

**5G AND THE  
EXPANDING ENTERPRISE  
OPPORTUNITY**

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### BUILDING A PARTNER ECOSYSTEM & ENTERPRISE MARKETPLACE

Service providers can leverage network exposure capabilities to build trusted relationships with their industry partners.

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### A PROLIFERATION OF VALUE OPPORTUNITIES

Urgent requirements for slicing done well by service providers.

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79%

5G QoS

### PUTTING VALUE ON VALUE-ADD

79% of industrial companies would expect to pay a premium for guaranteed 5G quality of service.

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### OFFERING SERVICE LEVEL AGREEMENTS

Set different QoS rules on different network slices to enable SLAs to be met.

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### SLICING: CONTROL & CHARGING

The flexibility required to control slice capability for rapidly evolving segments is not simply enabled by a "one size fits all" standardised template.

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## INTRODUCTION

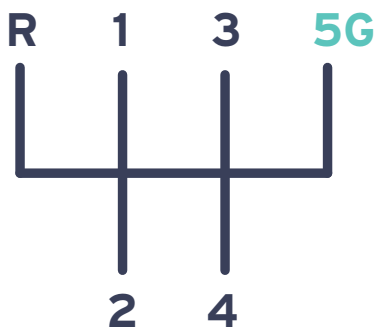
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The 5G shakeup has already started in many markets. Service providers are actively considering how they can evolve from being primarily consumer - oriented providers of voice, text and data to become much more business - and enterprise-focussed, enabling a more diverse range of B2B2x services.



Much of the consensus of analyst reports and articles has already been that the enterprise market is where the promise of 5G is likely to provide the greatest return. For sure, consumers will almost certainly benefit from 5G bandwidth, reliability and latency improvements but the mass-market “killer” use cases are yet to be proven or are several years away (e.g. automated vehicles controlled by 5G).

Industrial environments are however more fragmented but also hold huge use-case specific value in the near-term. Consider for example the critical demands of mining companies or hospitals in terms of control and accuracy. As well as the huge productivity advances promised by 5G, any changes can be the difference between life and death. Such environments therefore also provide a massive upside for service providers if they can be properly addressed. A single hospital environment, for example, could also require a range of: controllable services for customer (patient) waiting-room entertainment; reliable staff communications; reliable bursts of data for uploading 3D medical scans, through to critical control of incubator equipment and surgical instruments.



Automated vehicles controlled by 5G.



## INTRODUCTION

Depending on how value-chains are defined, enterprise segments represent a multi-billion dollar or multi-trillion dollar opportunity for service providers in terms of their unique positioning and potential (see Fig.1).

The stakes are high. In this paper we explore how service providers can rapidly address under-served enterprise segments and build necessary flexibility required for the exploding enterprise expectations of the near future - and of course how to best monetise those demands.

Fig. 1 Economic efficiency driven by 5G investment (in US\$), 2020-2035

|                  | INDUSTRY   | 5G-ENABLED OUTCOME |
|------------------|--|--------------------|
| Over 20 trillion | <ul style="list-style-type: none"> <li>• Manufacturing</li> </ul>                    |                    |
| Over 10 trillion | <ul style="list-style-type: none"> <li>• Information &amp; communications</li> </ul> |                    |
|                  | <ul style="list-style-type: none"> <li>• Wholesale, retail, entertainment</li> </ul> |                    |
|                  | <ul style="list-style-type: none"> <li>• Public services and utilities</li> </ul>    |                    |
| Over 5 trillion  | <ul style="list-style-type: none"> <li>• Construction</li> </ul>                     |                    |
|                  | <ul style="list-style-type: none"> <li>• Finance and Insurance</li> </ul>            |                    |
|                  | <ul style="list-style-type: none"> <li>• Logistics</li> </ul>                        |                    |
|                  | <ul style="list-style-type: none"> <li>• Agriculture</li> </ul>                      |                    |
| Over 2 trillion  | <ul style="list-style-type: none"> <li>• Real Estate</li> </ul>                      |                    |
|                  | <ul style="list-style-type: none"> <li>• Education</li> </ul>                        |                    |
|                  | <ul style="list-style-type: none"> <li>• Energy</li> </ul>                           |                    |
| Below 2 trillion | <ul style="list-style-type: none"> <li>• Health</li> </ul>                           |                    |
|                  | <ul style="list-style-type: none"> <li>• Others</li> </ul>                           |                    |

