The CIO's guide to 5G as a business growth engine

January 2022

STL PARTNERS

Agenda

1	**Foreword**
2	**Introduction**
3	**Chapter 1: Billing and Charging**
4	**Chapter 2: Policy**

This report highlights opportunities and challenges for telco CIOs in evolving their IT and OT for a 5G world

Report scope

This report focuses on global telco IT systems, their current state and necessary changes to adapt to 5G

- It serves as a guide to CIOs to navigate developing and providing 5G services, base connectivity and beyond
- The report is divided into a series of chapters, each focusing on a specific telco system

Each chapter draws out:

- Key 5G opportunities for telcos
- The associated technical and organisational challenges
- Recommendations for operators on how to overcome these challenges and succeed in the 5G market

Research scope

This report is supported by primary and secondary research insights, including interviews with telecoms operators and technology vendors globally:

Europe

North America

Middle East & Africa

Telecoms operators

Technology vendors
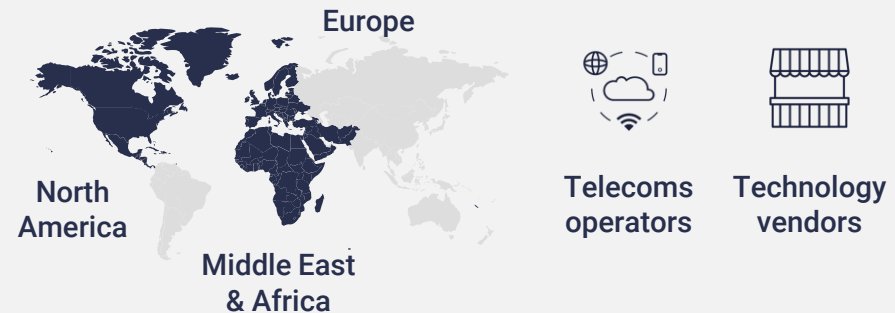
1. To **prioritise systems** for focus in this report
2. To understand a **deep and broad perspective**
3. To **reveal global and regional trends**

Agenda

1	**Foreword**
2	**Introduction**
3	**Chapter 1: Billing and Charging**
4	**Chapter 2: Policy**

5G offers telecoms operators an unprecedented opportunity to move up the value chain and tap into new revenue streams in a variety of industry verticals...

The global 5G services market is forecast to be worth $247B[1] in 2026. A 5G-evolved BSS can transform telecoms operators from traditional connectivity service providers to solution enablers for 5G and IoT, and ultimately service creators with the ability to establish and orchestrate high-value digital ecosystems.

The capabilities introduced through the new 5G core will result in a more flexible and customizable network. Operators are exploring new ways to monetise new and differentiated 5G and IoT use cases, based on different configurations around ultra-low latency, high-bandwidth, QoS, coverage, and reliability.

While early 5G efforts have largely focused on radio access network roll-out to expand coverage, telecoms operators must also consider changes in their core network that will be required to handle the complexities of moving from product to service-based solutions, manage new partner ecosystems, and enable new business models.

