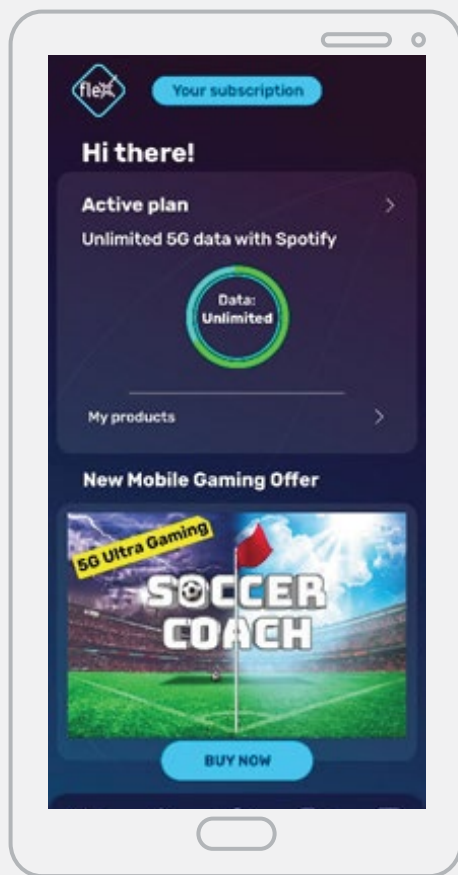


Figure 3: 5G Slice Based Gaming Offer

Let's take an example where a CSP partners with a gaming company to offer a mobile game called Soccer Coach. Here the CSP can offer the game on a dedicated network slice and position it as 'Ultra 5G', thus delivering the best graphics and gaming experience. Delivering the best gaming experience will help to provide satisfied customers, which can improve service adoption and help increase revenues from gaming subscriptions and also in-app purchases which provides growth for the CSP and the gaming company.

While moving to centre stage in the value chain it is important that the CSPs comply with net neutrality legislation. In the B2C market, devices may utilise slices with the

required network latency and speed to ensure an app (e.g. a game) delivers the right end user experience. The CSP can route the traffic to the correct slice, ensuring that the user gets the right experience. In order to comply with net neutrality laws CSPs cannot restrict a slice to certain business partners. They must make the slice available to all. So while CSPs can bundle apps with slices (as in the Soccer Coach) example, net neutrality restricts them from offering exclusivity.

CSPs can also open a new revenue stream of selling slicing as an SLA to ensure that customers get the best experience when using apps that require high speed / low latency. An example could be selling a 5G Ultra boost for, say, \$10 month, aimed at gamers to ensure that they get the high speed, low latency gaming experience from all games they play on their 5G SA device.

The other variation of this value chain is where the CSP sells connectivity as a service with a wholesale SLA to the digital content provider who then sells the content directly to the end customer. In this case the CSP is the first B in the B2B2X value chain. Sticking with the gaming example, in this case a gaming company (let's say Nintendo this time) could sell a gaming handset with an eSIM. Each time this handset is switched on it activates 5G SA connectivity for a particular gaming slice. Here Nintendo has the direct relationship with the consumer and is using 5G SA slicing to deliver the best gaming experience to their customers.

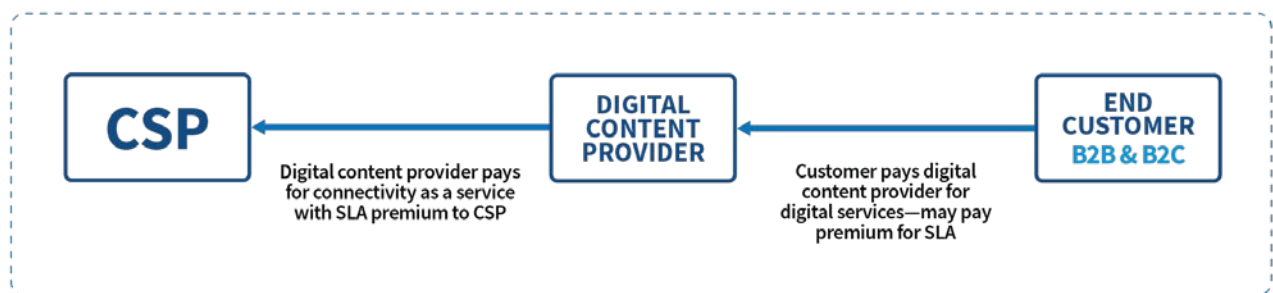


Figure 4: 5G SA B2B2X Value Chain - CSP Selling Assured 5G Slices to Digital Content Provider

The background of the slide features a close-up of a green leaf with water droplets. Overlaid on the left side is a network of yellow-green circular icons connected by lines. The icons include a heart with an ECG line, a mortar and pestle, a leaf, a pill, and a plant.