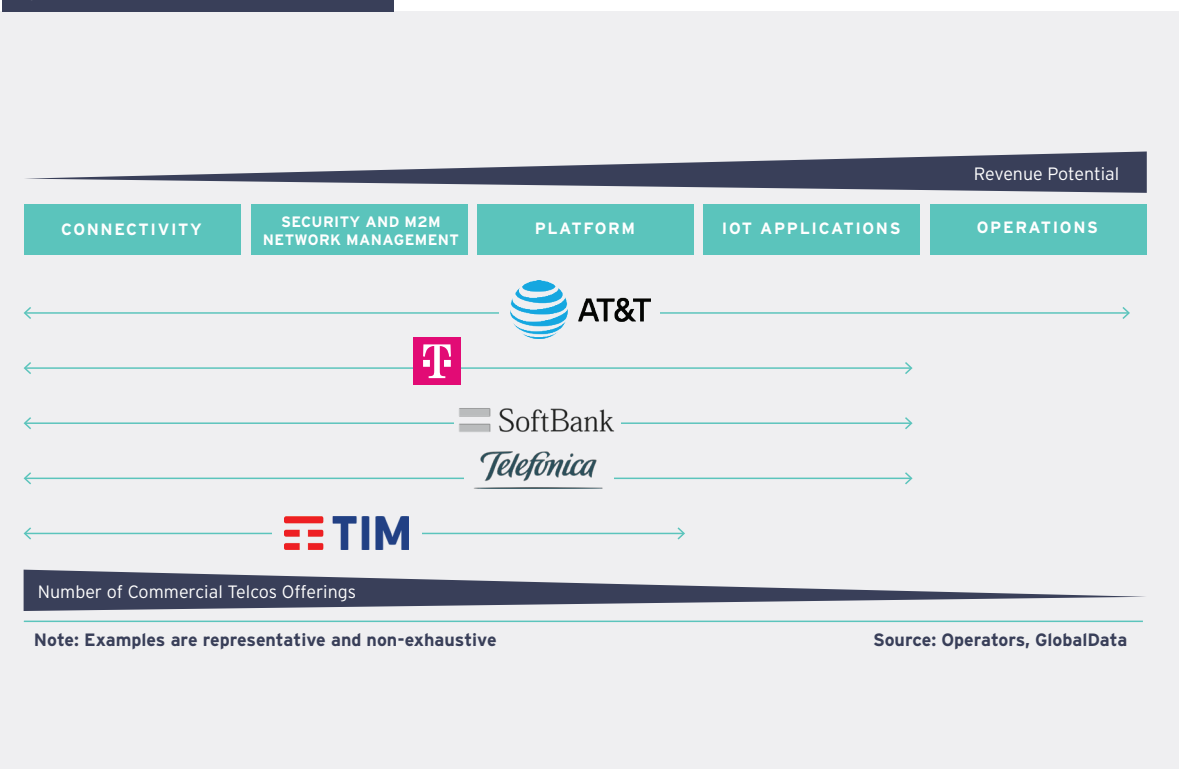
Source: IHS/ Deloitte

## FROM PIPE TO VALUE

For several years there has been consensus that service providers will have a number of strategic options in the context of 5G. Some options include service providers becoming brands selling high speed data, or wholesale providers while, others could see service providers building partner ecosystems and 5G enterprise marketplaces.

None of the options are unworthy if well executed but the risk is that some operators may flounder between less than optimally executed opportunities. As with 4G however and the rise of over-the-top (or OTT) service providers such as Google, Facebook and Netflix, it is fair to assume that the more service providers evolve through the value chain towards the point of usage, the more value that can be addressed (Fig.2). This is likely to hold true in a 5G / enterprise market also.

Fig. 2: Market Position V's Revenue



## FROM PIPE TO VALUE

Network slicing as better enabled by 5G is a much discussed topic. Essentially slicing is the separation of multiple virtual networks that operate on the same physical hardware. Or at least some network elements are separated depending on requirements. A key difference with the enterprise / industrial market however is that the granularity of control requirements is set to be more nuanced. There will be little or no room for “best effort” as may be the case in some consumer markets. Standards come to the fore in this context and 3GPP as well as the GSMA have specified (and continue to specify) network slicing definitions and associated slice characteristics. These required characteristics can in turn manifest as service-level agreements (SLAs) and points of definable control that service providers can in turn monetise: everything from uplink and downlink throughputs to geographic areas covered to numbers of devices covered within a slice (see Fig. 3: charging characteristics). As ever of course, standards are necessary but the means by which they are applied will make or break the business case.

Fig. 3: Slice Charging Characteristics (Source:GSMA / Openet)

| NETWORK SLICE CHARGING CHARACTERISTICS   |   |
|--|---|
| DATA SPEED   | QUALITY   |
| <ul style="list-style-type: none"><li>• Uplink throughput per network slice.</li><li>• Uplink throughput per user equipment (UE)</li><li>• Downlink throughput per network slice</li><li>• Downlink throughput per UE</li></ul>  | <ul style="list-style-type: none"><li>• Slice QoS parameters</li><li>• Latency</li><li>• Delay tolerance</li><li>• Reliability</li><li>• Availibilty</li><li>• Coverage</li><li>• Performance monitoring</li><li>• Performance prediciton</li></ul> |
| SLICE PARAMETERS   | SERVICES  |
| <ul style="list-style-type: none"><li>• Number of connections</li><li>• Number of terminals</li><li>• Number of simultaneous users</li><li>• Network Slice functions supported</li><li>• Access technologies supported</li></ul> | <ul style="list-style-type: none"><li>• Group communication support</li><li>• Location based message delivery</li><li>• Misson critical support</li><li>• User data access</li><li>• V2x communication mode</li></ul>                               |