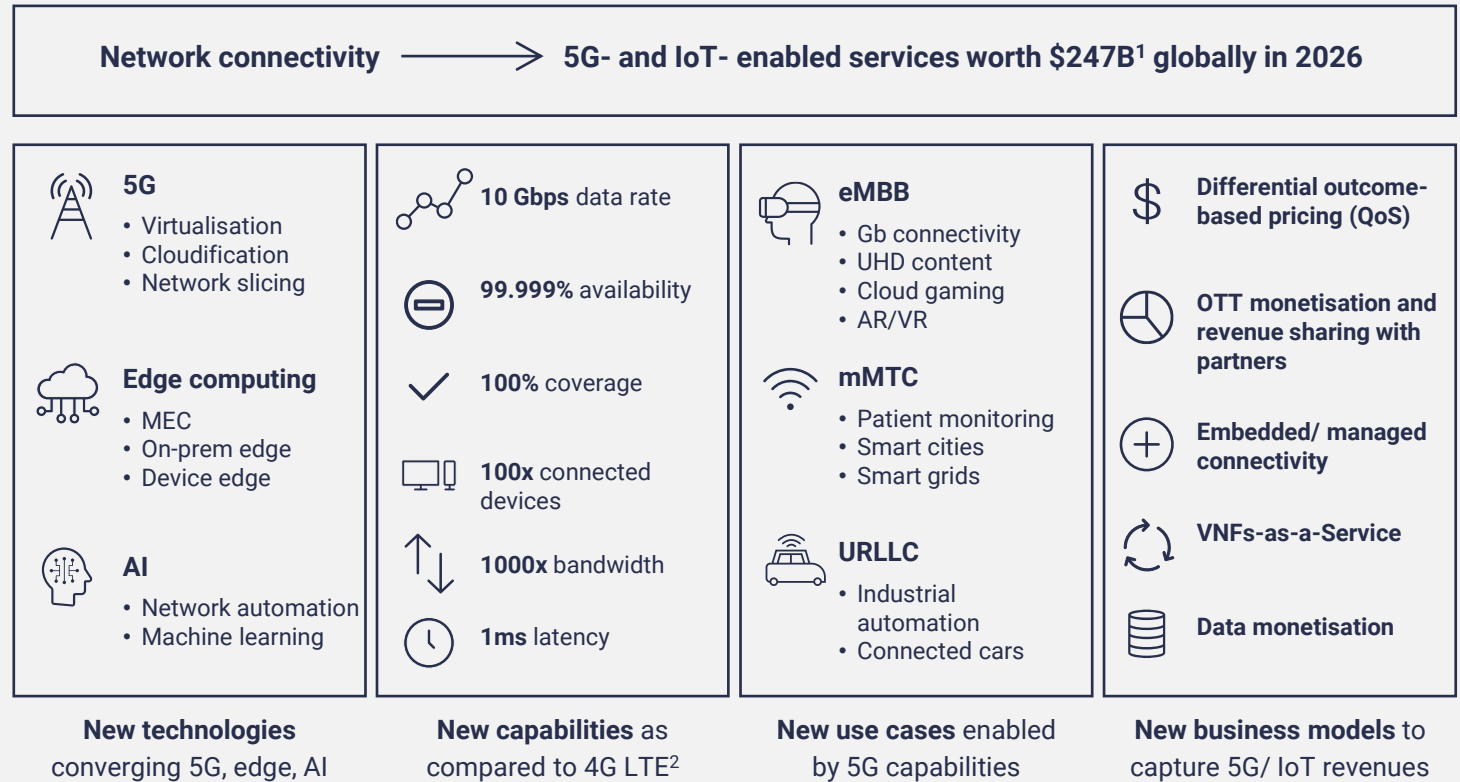**Figure 1. 5G means more data, new customers and partners, and different business models...**

Network connectivity ⟶ 5G- and IoT- enabled services worth $247B[1] globally in 2026

5G
- Virtualisation
- Cloudification
- Network slicing

Edge computing
- MEC
- On-prem edge
- Device edge

AI
- Network automation
- Machine learning

10 Gbps data rate

99.999% availability

100% coverage

100x connected devices

1000x bandwidth

1ms latency

eMBB
- Gb connectivity
- UHD content
- Cloud gaming
- AR/VR

mMTC
- Patient monitoring
- Smart cities
- Smart grids

URLLC
- Industrial automation
- Connected cars

Differential outcome-based pricing (QoS)

OTT monetisation and revenue sharing with partners

Embedded/ managed connectivity

VNFs-as-a-Service

Data monetisation

New technologies converging 5G, edge, AI

New capabilities as compared to 4G LTE[2]

New use cases enabled by 5G capabilities

New business models to capture 5G/ IoT revenues

Figure 1 - Source: STL Partners
[1]5G Services Market Global Forecast, Market Linker
[2]Thales (Gemalto), "Introducing 5G technology and networks (definition, use cases and rollout)", 2019.

...the real 5G revenue opportunity lies in nascent enterprise use cases, and BSS will need to support B2B and B2B2X[1] monetisation models

5G presents an opportunity for telecoms operators to transition from mass-scale, standardised B2C commodity products to a new category of enterprise services: higher-value, B2B and B2B2X solutions that are tailored for specific target industries, such as automotive, manufacturing, healthcare, and media & entertainment.

Network slicing is the key to unlocking the 5G opportunity. Enterprise and B2B2X are going to be transformational areas as 5G standalone core and slicing evolve.

Ecosystem Architect, EMEA CSP

Many are increasingly trying to move beyond B2C-focused portfolios and towards B2B or B2B2X, given that they are expected to provide more significant opportunities for revenue growth. However, enterprise use cases today are seeing much more hype than traction. Operators are still trying to understand the "killer" use cases and how to gain share in the enterprise space.