5G SA Makes CSPs an Attractive Business Partner for Digital Content Providers

For any company who is looking to provide bandwidth-hungry digital services the ability to ensure that these services are delivered as planned is essential. They also want to deliver the best customer experience and this sometimes can be impacted if network quality is not optimal.

Take the example of UHD TV Services. Sky TV are currently promoting a smart TV with bundled Sky TV and Netflix, called Sky Glass. Sky recommends a minimum of 25Mbps speed for this service. But in some cases, this may not be enough – e.g. for live 4K TV broadcasts a speed of 32Mbps may be required. Take a household with numerous connected devices active at the same time and you can see why broadband congestion and poor quality of service may be limiting Sky TV realising their revenue and customer satisfaction ambitions.

A CSP could partner with SkyTV to offer Sky Glass to their customers with a dedicated network slice with guaranteed QoS via 5G SA FWA to ensure the best viewing experience delivered at home. Also, with iOS 17 and Android support for slicing, this could be extended to smartphones so that family members can watch Sky TV in UHD quality when they're not at home, supported by a different 5G slice for Sky TV viewed on the customers' smartphones. This enables Sky TV to guarantee viewing experience regardless of device used, which will make the offer attractive to a wider audience. With 5G SA and support from all the main smartphone manufacturers this scenario is now possible.

There are many use cases where a company could make their digital services more attractive by building in 5G SA bandwidth on demand. As discussed above a gaming company could provide gaming handsets that when switched on activate an on-demand gaming network slice. There will be others where mission critical services can be enhanced with built-in 5G SA services. A hospital trust could

work with medical equipment manufacturers and CSPs to provide connected ambulances. The potential for new opportunities is huge and can open up many new vertical markets to CSPs, where the CSPs take a more central role in the value chain and open new revenue streams.





Assuring Network Quality

The key to CSPs taking a more active role in the value chain is that network quality can be assured. CSPs can develop service level agreements to retail customers and wholesale partners that guarantee network quality. This ensures that CSPs become attractive business partners for any company looking to deliver their services over a telecoms network.

The policy control function (PCF) in the 5G core controls and manages the set up and applies the rules on bitrate, latency and throughput for individual slices. This is integrated to the product management in the BSS and the convergent charging system (CCS) as can be seen in figure 5.

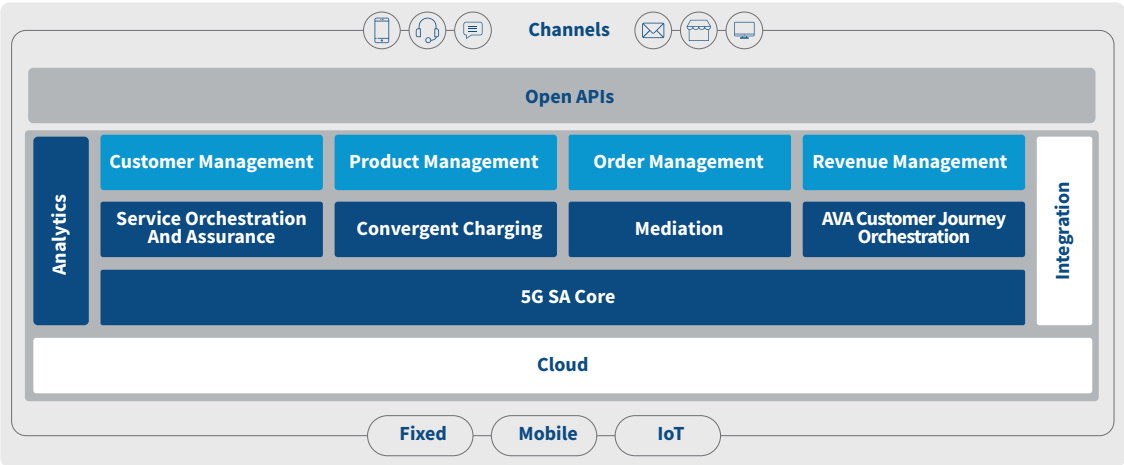


Figure 5: 5G Core, integrated with monetization and BSS



Managing Network Slicing to the Device

User Equipment Route Selection Policy (URSP) is a feature on leading policy control functions that delivers network slicing and policy controls all the way to the device.