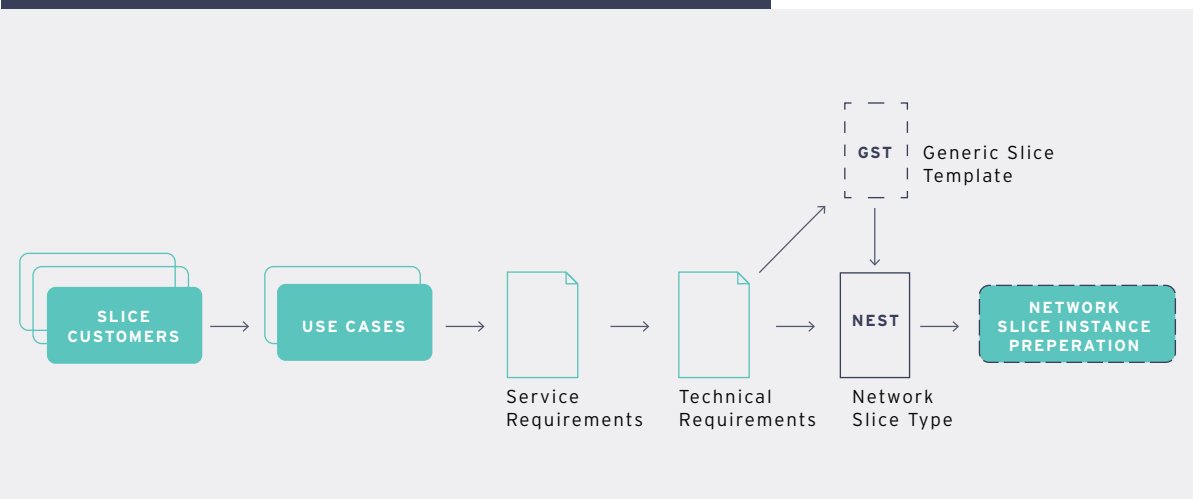
## CHOOSE YOUR SLICE

The flexibility required to control slice capability for rapidly evolving segments is not simply enabled by a “one size fits all” standardised template (Fig. 4). Not all segment or sub-segment requirements can be assumed as being the same.

For example one type of motor manufacturer may place significantly different slice and SLA demands on a communications service provider than another manufacturer. In this example, one or more of those individual motor manufacturers may also need to self-manage in terms of service (SLA) specifications and flexible control. Therefore they may need direct access to the operator network via an easy-to-access portal where they can define the parameters of the service accessed by their latest robot or other piece of equipment.

Think in terms of an easy-to-use appstore-style interface that perhaps non-technical personnel can access in order to setup new device types rapidly on the factory floor of the motor manufacturer’s plant. As soon as those devices are unboxed on the factory floor they can easily but securely be allowed to attach to a factory slice and that slice’s (SLA) characteristics adjusted in real-time according to the device’s capability, by the administrator at factory level. The core business of the car plant as it evolves should not be hamstrung by multiple support conversations or delays required to technically configure or re-configure a communication provider’s slice.

Fig. 4: From Slice Templates to Specific Slice Type (Source: GSMA / Openet)