Figure 2. 5G and IoT enterprise use cases require new and upgraded BSS capabilities

Monitor dynamic services for device volumes at scale

Meet 5G standards and adopt open frameworks

5G BSS must evolve in order to:

Support low-latency, real-time processing

Migrate legacy BSS stacks to cloud-native platforms

Source: STL Partners
[1]B2B2X is a business model that allows operators to provide networking, infrastructure and other services to businesses who, in turn, offer services to end-customers (enterprises or consumers).

Network slicing is one of these opportunities for telcos to monetise their networks in new ways

Network slicing could be a significant opportunity for telcos to monetise their 5G (SA) networks across multiple industry verticals in the B2B space. However, this brings complexities that will require an evolution in current IT systems.
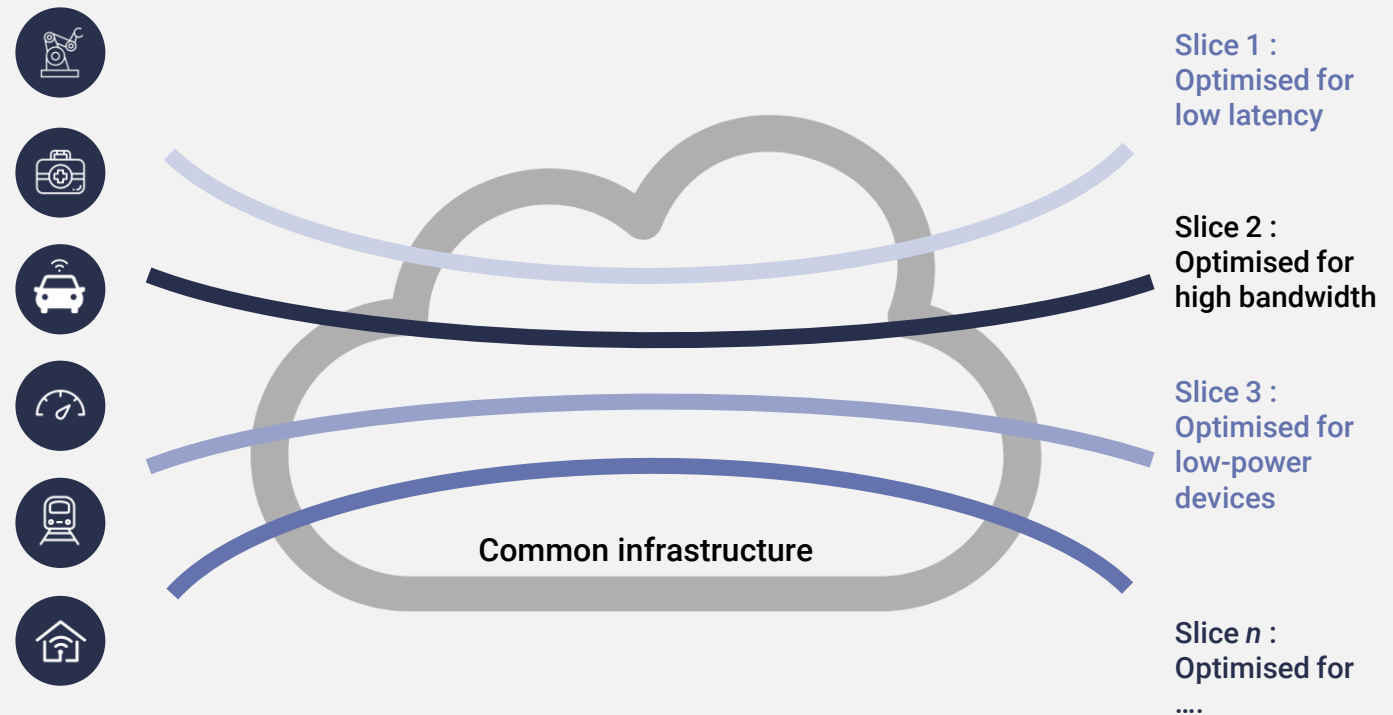
With slicing, telcos can deploy new services quickly, and provide tailored solutions to customers across a range of verticals while using minimal infrastructure.

However, there could be several different configurations of network capabilities available to customers to meet their individual needs.