Working with policy control, URSP enables the user equipment (UE) to dynamically switch among different network slices, depending on which application is running on the device. In this way, applications, based on their specific requirements, can be routed to dedicated slices based on the needs of the application, thus resulting in an enhanced user experience. In addition, there is multi-slice support meaning that a device can be connected to multiple slices simultaneously. This level of differentiation makes for many added-value experiences that can be monetized by the CSP.

URSP further benefits the CSP because it optimises the use of network resources and lowers operational costs by dynamically assigning specific policies using the policy control function. The CSP can set the configuration policies in advance per application or end user persona assigning them a specific slice or data network name (DNN) based on the use case: for example, the private profile for off-work entertainment and the professional profile for corporate applications or accessing specific network resources.

As part of the 5G Core the policy control function including the user equipment route selection policy needs to be integrated with BSS and monetization so that CSPs can manage and monetize the new services and business models that 5G slicing enables.



On-Demand Network Slicing

In June 2023 *Nokia announced* the successful trial of a solution that enables Android smartphone users to purchase and activate network slices on-demand from their operator. The move, which will be available to Android 14 users, will allow end users to enhance their experience across a wide range of applications such as gaming, streaming, broadcasting, and social media.

The solution enables operators to monetize 5G slicing services, for example, by offering premium network slices that can be purchased in selected areas based on customer demand.

The trial used Nokia's end-to-end slicing product portfolio, including its IMPACT entitlement and policy control servers and URSP technology implemented in Android 14. The IMPACT entitlement server verifies the network slice service availability, promotes

service packages for the end user, and sends purchased service options to the CSP's BSS, which activates the selected dynamic network slice policy for the user using URSP.

These new capabilities enhance the customer experience by allowing network slices to be tailored to support specific use cases and different kinds of applications based on network performance, quality, traffic routing, latency, and security. For example, a gamer could activate a new slice using local cloud gaming applications with an enhanced network performance, low latency, and edge slicing. Or sports event attendees could activate a 5G streaming slice to get fast access to video replays of event highlights, additional content, and insights related to their favorite athletes and teams. On-demand slices can also be enabled in the base stations serving concert arenas. This all opens up new revenue opportunities for CSPs as well as tailored solutions to deliver the optimal customer experience.

A person with blonde hair, wearing a black long-sleeved shirt, a black choker, and a pink and blue jacket tied around their waist, is standing on a concrete wall. They are wearing a VR headset and looking upwards. The background is a concrete wall with some graffiti.

Impact on BSS and Monetization

The impact of slicing on how many offers a CSP has will be significant. Video services can be supplied with different definitions (e.g. 4K) backed up with SLA so that the customer knows they will get the right viewing experience. New industrial applications such as 5G robotic production lines can be supplied and smart cities can evolve knowing that the mission-critical services (e.g. smart traffic management) will work as expected.

CSPs will get more partner requests and they can also sell 5G capacity on demand to business partners who want to spin up and monetize services. From a concert promoter looking to provide a 5G broadcast of a festival to the games company wanting instant SLA backed 5G connectivity to gaming handset when the handset is switched on and active, many businesses can see 5G as the delivery channel for their services and as such will be willing to pay a premium to have this channel backed up with a SLA which ensures the end user customer experience.

There will be pressure on CSPs to quickly capitalize on these new opportunities, new markets and new business models.

MORE OFFERS, LAUNCHED FASTER

A TM Forum CSP survey and report (*Transforming BSS, July 2023*) reported that the average CSP takes 2 – 8 weeks to launch a new product or offer. The most agile CSPs can launch a new offer in under a week, while less agile CSPs take 2 months. Time to market is a key competitive advantage for CSPs and only 17% of CSPs are happy with speed at which they're currently able to launch new products. A massive 81% want faster time to market.