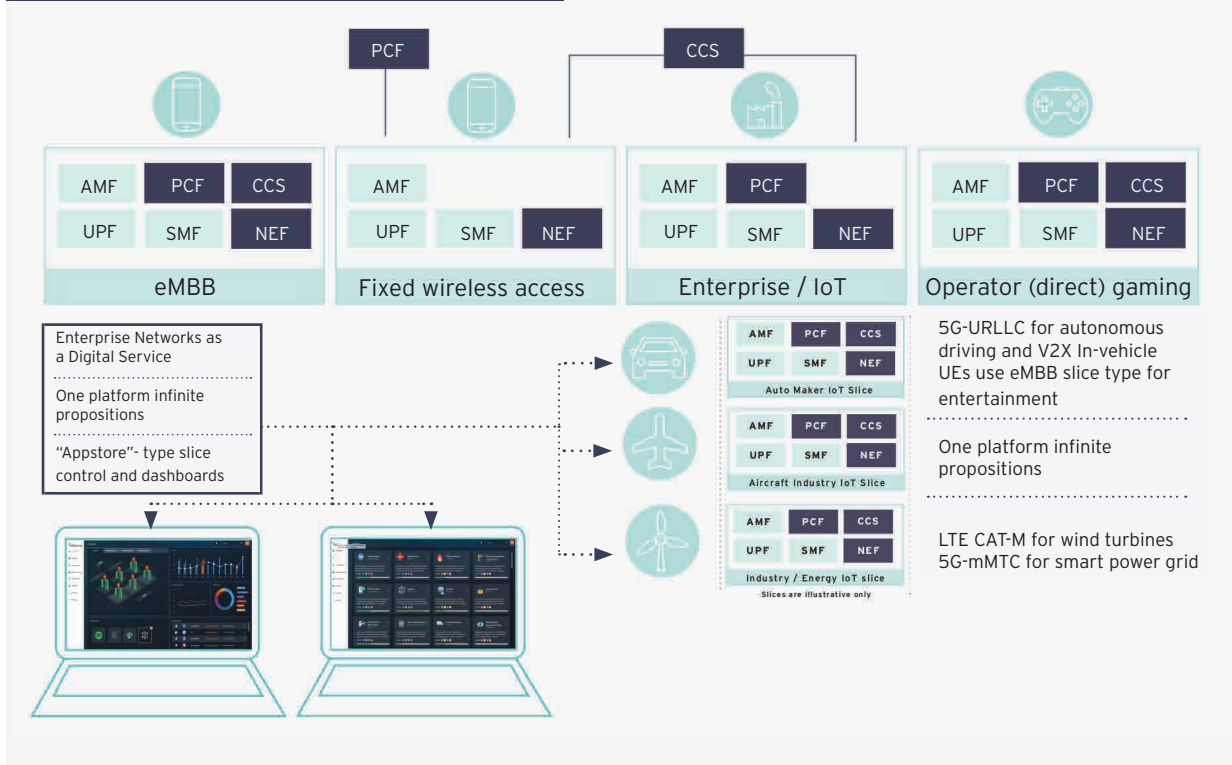


## SLICING: CONTROL AND CHARGING

In terms of its end-to-end nature, a particular network slice may have a full suite of network elements aside from radio access (which is presumably shared). It may even take the form of something close to a full MVNO (virtual network), or hosted sub-network.

Alternatively, certain elements could be maintained externally to the slice as they are deemed not really necessary for the expectations of that slice. So for example, depending on the SLA requirements, a slice user (say a manufacturer) may not want all the charging capability of their own 5G CCS (Convergent Charging System). If they have a monthly fee that covers a defined set of charged-for service capability within the slice they may not need their own charging control. So for example a hospital campus that “only” uses slicing to avail of massive broadband to upload 3D scans may not need to control their own charging if they are charged on a monthly basis. Therefore charging in relation to that slice may only need to be managed by the “parent” service provider network (Fig.5).

Fig. 5: Segment /Slice Options (Source: Openet)





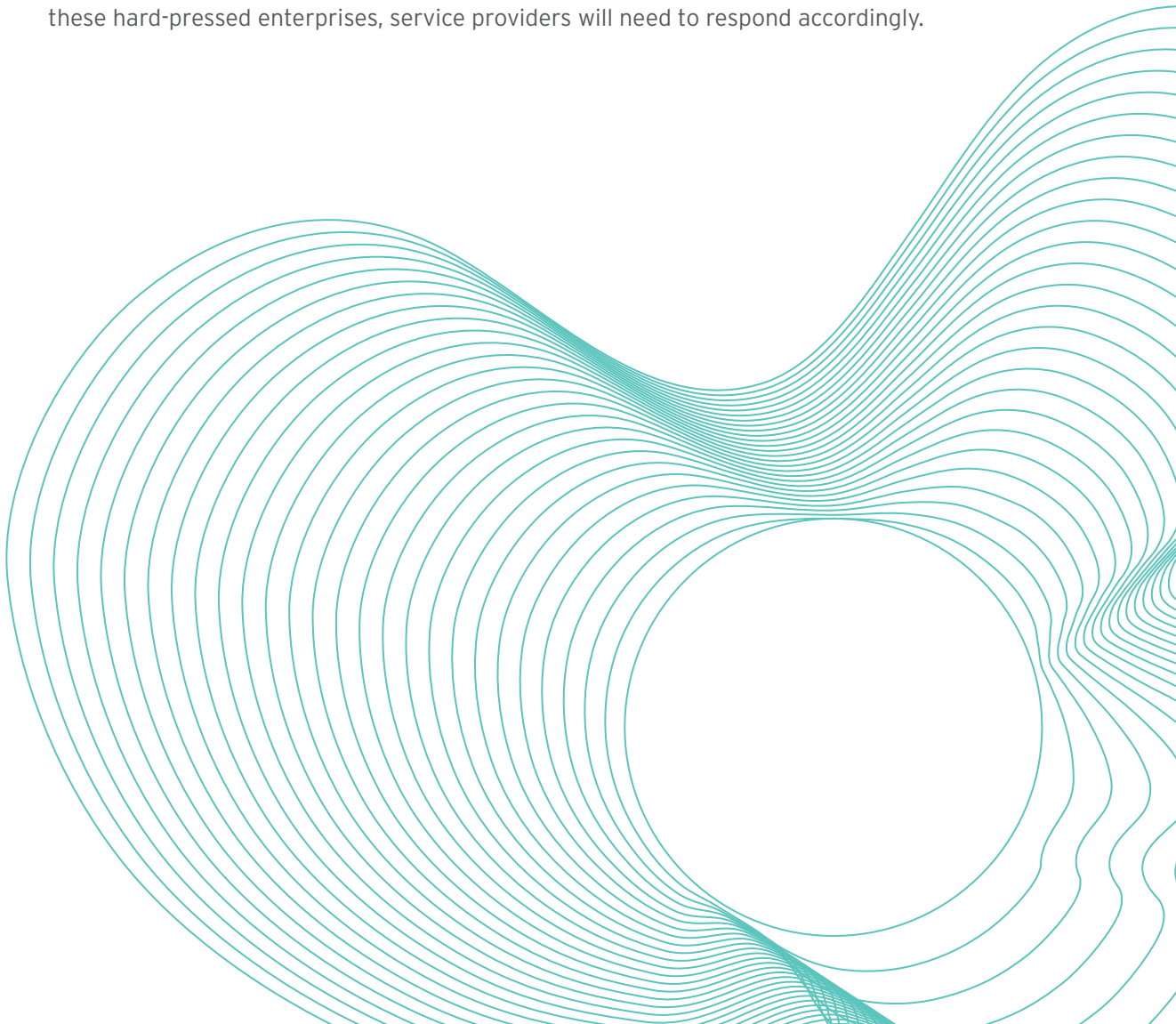
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## SLICING: CONTROL AND CHARGING

