



# Monetisation: Digital Transformation and 5G

- A new approach to charging  
that is ready for the world of 5G

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# INTRODUCTION

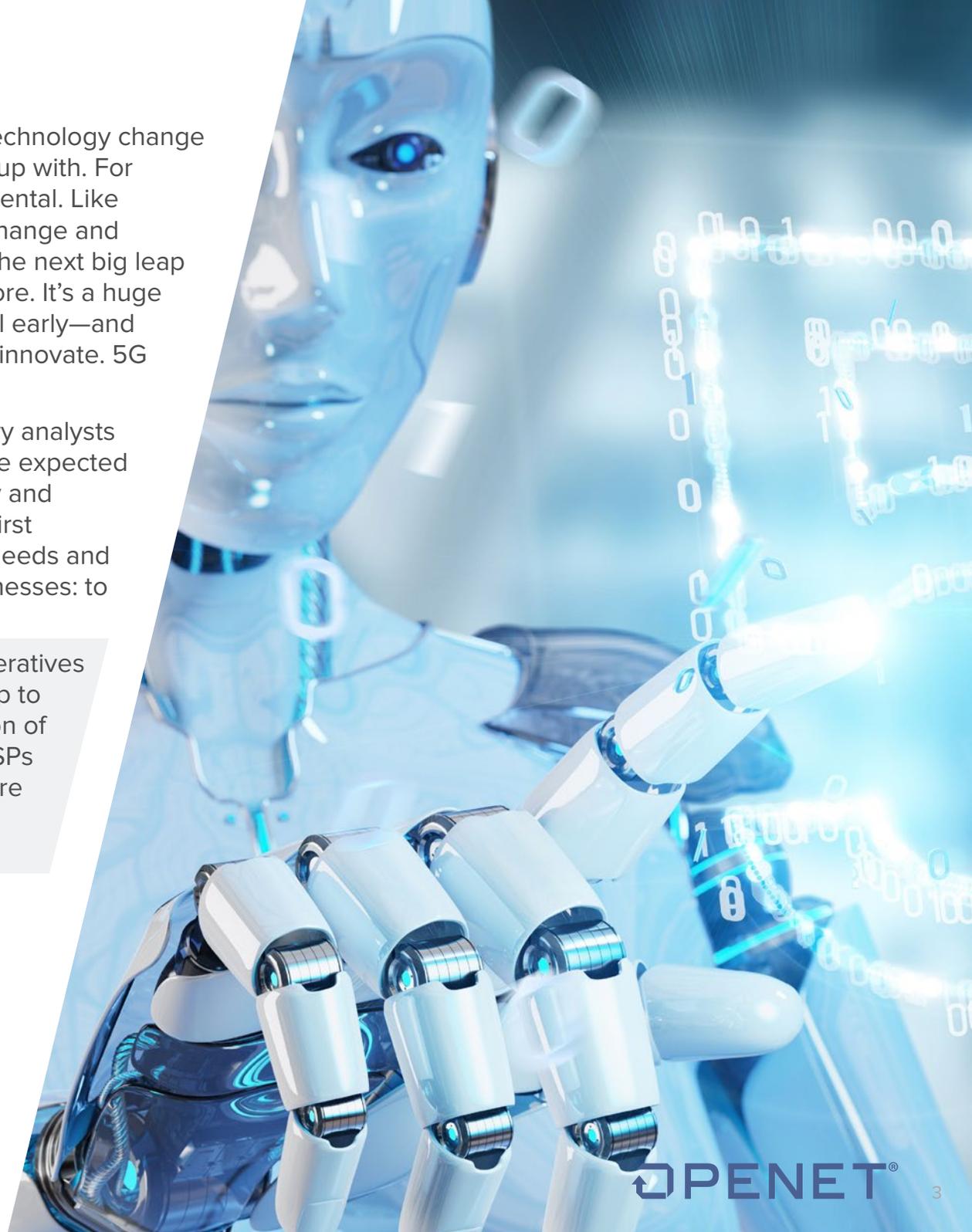
For those who observe trends, it is clear that the pace of technology change is continuing to accelerate at a pace that some can't keep up with. For those that do, the business advantages have been monumental. Like any other industry, the telecoms industry has seen major change and phenomenal advancement in the last 40 years alone. 5G, the next big leap in mobile networks, is as exciting as any of what came before. It's a huge opportunity for the businesses that understand its potential early—and move first—to change the way they work, collaborate, and innovate. 5G will change the way business does business.

Many Communication Service Providers (CSPs) and industry analysts are highlighting the improvements and changes that can be expected from 5G with regards to latency, speed, coverage, capacity and density; but the bigger story is the fact that 5G will be the first generation of network that can be configured for specific needs and use cases. This is going to create real opportunity for businesses: to use networks in ways that weren't possible before.

In a [recent research report](#) related to the operational imperatives associated with monetising 5G, **tmforum** noted that “Up to 72% of 5G revenue growth is dependent on transformation of operational and business support systems (OSS/BSS)”. CSPs will clearly need a new approach to enable them to capture the value from these new network capabilities and the business models they will facilitate.

With 5G seen as the next growth wave for the telecoms industry, and with the industry positioning towards 5G commercialisation, this paper will explore the needs, challenges and expectations of the future charging landscape for a Communication Service Provider (CSP).

So, let's talk about the future of charging ...



## A NEW APPROACH TO MONETISATION

The expectations that are espoused regarding 5G give rise to many questions, but regardless of whether the hype is to be believed or not, every “G” evolution has brought about new products and services that weren’t even considered when the network capability was evolving—and when those opportunities arise, every CSP needs to be ready to monetise it and quickly.

With high bandwidth, ultra-low latency and dynamic network slicing capabilities, 5G enables CSPs to not just offer a variety of new services but also play different roles in the digital value chain. There will be many technical challenges to overcome around a service based architecture and network slicing, but, it doesn’t take us long to master technical challenges, as the history of technical evolution has shown. More importantly, CSPs will have the opportunity to rethink their business models and how they want to participate and facilitate in value creation, value distribution and value capture. The effective participation of a CSP in the entire value lifecycle will determine their success in the 5G enabled digital world.