TM Forum Transforming BSS

CSP Survey – Key Findings

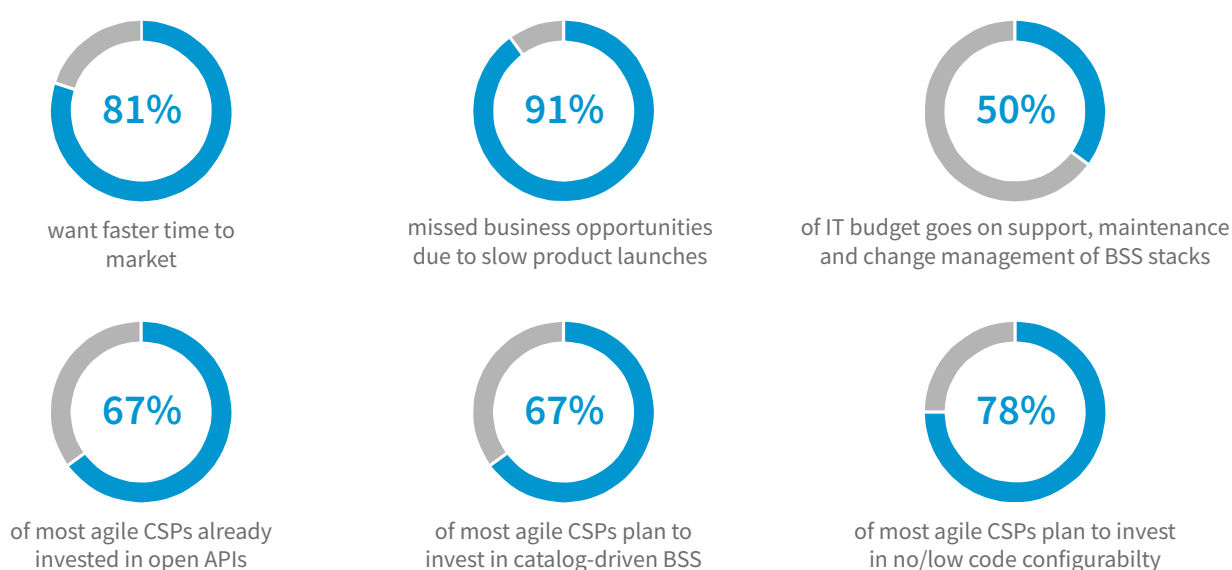


Figure 6: TM Forum BSS Transformation Report (July 2023) Key Findings

Slow time to market increases opportunity costs. CSPs using BSS stacks that don't deliver the required agility and fast time to market are missing out on opportunities. 91% of CSPs have missed out on business opportunities due to slow product launches. As well as opportunity cost there is the question of IT spend just to keep the lights of legacy stacks on. The average CSP spends around half its IT budget on support, maintenance and change management for its BSS stack. As the velocity of change increases so will the rate (and cost) of change management which only goes to increase the level of technical debt.

The number of new CSP offers is increasing, with 49% of CSPs planning more product launches in 2023 than in 2022. This number jumps to 77% in Latin America and 56% in Asia-Pacific.

This change is resulting in CSPs investing in agility. Figure 7 below shows the average CSP's investment plans to boost flexibility and agility.