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Alternatively, a hospital organisation may need their own charging capability if they are planning on enabling wholesale services either within their own corporate organisation (say for cost control reasons) or outside their organisation (suppose they need to charge different segments at different rates for various services). This greater level of monetisation capability could, depending on the commercial ambitions, represent diversification and huge upside for such commercial enterprises.

Similarly, control of quality of service (QoS as managed by the 5G PCF) including access, bandwidth and quota may need to be more nuanced at a local level or may need to support low latency requirements at the edge. If for example our manufacturer has a wide range of different device types (ranging from “critical” manufacturing robots to “occasional” atmosphere monitoring for example), that enterprise may need granularity of control that our hospital does not need. Alternatively, an enterprise may be pleased to have the control of services “outsourced” to the communication services provider. Whatever the degree of flexibility required by these hard-pressed enterprises, service providers will need to respond accordingly.



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## PUTTING VALUE ON VALUE-ADD

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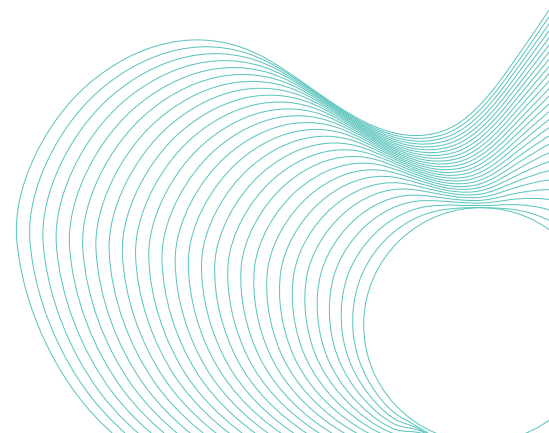
5G-driven slicing has often been over-hyped but advanced operators are moving ahead and the standards-body (3GPP) is also. Slices need to be managed through their life-cycles from rapid conception through to end-of life.

They also need to be defined in detail in terms of evolving SLA characteristics, specific to a particular slice, during its life-cycle. That management and set of SLA characteristics provide value and can of course be monetised. In addition to the 5G charging function (or CHF which is an evolution of 4G charging), further advances (such as CSIF or Charging Subscribing and Interaction Function\*) that cater for expanding charging complexity across a much evolved 5G ecosystem are also emerging. Of course data analytics, or in 5G functional terms, the NWDAF (or Network Data Analytics Function) has an increasing role to play in terms of SLA performance metrics. So the CSIF would consume analytics results from the NWDAF and trigger charging so that slices can be charged for in myriad new ways.

## BUILDING A PARTNER ECOSYSTEM TO DELIVER TO VERTICALS

The initial driver for this opening up of 5G networks will be the new business opportunities enabled by ultra-reliable and low latency communications (URLLC) and massive machine-type communications (mMTC). In order to offer 5G services beyond connectivity service providers will need to build a partner ecosystem. Service providers are not expert in end user use cases - such as manufacturing, logistics, healthcare or education. But they are expert in running and managing networks, as well as running the IT systems that can provide control, monetisation and analysis of services delivered over these networks. With 5G this places the service providers at the centre of a partner ecosystem to provide a range of enterprise 5G services.

This involves building a cloud based 5G partnership platform where 5G service partners can sign up to work with service providers. Creating a platform-driven partner ecosystem will allow service providers to quickly and cost effectively expand their partner relationships to create a vast network of partners.