This raises a number of key considerations for telcos to ensure they can exploit this opportunity, for example:

- How can we ensure that more complex charging data is accurately and reliably processed?
- How can we charge for a capability that cannot be easily standardised or productised?
- How can we provide customers with visibility over how they are being charged for services used in this more complex environment?

Figure 4. Network slicing offers telcos new ways to charge for their network capabilities

Slice 1 : Optimised for low latency

Slice 2 : Optimised for high bandwidth

Slice 3 : Optimised for low-power devices

Slice *n* : Optimised for ....

Common infrastructure

Source: STL Partners

Telco BSS systems today are not fit for a truly 5G future

Through our interview programme, CSPs have identified the following as priority IT systems that need to change:

OSS/BSS function	5G impact	Latency and availability requirements
Billing	• Increasing demand for high quality of customer experience, as well as more complex B2B solutions e.g., changing billing systems to offer usage-based, PAYG models, and manage billing for multiple-partner enabled solutions	• Latency requirements are not sub-millisecond, but billing will need to become more real-time to improve efficiency of data processing and decrease storage requirements for the charging functions (e.g. moving from batch to stream processing to ingest charging data as it comes)
Charging	• Differentiated 5G and IoT services require dynamic, flexible rating and charging models for monetisation • 3GPP Rel-15 outlines a converged charging system that can charge on different parameters e.g., QoS	• Requires real-time usage data processing e.g., <20ms (source: telco interviewees) • Reliability is equally important for rating and charging to ensure that customers are accurately charged
Policy control	• 5G service-based architectures (SBA) and network slicing requires automated control of network resources and network slice configuration, based on dynamic network conditions • Operators may need to centralise policy control for 5G and legacy networks	• Requires sub-millisecond latency e.g., <30ms (source: tech vendor and telco interviewees) • Real-time decision-making is required to enable slice selection based on dynamic network conditions, type of service and subscriber
Customer management (CVM & CEM)	• In the front-end, 5G customers demand real-time, omnichannel support, automated self-service options, and pin-point accurate, personalised product offerings • In the back-end, operators need to have an in-depth understanding of underlying network resources to make dynamic adjustments to customer experiences	• Requires 3 or 4 9s baseline availability • Real-time and predictive personalisation is required to deliver customised product recommendations and enhance customer experience
Fraud management and prevention	• IoT use cases rapidly increase the number of connected devices and attack surfaces, requiring operators to use AI/ML to automate fraud detection and prevention and process large volumes of customer data in real-time	• Low latency requirements will increase with network slicing, for real-time slice provisioning
Service provisioning	• An end-to-end service catalogue will be critical for faster and more flexible service creation, and to provide real-time optionality and personalisation for customers	• End-to-end catalog is still nascent and service creation can currently take months rather than days
Partner management	• Partner onboarding and lifecycle management must be highly automated to monetise OTT, B2B and B2B2X business models, e.g. Communications-aaS and Cloud Platforms-aaS	• Most telcos do not have an automated solution in place for managing partners yet

Delivering on 5G enterprise use cases requires both new and upgraded BSS capabilities, particularly to support IoT device connectivity

Key considerations for evolving BSS to 5G

1

Monitoring dynamic services for device volumes at scale

BSS systems must be configured to efficiently monitor service levels for magnitudes of 100s-10,000s of devices per enterprise customer. Each device may have very different SLAs, charging for low ARPU services, and requires automating BSS end-to-end (e.g., an IoT device being automatically provisioned a service then charged appropriately)

Optimised information models and a high degree of automation are required to handle huge numbers of devices.

2

Support low-latency, real-time processing

Real-time processing will be critical to enabling low-latency, high-bandwidth 5G enterprise use cases, which will be supported by converged charging systems (integrating BSS functions: charging, policy control, network exchange), and could be enabled by network slicing (supporting industrial use cases with guaranteed quality of service in the network).

BSS must make real-time policy decisions to provide the QoS required to support these use cases.

3

Migrate legacy BSS stacks to cloud-native platforms

Most existing monetisation systems are designed based on monolithic architecture frameworks, which are limited in capacity to scale and support new use cases. 5G is built on cloud-native platforms and a cloud-native BSS architecture allows integration across various enterprise use cases in a cost-effective manner.

Equally, IT systems must be scalable to ensure efficiency and reliability across distributed networks for edge computing applications.

4

Meet 5G standards and adopt open frameworks

Operators are beginning to adopt IT standards to innovate and monetise new services faster, while avoiding integration costs of tightly coupled components.