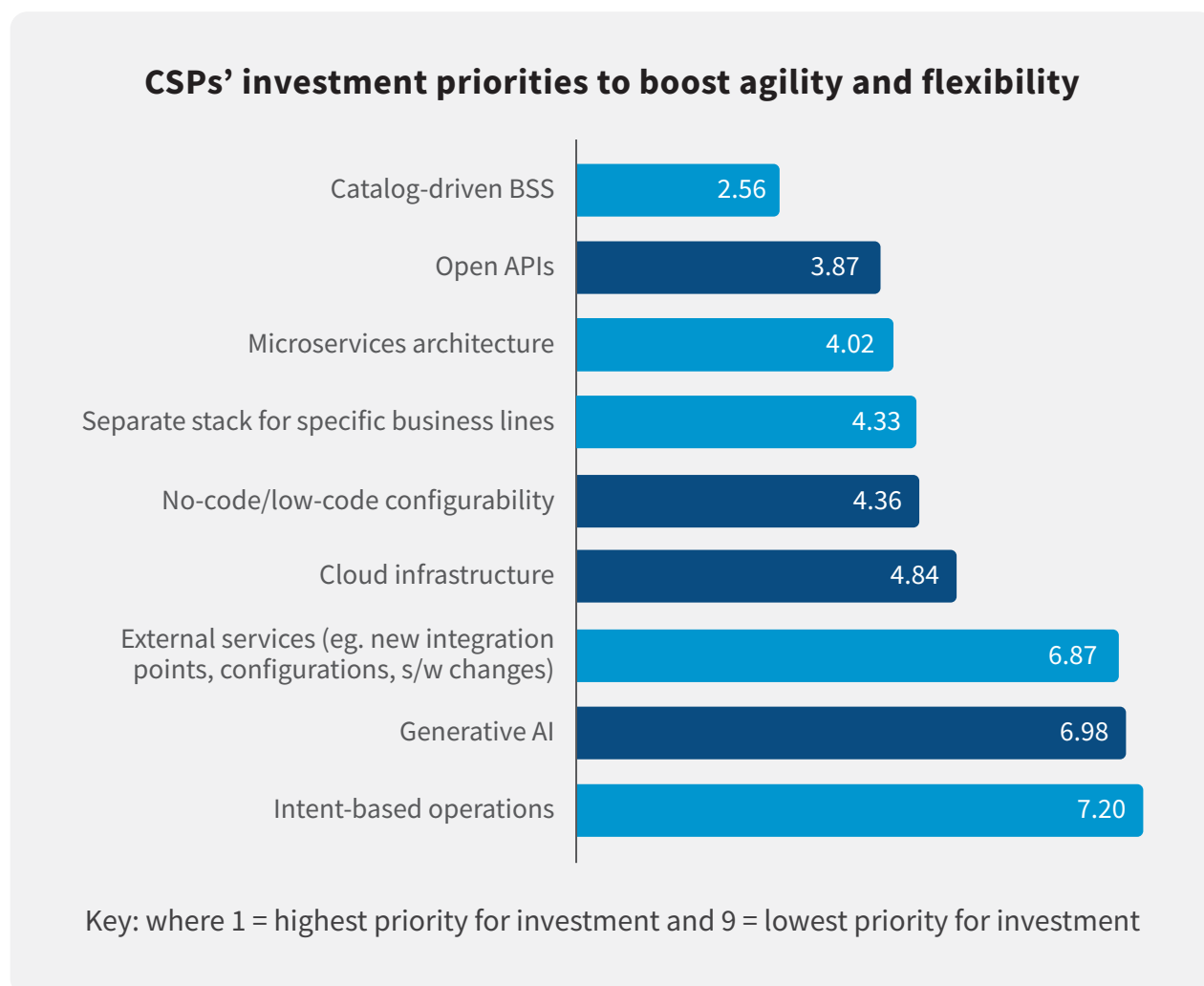