The current approach to monetisation for CSPs has become somewhat of a systems mess, primarily because it has been a piecemeal evolution of needs, sometimes addressed in silos, or on new systems without retiring the old ones. The future has to be better, right? Even if the future is better, the transition to 5G will be gradual and incremental (as has been the case with every G before it), so CSPs will also need the ability to support the evolution to 5G in parallel, or in conjunction, with their existing 4G (and earlier) services.

So, what are the different elements of any potential new approach?



## Improve Customer Experience

One thing many CSPs agree on is that improving customer experience is a key goal, but why, and what does that mean? For any CSP, managing the relationship with their customers should be about much more than improving product ratings or decreasing wait times. They need to fully understand the customer journey, by learning what customers experience from the moment they begin considering a purchase, to the point where they buy a product or service. One goal should be to work to make that journey as simple, clear, and efficient as possible.

If the focus is specifically on the monetisation process, in many cases the end-to-end experience is not as a CSP would want it—data, configuration and processes are all managed and executed separately, and many attempts to better integrate systems, or consolidate data, have not had the transformative effect desired. As a result the end-to-end journeys from the customer's perspective are broken, fragmented, inconsistent, and sometimes just doesn't work.

Equally, in this age of convenience, customers across the globe are getting used to different experiences around how they are presented with payment flexibility. Customers want choice, and they are familiar with so many new ways where the service provider engages to effect value exchange. How do they prefer to pay: cash, direct debit from their bank, or credit card? Or are they a bit more adventurous with regards to relying on PayPal, Google Pay or Apple Pay—and the tap-and-go capability either their credit card or their phone affords today? These new ways of paying are favoured because they are just more convenient.



## Capture New Revenue

Beyond customer experience, which addresses the ability to ensure a CSP gets and keep customers, they also need to ensure that they generate a consistent, and preferably growing, revenue stream. Like the children's story where the chicken worries about the fact that the "sky is falling", it is hard not to focus on the fact that ARPUs are falling in many markets and for many operators.

So what have CSPs typically tended to focus on?

1. Getting more convergence and real-time behaviour around their existing services (to improve customer experience and reduce costs—in the hope of increased margins).
2. Look to services like media and content as an additional source of revenue beyond data connectivity and legacy services like voice and messaging.
3. New stuff such as: financial services (leveraging the fact that service providers are already trusted with a customer's cash for prepay use cases), and incorporating partner services (akin to an acquisition to grow bottom line revenue, or to scale).

But, according to a recent Analysis Mason report, "CSPs have been trying to diversify their services beyond those of connectivity for over 20 years with limited success." Those focus items may still be important, but where is the future? As noted already, the expectation is that 5G and the internet of things (IoT) offer up a huge promise of future benefit for telco's. But, delivering on the business case for any new product or service needs a monetisation solution that can incorporate it easily and with much less cost than the revenue the product or service will provide. This is not always the reality today.

**“CSPs have been trying to diversify their services beyond those of connectivity for over 20 years with limited success.”**



**“CSPs clearly need an evolution path to the future promise of 5G”**

CSPs clearly need an evolution path to the future promise of 5G, as there are a number of key capabilities every CSP should have, both to be ready for 5G monetisation, and to make the most of their existing assets in the interim. These include:

- Supporting partnering strategies.
- Turning APIs into products.
- Leveraging their existing network capabilities, to kick-start the internet of things (IoT) in advance of full 5G rollout, as there are countless lessons to be learned.
- Leveraging data driven decision making (moving from data for knowledge, to predictive analytics, and ultimately to prescriptive analytics and making data actionable).

For many CSPs partnering has sometimes been limited to the ability to incorporate simple partner offerings into a bundle sold to the end customer, or where traditional wholesale operations have been in place to allow 3rd parties to resell a CSPs network services (inc. carrier interconnect and roaming settlement). But, the existing solutions enabling this have faced significant integration challenges, with lengthy time periods before the benefit of the partnership is realised. Partnering in the world of 5G network slices, or as part of IoT eco-systems, will require a very different mindset related to how partners are integrated. It will require standard and open APIs, to on-board partners and their catalogue of products—along with the ability to settle and share revenue across a partner eco-system; with elements of service assurance and the ability to identify and counter fraud thrown in for good measure.

**“ Network connectivity is not the sole contributor to revenue potential ”**

Leveraging well defined integration points, i.e. APIs, has existed in the world of IT for many years. Service Oriented Architectures (SOA) and more recent microservices architectures embody this. APIs can be used to better support internal integration, but this primarily supports more automation and therefore focusses on cost saving.

- APIs can be used for better partner integration and interaction, enabling a CSP to tap into shared revenue. However, consider the possibility of looking at APIs as products in their own right.

- Public APIs focussed on exposing the value behind what they can do, or the data they present, enable a business to tap into a new source of direct revenue. Many Platform-as-a-Service (PaaS) providers leverage this heavily.

Even if APIs can be exposed, the ability to monetise them is required. To do so requires capabilities to be able to set and enforce the number of API requests allowed in defined time period (per API consumer) by setting throttling rules. This enables the enforcement of business SLAs, facilitating the provision of tiered access for APIs—linked with different pricing rules. The need for this capability will come to the fore in the world of 5G.

Most predictions point to the advent of 5G being the ultimate enabler of the Internet of Things (IoT), but CSPs need to consider that there are existing options around how they can enable M2M and IoT use cases with the networks of today. CSPs need to consider the possibilities around IoT and the prospect of growth in connected things beyond the saturated subscriber based smartphone marketplace—and use current opportunities to learn how to monetise the IoT before 5G makes it a far more ubiquitous reality. CSPs looking for new sources of revenue need to consider the benefits of additional connected devices, based on a different business model, with connectivity at the heart, but not the sole contributor to the revenue potential.