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## PUTTING VALUE ON VALUE-ADD

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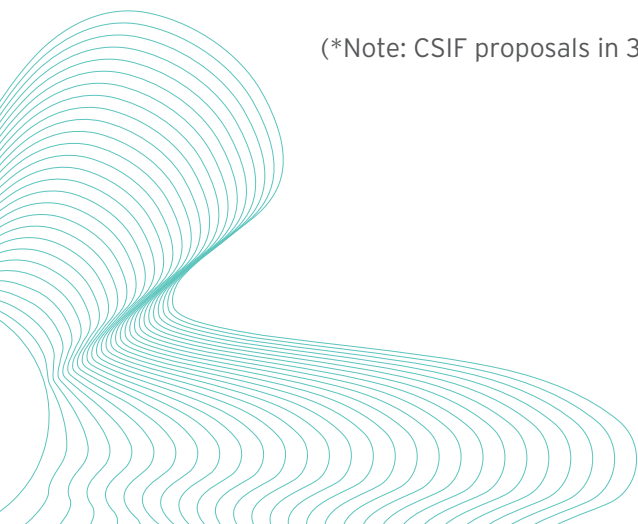
They could supply security services, logistics tracking, healthcare, on-line learning, etc, etc. These services are combined with 'on demand' 5G connectivity to opens up new revenue opportunities. The service provider and their partners can provide a range of options by using network slicing to deliver QoS options - which will have different monetisation rules.

The 5G Network Exposure Function (NEF) facilitates secure, robust, developer-friendly access to exposed network services and capabilities. Authorized third-party developers and enterprises can use the available northbound APIs to create their own network services on-demand. Service Assurance and network automation may be further enhanced by application server interactions with policy and charging controls as well as network analytics, edge computing components and network slicing. The NEF can provide a multi-layer policy framework that enables policy decisions at the application, business and infrastructure levels.

As such, Service providers become an access platform and enabler for trusted partners. Service providers can leverage network exposure capabilities to build trusted relationships with their industry partners by helping them innovate and deliver value-added services.

These new and evolving functions need to be managed, no longer as waterfall projects but as open and updatable elements within a service-based architecture (SBA). Cloud- and microservices-based, they are key elements to a web-scale evolution. Their objective is to ensure service providers remain competitive and in front of revenue opportunities regardless of their positions in the 5G value chain.

(\*Note: CSIF proposals in 3GPP Release 16 may be subject to changes).



## A PROLIFERATION OF VALUE OPPORTUNITIES

So what does all of this required flexibility of deployment out to the edge provide? Ultimately for service providers it enables a much wider range of value-based devices and services and therefore a wider range of monetisation possibilities.

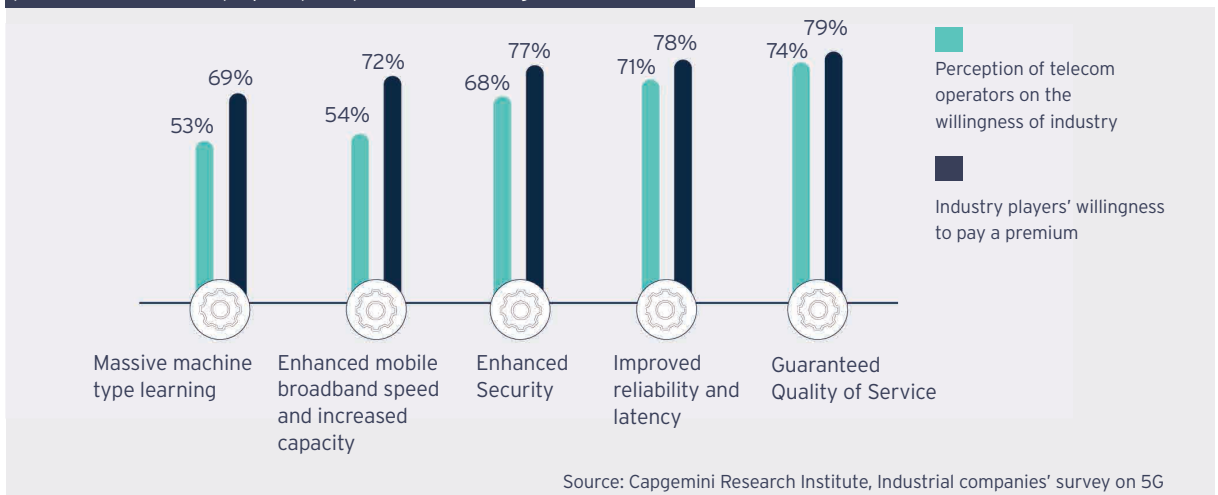
### Delivering an AppStore Approach to 5G Enterprise Market Places

Having built a partner ecosystem to deliver 'on demand' 5G enterprise services, there is the need to provide a cloud based app store or enterprise market place. Customers could log onto this and order services as well as build enterprise bundles and have them delivered and activated 'on demand'. As can be seen in Fig.6, enterprises expect to pay a premium for guaranteed 5G QoS. It is the service providers' ability to control the 5G network that will place them in the centre of the 5G enterprise service value chain, and make them an attractive partner for companies who want to sell their services to enterprises.

Enterprises have not only been looking forward to such service capabilities for some time and research has shown that they are willing to pay a premium for them. A study by Capgemini in 2019, where they interviewed over 800 industrial companies and 150 telecoms executives shows that telcos may underestimate the willingness of enterprises to pay a premium (See Fig. 6 for details). It will be down to network slicing to control and manage QoS, and to provide SLAs.