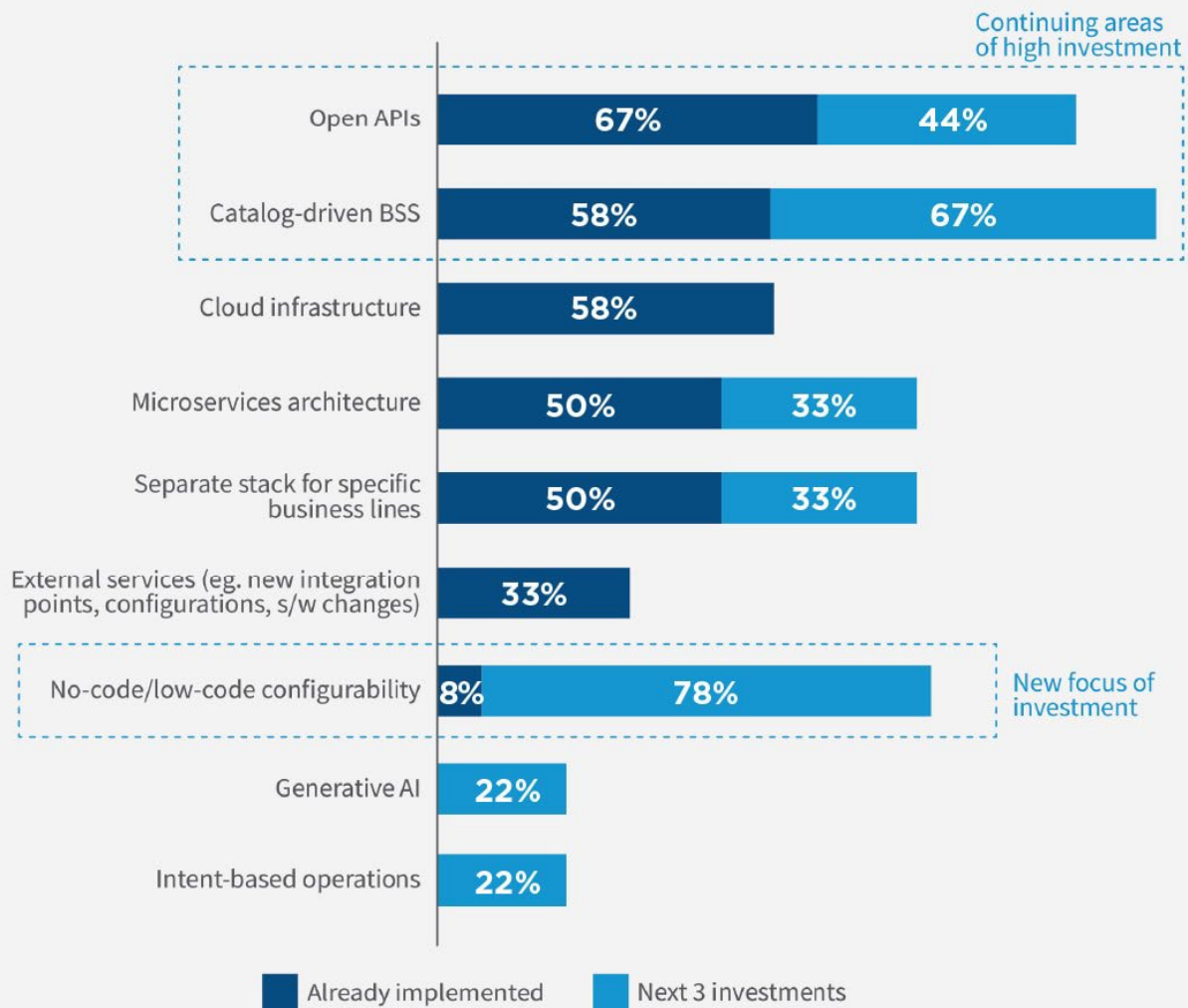