## Embrace The Wider Value Chain

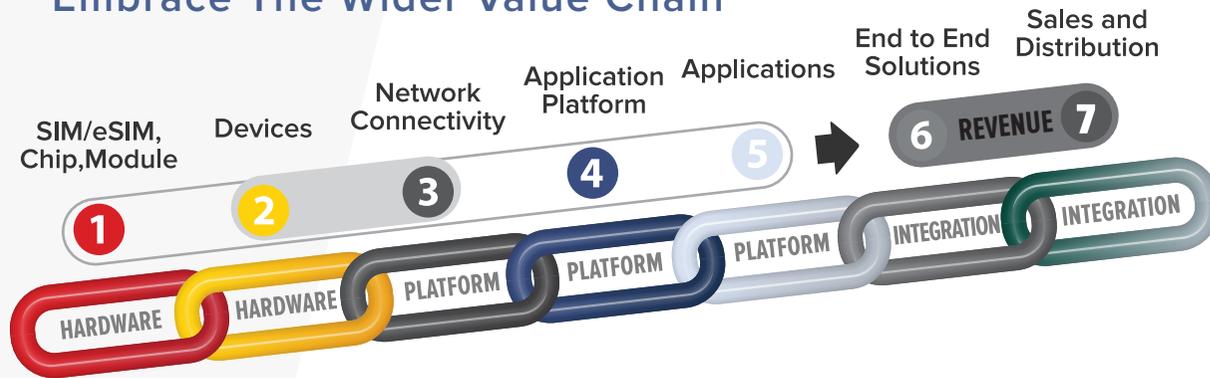


Figure 1: The Wider Value Chain

In the context of the 5G and IoT, the revenues an MNO can secure are dependent on the position or positions they choose to occupy in the value chain, as illustrated in figure 1. All MNOs provide connectivity to the end user or a third-party service provider. Many now provide platforms. Another position is that of direct distribution and sale of the entire solution or service to the end user.

In this context of a massively networked world, CSPs need to think about their place in the bigger scheme of things. It needs to be based on more than just “Here’s a SIM, away you go!”. Products and services will no longer exist in isolation. Instead, they will work with others in partnerships to create exciting new offerings. Customers have historically had a relatively straightforward relationship with suppliers—but IoT is likely to create complex customer relationship scenarios, revolving around a mash-up of services from multiple brands combined to create an outcome.



## Enable New Business Models

As noted earlier, the big story with 5G is the fact that it will be the first generation of network that can be configured for specific needs and use cases, in turn creating real opportunity for businesses: to use networks in ways that weren't possible before. But this in turn creates an opportunity and a need for CSPs to rethink their business models and how they want to participate and facilitate in value creation, value distribution and value capture.

Many vendors have talked previously about enabling new business models but what does that actually mean? And what needs to be done to truly take advantage of the potential for new revenue opportunities?

To answer that we need to address what a business model is. It is the rationale around how an organisation creates, delivers, captures (and defends) value; AND, the goal of an effective business model is the development of the means to generate revenue and earn profit. Many point to the Business Model Canvas formulated by Alex Osterwalder as one of the clearest ways to articulate all the elements to be considered in developing a business model.

To capture the value, the business model needs a solid monetisation model and ways to realise the revenue potential—which includes defining:

- How a product is going to be offered to customers
- What the customers give to get to use the product
- When and how customers give it
- Reconciling this with the costs side of the model and settlement with partners

This view of a monetisation model incorporates existing concepts like, the catalogue of products\services, sales channels and eligibility, order entry, the definition of cost\price and the capabilities of charging and billing, as well as all the different payment methods and options available for value exchange. It should also tie in closely how the product or service is ultimately delivered (or activated), where the catalogue also needs to include the definition of how that customer will get the product, or access to the service, after the fact.

Any future charging capability, if it is to support the implementation of a comprehensive monetisation model, needs to tie all of the above concepts together, as shown in figure 2. This will enable a CSP to: **Create, Sell, Deliver** and **Charge** for the product or service being offered, in much simpler ways. This also needs to support the monetisation of any envisaged product or service in very flexible ways, regardless of the expected Business to Business to Customer (B2B2C) relationships involved.

With the value chain discussed earlier in mind, new monetisation capabilities need to facilitate an expansion of the eco-system of things that can be combined, solving new problems that inherently add value to the service being offered by a CSP, which therefore can be monetised in new creative and flexible ways.