GSA tracking reports have already shown that the range of device types, everything from robots and drones to vending machines and TV's is expanding at a much more rapid pace than was the case with 4G. Whatever form they take, they will have to work out of the box and be easily controllable and monetised. The alternative is that they are treated as if they are "the same". Worse still, they may simply overwhelm the network and provide nothing more than basic revenue streams for service providers.

Fig. 6: Difference between industry players' willingness to pay a premium and telecom players' perception of this willingness



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## CONCLUSIONS AND OPPORTUNITIES

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The four points below highlight the main conclusions on this paper and what the major impact will be on service providers.



**1.  
EXPECT  
DISRUPTION**

Cloud and software-based networks will mean that competition will come from new sources. Aside from existing competitors: new entrants, substitutes, suppliers and customers - all seeking more diversified portfolios, will make attempts to compete directly and indirectly, often bundling services in new and innovative ways that are yet to be imagined. Value chains will get shaken up as we move core network functions to the cloud.



**2.  
BUILD  
FOR CHANGE**

Rapid and accelerating change is the new norm and waiting to see what happens will, by definition mean that some service providers are further exposed to disruption from cloud-based providers. New 5G functions will evolve as 3GPP Release 15 moves to Release 16 and beyond. Cloud, microservices and DevOps methodologies will provide increasing speed, flexibility and value that service providers have been seeking for services that have yet to be imagined. The expectations relating to 5G in the enterprise market will provide added impetus.



**3.  
5G  
MATURITY**

Enterprise opportunities exist today whether on 4G or 5G. 5G will keep evolving in any event, so a key approach will be to have an organisational setup for the much higher expectations of enterprise whether current demands can be met with 4G or 5G. Some functions will evolve from their 4G parents; some will be built especially for 5G but 4G will need to co-exist with 5G for some time. Both need to be cohesively managed. Both need close consideration from the enterprise perspective. For example, if self-service is a new norm, what impact does this have on an enterprise in a hybrid 4G/5G environment?




**4.  
GOING IT ALONE  
WON'T BE EASY OR  
EVEN POSSIBLE**

Traditions are breaking down and this includes moving from "best in suite" (monolithic stacks) to much more flexible "best in class" functional combinations and open interfaces. Service launch times will reduce from months to days or minutes. Proven flexibility will be a key source of competitive advantage and business value. This includes flexibility to open up to new partnership types. Some will be for short-lived opportunities. Others will be more strategic. All will rely on available flexibility that is ahead of the competition.

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Enterprise 5G requirements are now moving beyond exploration. All of this means that partnerships done well may be the difference between success and failure in a more complex but more powerful and more open 5G ecosystem and marketplace - especially when it comes to the exacting demands of enterprises. The ability to pivot and seek value amid the myriad choices that have already become available will depend increasingly on pre-built flexibility.

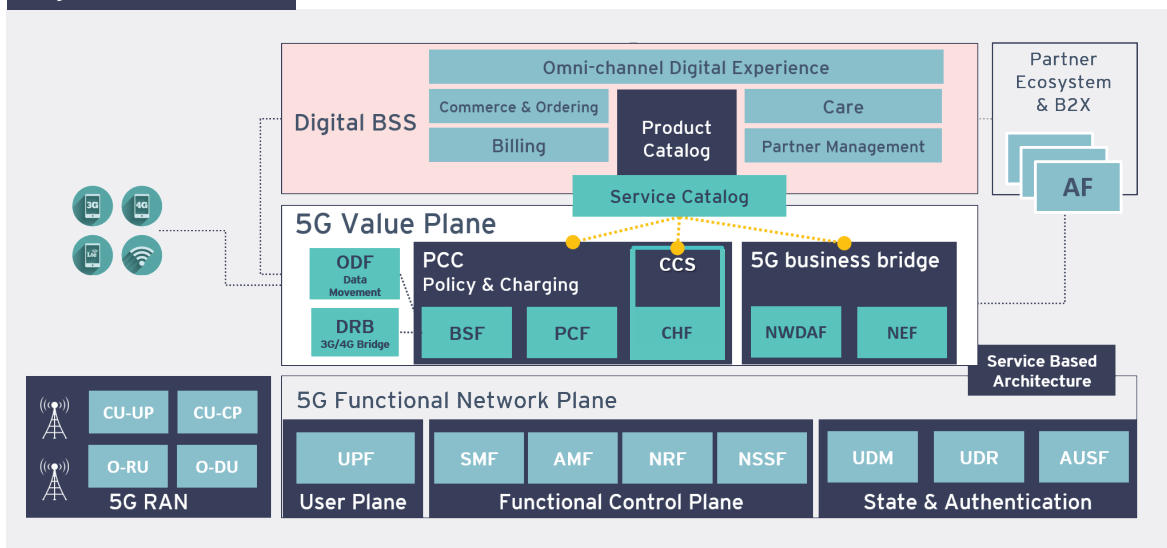


## 5G VALUE PLANE - BRIDGING 5G NETWORKS AND BUSINESS AND IT

5G, and the introduction of new capabilities such as slicing, enables operators to start monetising their 5G networks. It enables them to go way beyond selling connectivity. There has been research for both the enterprise and consumer markets that show customers will pay a premium for 5G services that come with a guaranteed Quality of Service. Mission critical applications such as 5G healthcare and remote surgery, can use slices with a higher quality of service than standard connectivity. These services where network attributes (latency, QoS, etc) are a fundamental part of the offer, are called network embedded services