Figure 7: Average CSPs Investment Priorities to Boost Agility and Flexibility

Many CSPs already enjoy a fast time to market and agile operations. When we look at the top 3 investment priorities of the most agile CSPs (those who can launch offers in less than a week) a different picture emerges. We can see from figure 8 below that 58% have already implemented a catalog-driven BSS, 67% have open APIs and 58% already have cloud infrastructure. With regards to where these agile CSPs see their main investments, 78% see no/low code configurability as a new focus of investment to take them to the next level of agility.

Top 3 areas of investment for most agile CSPs

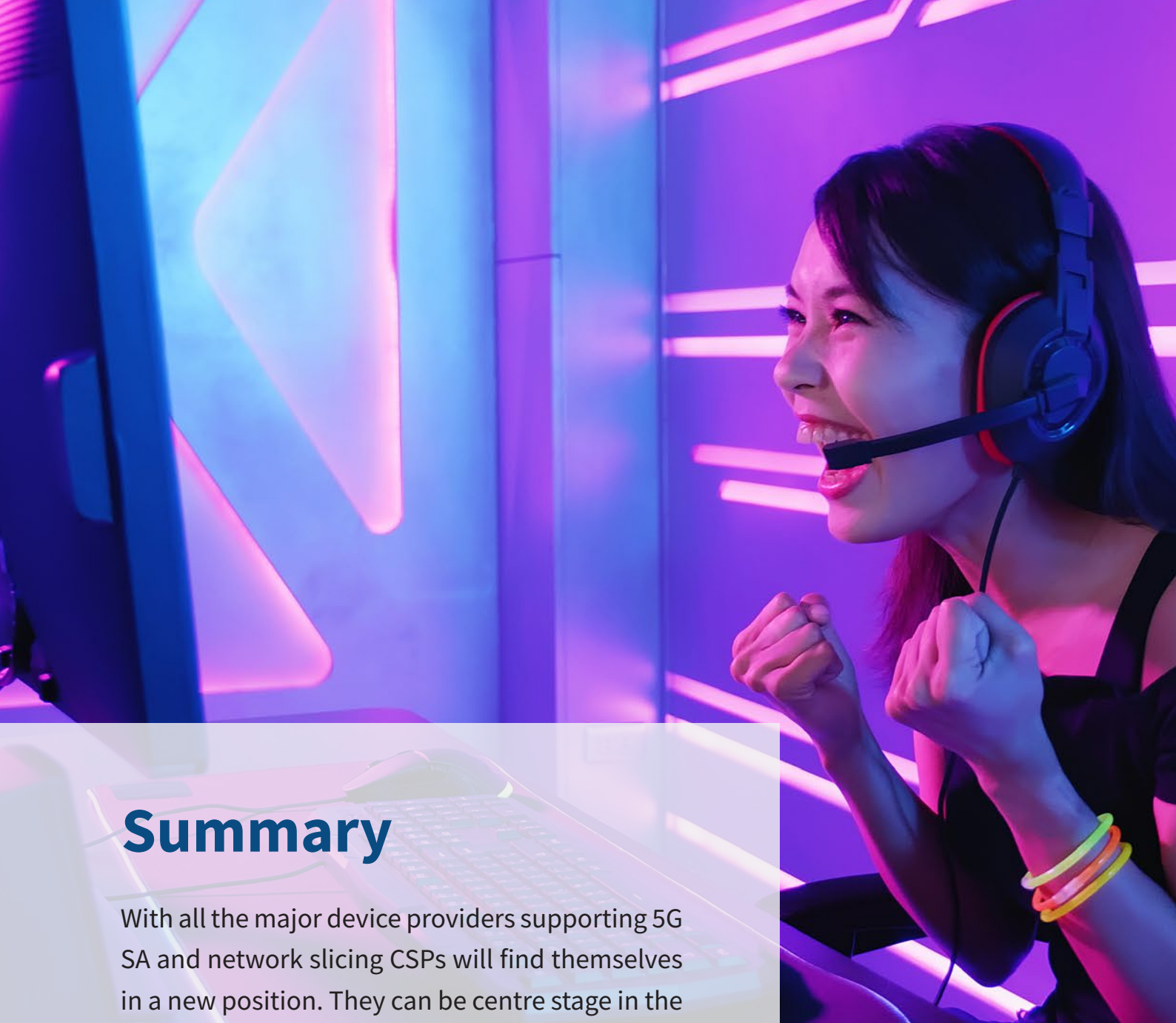


Key : diagram shows the percentage of top performing CSPs (those which can launch products and offers in less than a week) which have already invested in the technologies shown. It also shows the proportion of these CSPs which have prioritized investment in these areas going forward (i.e. they have been rated as the 1st, 2nd or 3rd priority for investment).

Figure 8: Top Investment Areas for Agile CSPs

It's clear that CSPs want a more agile approach to BSS and monetization so they are best placed to capitalise on the new opportunities that 5G SA and network slicing will deliver.

Qvantel's and Nokia's pre-integrated no / low code digital monetization solution can bring this agility to CSPs. It can be deployed as a SaaS solution to support 5G so CSPs can quickly start to develop, manage and monetize new 5G SA offers. For more information please click [here](#).



Summary

With all the major device providers supporting 5G SA and network slicing CSPs will find themselves in a new position. They can be centre stage in the digital value chain and move from selling connectivity to selling and enabling experiences. These can include providing a gaming experience to providing assurance that the robotic production line in a smart factory will work as expected. With 5G SA CSPs are now in a position to monetize experience and assurance. However, to do so will require CSPs to review the systems and processes they have in place to ensure that they can deliver the levels of agility and the speed to market that many CSPs want.

ABOUT QVANTEL

Qvantel is leading the evolution of Digital BSS. Qvantel Flex BSS is a no / low code, cloud-native Digital BSS that is enabling communication service providers (CSPs) to quickly transform to digital-first companies. By pioneering the use of no / low code technology in telecoms Qvantel Flex BSS enables CSPs to react quickly to new opportunities and develop new offers, processes and business models.

Headquartered in Finland, with over 20 offices worldwide, Qvantel is a global, product-based company. Our customers include leading CSPs, telecoms groups, MVNEs / MVNOs and digital-first sub-brands. Qvantel software delivers the best customer experience possible for over 230 million telecoms customers covering mobile, fixed and TV services.

ABOUT NOKIA

At Nokia, we create technology that helps the world act together. As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry. Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

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