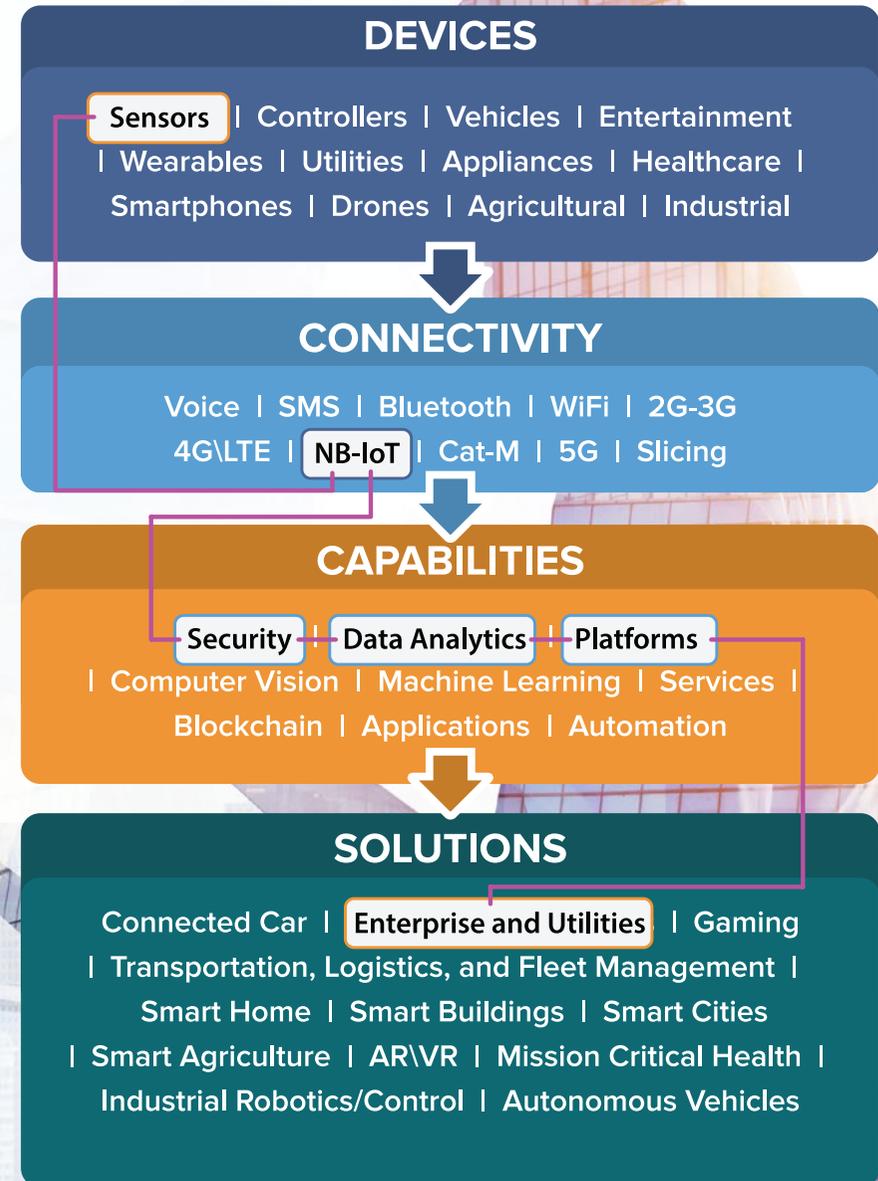


Figure 2: The Cycle from Creating a Proposition to when it gets Monetised

## The Promise and The Uncertainty of 5G

If 5G is to be a significant enabler of the Internet of Everything (IoE), different capabilities will drive different network configurations.

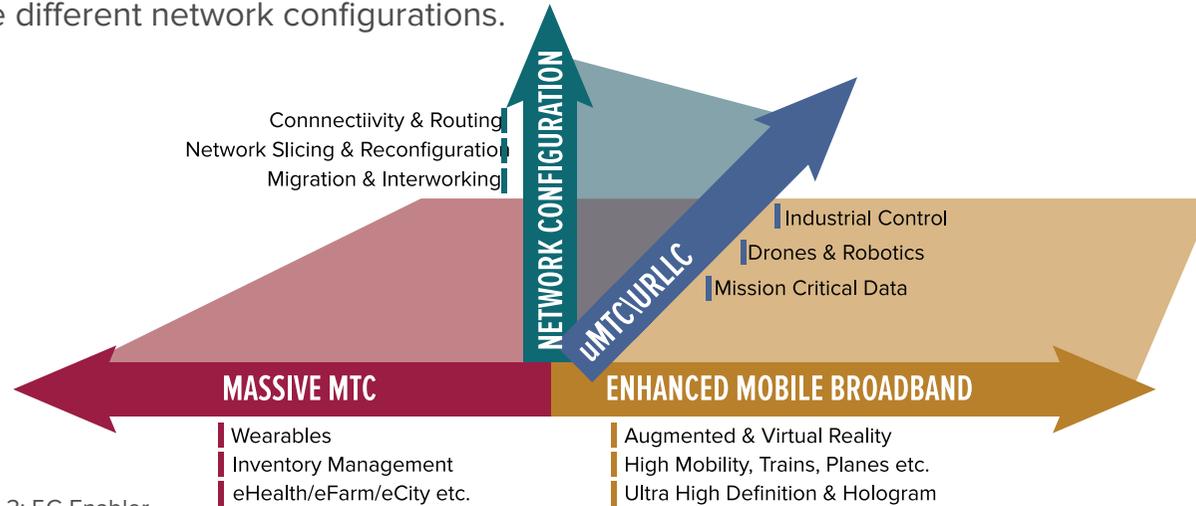
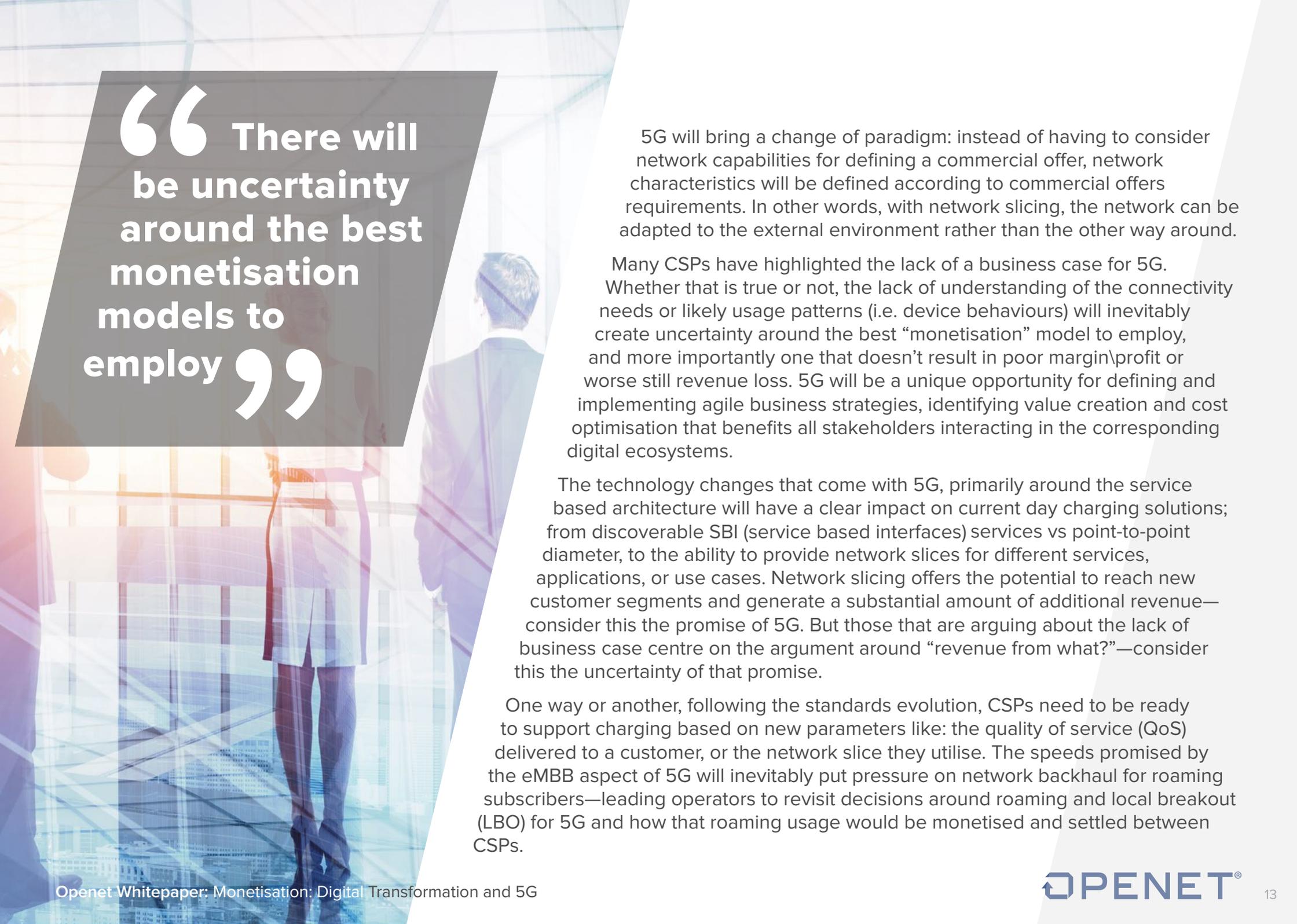


Figure 3: 5G Enabler

The different network configurations envisaged include support for massive Machine Type Communication (mMTC), ultra-Reliable and Low Latency machine-type communication (uMTC\URLLC) and evolved Mobile Broad Band (eMBB), as illustrated in figure 3.