With the emergence of network embedded services and the subsequent monetisation of the 5G network, there will be closer scrutiny on how service providers develop, manage and monetise 5G services. Clearly, the network functions in 5G need to be very tightly integrated into BSS - after all, the network attributes are not just means of delivering a service, but they are now part of the service. As such, we'll see the emergence of a 5G Value Plane that bridges IT & business functions and the 5G network. Central to this 5G Value Plane are the service catalog in BSS, as well as 5G Policy (PCF) and Charging (CHF, CCS).

Fig. 7: 5G Value Plane



With 5G, policy is no longer just a network control mechanism. It is used to build and deliver 5G services. It's like the brain of the network and is integrated with 5G charging so that different offers with different network characteristics (e.g. guaranteed QoS) will have different pricing and charging rules applied. 5G policy and charging functions in the 5G Value Plane need to be integrated to service catalogs in existing BSS stacks, and also to the 5G network, thus providing a bridge between business & IT, and the 5G network. This provides the agility needed for service providers to quickly develop, launch, manage and monetise new 5G offers. This will open new revenue streams, enable the development of new business models, and dramatically improve the ability to monetise the 5G network.

**ABOUT OPENET:**

Openet, an Amdocs company, is a leading software and services provider to communications companies. Our deep domain expertise & understanding of complex systems, underpinned by the tenacity and determination of our people, enable us to radically transform how our customers do business, providing best in class digital and 5G business support systems.

In an industry where the only constant is change, our open and innovative technology is built for change. For the last 20 years we have helped the world's most innovative communications companies manage and monetise their business and evolve from communications companies to digital service providers. This gives our customers the power to enter new markets, open new revenue streams and increase profitability.

**AMDOCS & OPENET:**

Amdocs (with Openet as an important part of the engine) has evolved to be the best vendor-partner to drive the enablement of 5G innovation to become commercial reality and help change the industry. We combine agile, cloud-native IT with the power of the 5G network to enable new opportunities for service providers, open new markets and develop new business models. Beyond the vision for software products, Amdocs has expanded its delivery, support and operations models that are most suitable for our customers' needs. 5G is driving change in our societies and economies, and offers huge opportunities for our customers.

**Together Openet and Amdocs are Built for Change.**

**OPENET PRODUCTS:**

**Openet Charging:**

Real-time convergent charging for digital and 5G services

**Openet Policy:**

Network policy control for next gen fixed, mobile and converged networks

**Openet Data:**

Data management, data processing and data governance solution designed to collect and manage data at 5G volumes in real-time

**Openet Digital Platform:**

End to end Digital BSS/OSS stack containing Openet & our partners' products

**Openet Forge:**

The digital enablement toolkit which contains Openet's library of microservices, upon which all Openet products are built

**DELIVERING BUSINESS VALUE:**

40%

Reduction in time to market for new offer creation

28%

Uplift in offer uptake

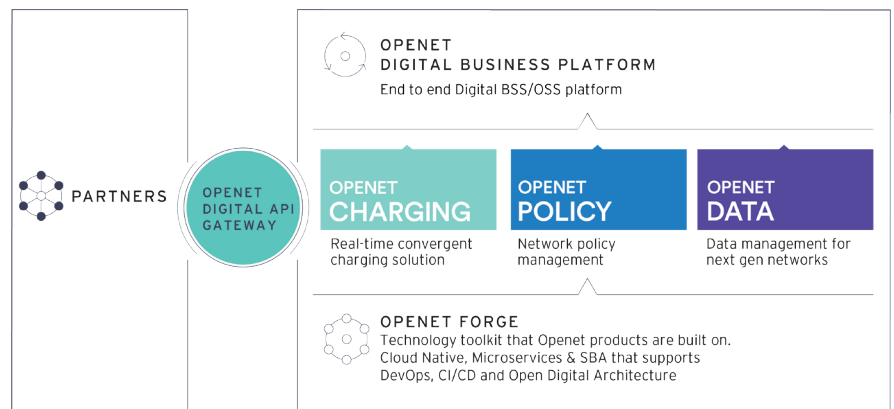
11%

Increase in mobile data ARPU

41%

Increase in mobile data revenues

**OPENET PRODUCT PORTFOLIO**



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**CONTACT**

|                                   |                               |                                     |                                   |
|-----------------------------------|-------------------------------|-------------------------------------|-----------------------------------|
| <b>IRELAND</b><br>+353 1 620 4600 | <b>USA</b><br>+1 703 480 1820 | <b>MALAYSIA</b><br>+60 3 2 289 8500 | <b>BRAZIL</b><br>+55 11 2395 7200 |
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