- mMTC use cases will be the ones most impacted by cost factors as their existence relies on the possibility of deploying large fleets of connected devices at a relatively low cost.
- uMTC\URLLC is overall less affected by cost constraints, as it aims at addressing critical use cases which are often able to pay if the service provided is efficient; however, their key requirements (worst-case scenarios, QoS and latency guarantee), and thus charging metrics, differ significantly from traditional wireless network requirements.
- eMBB use cases face a lack of willingness of the end user to pay, which will require new business/monetisation models and ecosystem interplays between actors such as media industries, CSPs, manufacturers etc.

“5G will be a significant enabler of the Internet of Everything (IoE)”



**“ There will be uncertainty around the best monetisation models to employ ”**

5G will bring a change of paradigm: instead of having to consider network capabilities for defining a commercial offer, network characteristics will be defined according to commercial offers requirements. In other words, with network slicing, the network can be adapted to the external environment rather than the other way around.

Many CSPs have highlighted the lack of a business case for 5G. Whether that is true or not, the lack of understanding of the connectivity needs or likely usage patterns (i.e. device behaviours) will inevitably create uncertainty around the best “monetisation” model to employ, and more importantly one that doesn’t result in poor margin\profit or worse still revenue loss. 5G will be a unique opportunity for defining and implementing agile business strategies, identifying value creation and cost optimisation that benefits all stakeholders interacting in the corresponding digital ecosystems.

The technology changes that come with 5G, primarily around the service based architecture will have a clear impact on current day charging solutions; from discoverable SBI (service based interfaces) services vs point-to-point diameter, to the ability to provide network slices for different services, applications, or use cases. Network slicing offers the potential to reach new customer segments and generate a substantial amount of additional revenue—consider this the promise of 5G. But those that are arguing about the lack of business case centre on the argument around “revenue from what?”—consider this the uncertainty of that promise.

One way or another, following the standards evolution, CSPs need to be ready to support charging based on new parameters like: the quality of service (QoS) delivered to a customer, or the network slice they utilise. The speeds promised by the eMBB aspect of 5G will inevitably put pressure on network backhaul for roaming subscribers—leading operators to revisit decisions around roaming and local breakout (LBO) for 5G and how that roaming usage would be monetised and settled between CSPs.

For some types of network slice, it may be necessary to have the charging function closely aligned to the slice itself. For example, certain low latency applications may require certain functions that were previously delivered as part of a centralised core to be delivered in a distributed way—closer to the network edge. This has significant implications for the design of the applications that deliver those functions in the 5G context as shown in figure 4 below.

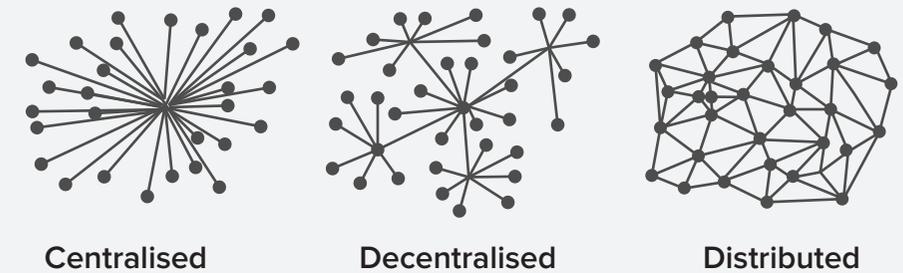


Figure 4: Comparison of Centralised, Decentralised and Distributed Functions

It's early days for 5G, but some very important lessons are already being learned—mainly that the real value isn't in 5G connectivity but in the flexibility around the delivery of new services and the new business models the technology enables. Can existing systems support the envisaged future? Does the flexibility exist that will inevitably be required to truly capitalise on the promise of 5G?

Agility and flexibility are goals that are hard to argue with, but for service providers to achieve them has not proven easy. Not only have networks been complex and static, but OSS and BSS architectures were not designed with agile innovation in mind. They were designed to increasingly automate the processes associated with the delivery of a small number of mass market services, and as such, are not suited for constant innovation.

“CSPs need more support from vendors”

The proliferation of products and services, especially ones that can be instantly delivered and personalised, and the pressure of competition, demands faster, cheaper, and easier methods for innovating and delivering services.

Enabling this flexibility is not just a process for the future: the same innovation and service delivery approach that will be necessary in the world of network clouds, digital services and 5G, is highly desirable today.



#### LAUNCH FAST

To optimise the create to cash process



#### LEARN & FAIL FAST

To experiment with new opportunities, and to learn what works and what doesn't



#### SCALE FAST

To scale up successful ones, & scale down those less favourable

Figure 5: Flexibility is not a process for the future, it is needed today

Competition already exists, and many aspects of today's networks are sufficiently flexible that it makes sense to put in place an infrastructure that can deliver immediate benefits in terms of lower cost and higher agility, while preparing to take full economic advantage of emerging technologies. as shown in figure 5, the key drivers of launch fast, learn & fail fast and scale fast are fundamentals for CSPs in a digital and 5G world CSPs need more support from vendors to gain this flexibility!

# GETTING TO HOW - TIE CONCEPTS TOGETHER

Every service provider wants the ability to innovate more quickly, increase revenues and margins while satisfying customers on a more personalised and timely basis. A monetisation solution for the future must not look like a repeat of the solutions that service providers already have from one or multiple vendors, poorly integrated, inflexible and difficult to manage in an end-to-end context. It must look different. In the past, some large vendors sought to acquire new technologies to extend their stacks and failed to integrate them well, creating issues for the service providers they sold to. So, why do concepts and systems need to be tied together?

Firstly, there is a compelling need to bring networks and the services they provide much closer to the IT systems support monetisation. In order to improve monetisation, there are two key aspects (at least) that need to be addressed:

- Time-to-Market
- Customer Experience

Achieving time-to-market goals requires the ability to create a new proposition and to put it on the virtual shelf to be able to sell it quickly (with the flexibility to define everything in one go, including the proposition details, the price\cost and the rules and steps required to fulfil an order). The reason that time-to-market is so important is because being late erodes the addressable market that is available to sell a proposition into.

Ensuring a good customer experience (including how the customer is engaged proactively) requires the ability to advertise, or enable a customer to discover the proposition that's been created. Once they know it's there, and choose it, the next step is to ensure it is fully delivered or activated on demand, and that the customer can be charged or billed correctly and pay in the easiest way possible.

In addition, there is also a continued desire to achieve simplicity of operations, where automation has always been key. However, there needs to be much more dependence on data and machine learning principles, to enable service provider staff on two different fronts.





From a purely operational perspective CSPs need to be able to better anticipate and react to problems, reducing OPEX, reducing the prospect of regulatory issues, and ultimately improving customer experience. But equally, there is a need to improve decision making around what works and doesn't work for their end-customers.

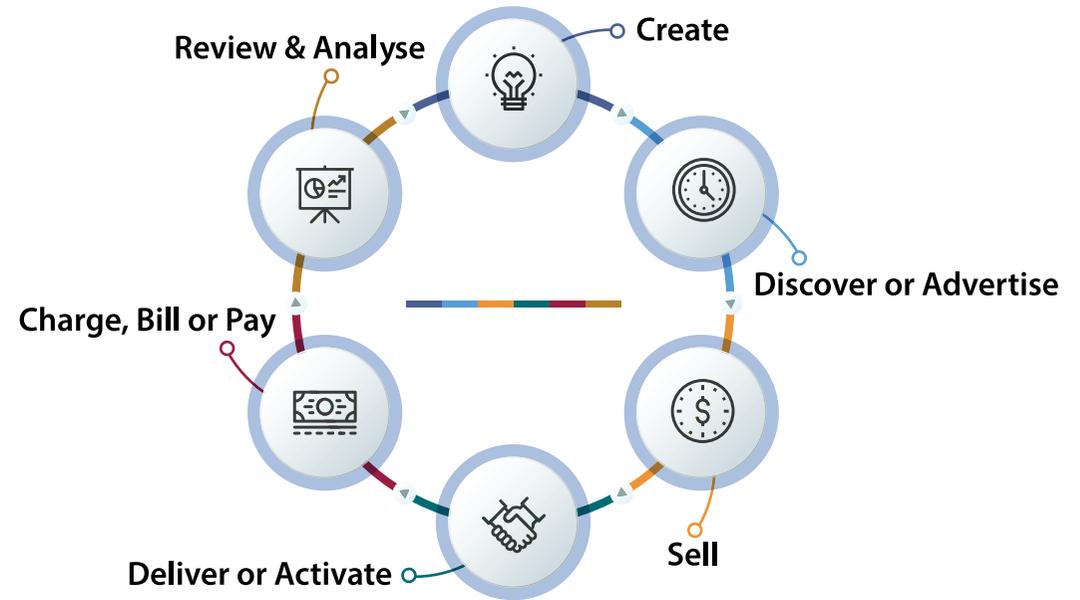


Figure 6: The Cycle from Creating a Proposition to when it gets Monetised

As highlighted in figure 6, the creation of a proposition, to collecting the revenue it generates at every step along the way, allows for greater insight to be gathered around what works and what doesn't. This includes details of what does and doesn't resonate, what customers choose and what they don't, and their choices when it comes to spend and payments. Holistically, all of this information should form inputs into a data driven process around improving engagement, refining the propositions, and ultimately improving monetisation.

So what's different? Some CSPs are doing this already. Perhaps they are, with varying degrees of success. But again, ask the question, how can it be improved? Because it can.

# WHAT THIS MEANS FOR CSPs

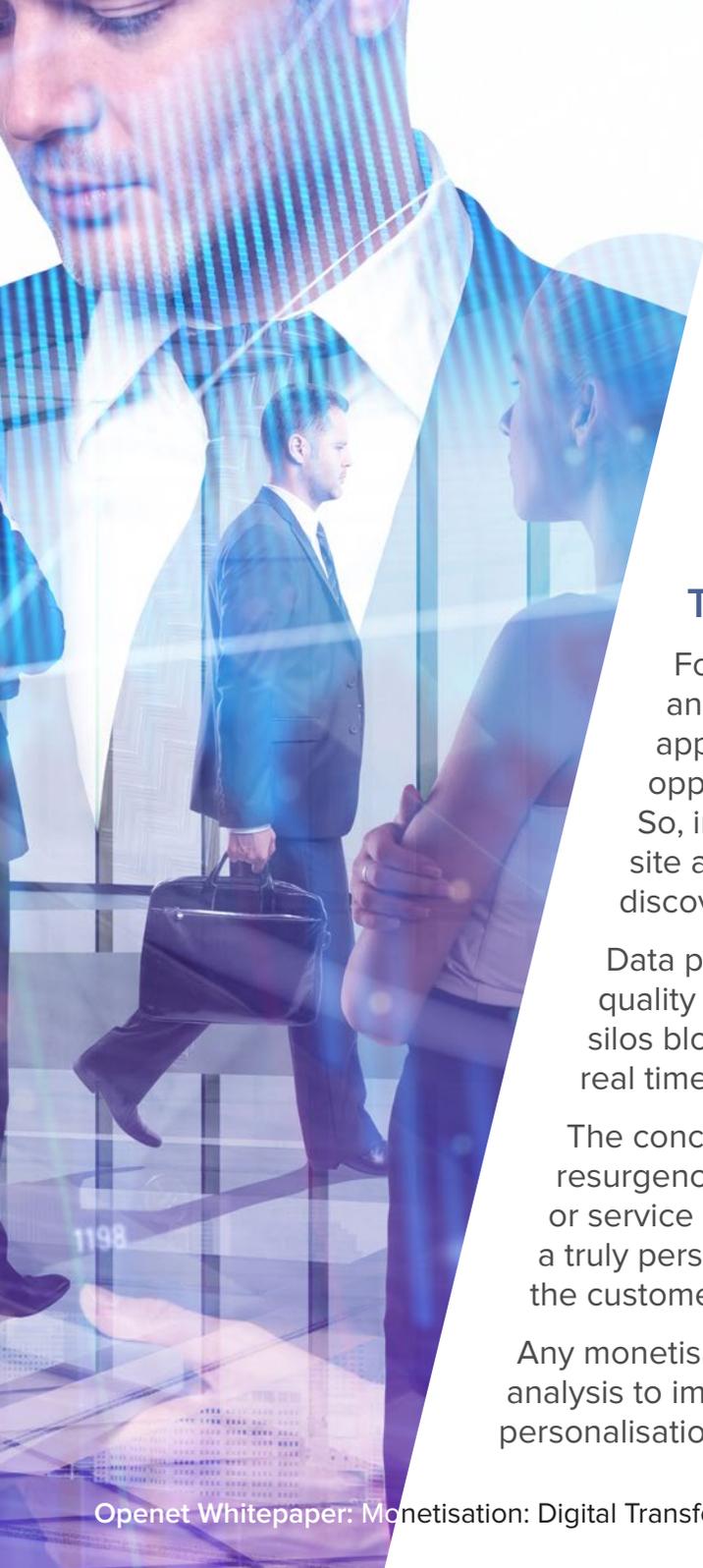
## To Create Value and Get it to Market Quickly

The need for an Enterprise Product Catalogue is as compelling as ever. The catalogue facilitates having a centralised view of all Products\Services, including those of partners, and the management of the product lifecycle. Having a single, centralised source for all product and service information, increases accuracy and reduces operational costs. But, it also provides flexible approaches to catalogue configuration which enables service providers to manage all elements of a go-to-market strategy and thereby quickly launch offers to the market. This includes defining sales channels and eligibility, order entry requirements, holding the definition of cost\price and linking to the specific capabilities of a modern charging solution to leverage all the options available for value exchange that are possible.

However, the traditional view of products and services is going to blossom with the advent of 5G, and the complexity of the management of the monetisation of them is similarly going to expand. The current models of Flat Rate charging, Pay per Use, and Subscriptions will need a revamp. The ways service providers have leveraged handset subsidisation (based on the so-called razor blade model, where the dependent good is sold at a loss (or at cost) and the services it consumes, or ancillary products, generates the profits) has probably run its course, especially given the lower cost aspects of the device expectations in the Internet of Everything. To compete with the OTTs that are eating their lunch, CSPs need to be able to match the two-sided market business models, and B2B2X capabilities, and leverage as-a-Service approaches to how they monetise the capabilities that network slices promise.

Service providers will need the ability to compose a charging function with new Business Models in mind, configure them for the circumstance under which they are being used, and deploy them into the network of the future to be discovered by network capabilities that will utilise them.

**“Products and services will blossom with the advent of 5G, and monetisation complexity is going to expand in tandem”**



With microservices being a currently prevalent approach to providing re-usability and modularity for new solutions, the charging approach of the future needs to move away from the concept of the flexibly configurable monolith (regardless of how well integrated all the components are), to a composition approach for new charging flow logic, along with the packaging of the microservices and their configuration, into a function that is fit for purpose and can be deployed anywhere in the network. Tying this back to the service creation aspects of the catalogue will be key to enabling a service provider to add the composability of the monetisation model into the mix of capabilities already involved with bundling and publishing sellable things.

## To Move from Advertising To Product Discovery

For many consumers, shopping is as much about product discovery as it is about buying – and the traditional mechanisms of advertising are becoming outmoded where mass market appeal is being replaced by consumer desires for a far more personalised experience. The real opportunity for CSPs is not just to aid the “buying” aspect of shopping, but in “discovery,” as well. So, instead of just thinking how different channels can be used, including a modern ecommerce site and an engaging mobile app to sell products, think about how customers can be helped to discover them.

Data provides an unparalleled opportunity to understand customer’s preferences, habits and the quality and causes of customer experience. But how can operators unlock the value of data? Data silos block progress, while the massive scale of events and metrics to be analysed can jeopardise the real time promise of even the most robust deployments.

The concept of the next best offer and recommendations, is not new to marketers, but it is seeing a resurgence with customers being more tech-savvy, using ad blockers, and preferring to pull for product or service information themselves, rather than having it pushed at them. Determining a next best offer in a truly personalised fashion and in the context of what a customer is currently doing, needs data about the customer, their behaviours and purchase patterns, to be able to discern their likes and dislikes.

Any monetisation solution of the future needs to enable transparent data integration and stream-based analysis to improve the business outcome and to enable the CSP to meet customer expectations regarding personalisation and product discovery.

## To Facilitate Selling

Many businesses think of configure-price-quote (CPQ) tools first as business-to-business (B2B) tools—which means they see them first and foremost as tools for their sales and channel partner teams. While this is certainly one use case for CPQ tools, these tools are also used to address Business to Consumer (B2C) business scenarios. Most of the time consumers don't know they are using a CPQ Tool. Consider the consumer interaction with the typical e-commerce shopping cart where they select the products and services they are interested in. The best-in-class e-commerce sites leverage guided selling functionality, provide discounts when bundles are selected (i.e. buy 2 particular items, get the bundle at a reduced price), make recommendations for additional purchases and other means to both improve the customer experience and capture new revenue.

While there are many different use cases between consumers and B2B users, there are also a number of common capabilities. Both should expect for example to:

- Get product suggestions (e.g. add on products, cross sell or up sell products)
- See customer specific prices (e.g. see list price, with custom or personalised discounts)
- Receive help as needed (through guided selling, with product images, and information on product availability and shipping information; and with supporting tools such as the ability to chat)

So, is it necessary to maintain this information for consumers and B2B users separately? Ideally, no if the functionality is the same, in the spirit of simplification, it makes sense to use one CPQ tool for all channels as long as there isn't a compelling reason to not do it. But ultimately, a single CPQ will make it easier for customers to do business with a CSP because the same products can be offered, no matter what channel a customer uses, in the same way. This means there is less need for training and less possibility for confusion.



Figure 7: Configure Price Quote Workflow

Ideally, one CPQ tool can be aided with different User Experiences (UX) for front-end applications (e.g. Sales, Channel, Website) and back-end users, processes and systems (e.g. order management, provisioning, logistics). After all, CPQ is only a tool to keep a business running smoothly.

## To Seamlessly Deliver or Activate

To deliver a quality customer experience of the monetisation flow, order management is a must. This encompasses several critical touch points between the end-customer and with the CSP, and thus, to ensure it functions properly, should be a strategic objective of any enterprise with the goal or desire being to have zero-touch and zero-fallout.

Intensely manual, highly error-prone and woefully inaccurate are not the characteristics of a robust, future-oriented digital service provider. The success of an operator in the digital age is measured by the pace and ease with which they can introduce new services to market and deliver them seamlessly to customers—regardless of the complexity of the underlying infrastructure.

Order management should be workflow driven and with workflows and a rules engine being central elements. The rules engine allows the definition of business rules that can be applied on workflow steps and a BPEL-enabled workflow engine can be leveraged to orchestrate intelligent provisioning.

It must be dynamically integrated with the centralised enterprise catalogue to ensure business rules defined for products, services and resources are accurately utilised during fulfilment. It must provide collaborative tools that allow product managers and designers to work together to create consistent fulfilment configurations. The result will be dramatically reduced order fallout and time-to-market for new offerings.



## Make the Path from Charging to Payment, as Simple as Possible

Charging, Billing and Payments have typically been delivered across a suite of systems. The future monetisation needs of a CSP to leverage flexible charging, along with the flexibility to compose new monetisation models as already discussed. It needs to leverage integrated pre-pay and post-billing capabilities, for all online and offline scenarios, along with an array of supported payment method options; all tightly integrated.

Ideally, rating and charging (for online and offline) should reside in one place. In current CSP deployments, online and offline practises have typically resulted in different behaviours due to perceived limitations. If a customer was incorrectly charged in an online fashion, the only option was to adjust their account, or provide them a refund (but accurately assessing this was horribly manual). If a customer was incorrectly charged over an offline billing cycle, time was available before they were issued with their bill (i.e. Invoice emailed or posted) to correct the error. These behaviours need to change for a digital world where customers are expecting to see a live (and correct state) of their spend, regardless of whether they are pre-paying for service, being billed at the end of the billing cycle, or some alternative hybrid.

‘Don’t Repeat Yourself’ (DRY) is a principle of software development aimed at reducing repetition of software patterns. The DRY principle states that “Every piece of knowledge must have a single, unambiguous, authoritative representation within a system”. When the DRY principle is applied successfully, a modification of any single element of a system does not require a change in other logically unrelated elements.

Applied at the systems level, this is one of the main reasons behind drives to converge replicated capabilities into one function that is doing that task for all required purposes. It is also a driver behind the benefits of microservices where a business function is clearly defined and reused in many different circumstances. This has the knock on benefit of removing the complexity that currently leads to reduced efficiency, and low levels of innovative business functionality being available.



**“Don’t Repeat Yourself’ (DRY) is a principle of software development aimed at reducing repetition of software patterns”**

A man in a dark suit and white shirt is shown from the chest up, holding a smartphone in his right hand. The background is a composite image featuring a cityscape with tall buildings, overlaid with a semi-transparent bar chart and a grid pattern. The lighting is bright, suggesting a sunny day.

## THE LAST WORD

As noted in the introduction to this paper, many CSPs and industry analysts are highlighting the improvements and changes that can be expected from 5G technologies—but to capitalise on the bigger story being the fact that 5G will be the first generation of network that can be configured for specific needs and use cases—changes are inevitable around the monetisation capabilities needed in their systems infrastructure.

There will be yet another blurring of the network-IT divide but specifically in the alignment of network service charging with IT flexibility paradigms.

There will be a need to respond to the product/service complexity that comes with 5G, through the new capabilities of a charging solution ready for 5G.

The scale of 5G and the ephemeral flexibility of the programmable 5G network, will lead to moving to IT and web-scale technologies and ultimately the need to support a new frequency of change, along with the amount of new information that will be generated as a result.

As noted previously, charging solutions of the future need to tie many existing concepts and systems together much more holistically, to enable a CSP to create the conditions to define and deliver new products and services in very flexible ways.

If 5G is seen as the next growth wave for the telecoms industry, bring it on!

# ABOUT OPENET

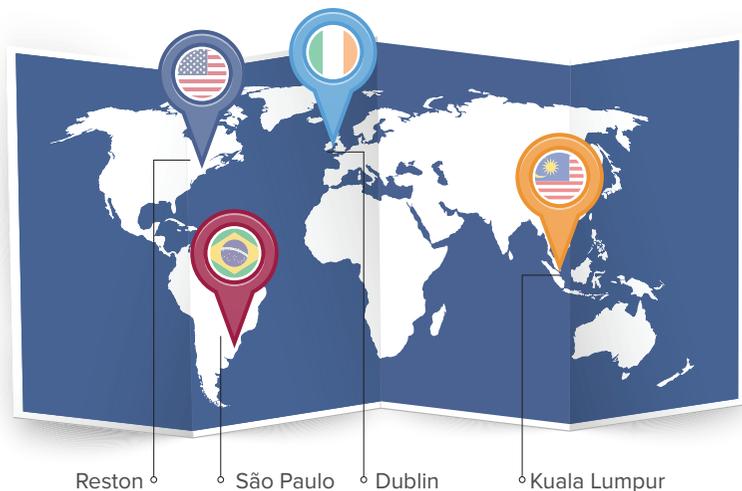
Openet provides real-time software solutions and services to enable service providers to create new revenues from digital services and improve customer engagement. Our Digital Business Platform and solutions enable service providers to be more agile, innovative and enjoy a faster time to value.

We are all for open solutions that deliver value and benefits to our customers. We are against vendor lock-in and the vendor first, second and third approach that has been endemic in telecoms. We work with our customers to deliver innovative solutions that drive value and enable change.

We passionately believe that the most adaptable businesses are those that prosper best. We help our customers transform their businesses and access new revenues and profits by using the latest technologies and methods—in ways ranging from augmenting existing architectures or replacement with more agile and cost-effective end to end platforms.

Since its foundation in 1999, Openet has been at the forefront of telecoms software development and innovation. Our success is personified by the many long-term relationships it has fostered with the largest, most progressive, and demanding operators across the globe.

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