TMF Open APIs are maturing and becoming the de-facto standard for northbound BSS integrations, making it easier to interface with telco and enterprise systems for B2B2X services and open new markets in API management and monetisation.

Alongside a technology evolution, telcos must adapt their organisations to enable IT/OT convergence and exploit 5G

- Telcos are evolving their networks towards cloud native, particularly in the core, requiring software-network expertise
- Networks will require deeper integration with IT systems to ensure maximum flexibility and ability to act on data insights
- The separation of CIO, CTO and product teams can make the creation of innovative services and business cases difficult

OT
Physical assets and underlying systems required to run the network (e.g. 5G, OSS)

→ **IT/OT convergence** ←

IT
Application-centric systems to run, manage and optimise service operation (e.g. BSS orchestration, charging)

This convergence means telcos must make fundamental changes across their organisations to feel the full benefit of 5G

Organisation	Technology	Business enablers
Greater cross-team collaboration	**More flexible architecture**	**Deeper proposition clarity**

Organisation — Greater cross-team collaboration
- Operators must drive **greater convergence between CIO and network teams** to ensure necessary subject matter experts can collaborate efficiently to design and build **cloud-native, programmable 5G networks**
- Cross-functional, agile teams (e.g. combining IT, OT and product teams) and **use of CI/CD and DevOps processes** will be key to growth and success
- This can be supplemented by **retraining of existing workforce** to fill skill gaps in software development

Technology — More flexible architecture
- Existing legacy systems must be replaced by **open, transparent and scalable solutions** that maintain **data consistency** – open APIs and microservices will be key, but will bring different versions of data that must be kept consistent for accurate decisioning
- New systems must be able to **orchestrate cross-functionally**, provisioning network and other services
- Customers and partners want to **interact directly with operator systems** to enhance service visibility, accelerate onboarding and service configuration

Business enablers — Deeper proposition clarity
- Operators must frame 5G as an enabler for moving up the value chain
- Proposition teams must quickly **refine planned offerings, including charging models**, to reach beyond mobile broadband and **ward off early revenue plateaus**
- 5G offers opportunity **to differentiate connectivity play** (e.g. unique SLAs per network slice) **and innovate with partners**, prospective and existing

Agenda

Chapter 1: Billing and Charging

Reah Jamnadass, Senior Consultant | reah.jamnadass@stlpartners.com

Izzy Montgomery, Consultant | izzy.montgomery@stlpartners.com

Billing and charging are top priority IT systems for telcos to evolve in the short term, particularly to monetise their investments in 5G

OSS/BSS function	5G impact	Latency and availability requirements
Billing	• Increasing demand for high quality of customer experience, as well as more complex B2B solutions e.g., changing billing systems to offer usage-based, PAYG models, and manage billing for multiple-partner enabled solutions	• Latency requirements are not sub-millisecond, but billing will need to become more real-time to improve efficiency of data processing and decrease storage requirements for the charging functions (e.g. moving from batch to stream processing to ingest charging data as it comes)
Charging	• Differentiated 5G and IoT services require dynamic, flexible rating and charging models for monetisation • 3GPP Rel-15 outlines a converged charging system that can charge on different parameters e.g., QoS	• Requires real-time usage data processing e.g., <20ms (source: APAC telco interviewee) • Reliability is equally important for rating and charging to ensure that customers are accurately charged

Recommendations for telco CIOs to effectively evolve billing and charging for 5G:

1 **Prepare for new charging models** now to maximise value when 5G-enabled opportunities (e.g. slicing) mature

2 **Invest in evolving your billing systems** to handle more complex (B2B) solutions with multiple partners

3 **Be proactive in engaging partners** and understanding their capabilities to co-develop a 5G-ready system

4 Explore how billing and charging might need to evolve alongside **other functions, such as policy control**

This evolution will become an increasing priority with the rollout of 5G SA, as telcos seek to enable more complex B2B(2X) solutions

75% of telcos interviewed highlighted billing and charging as priority systems to evolve as 5G becomes more widespread and digital transformation is required.

In quite a few of the new B2B use cases, we need to think about how billing and charging play into new business models.

SVP, EMEA CSP

The main drivers for this evolution are:

Increasing network traffic from consumer and enterprise apps that needs to be processed, charged and billed for accurately

The opportunity to monetise this data and exploit value from dynamic new use cases that have specific network requirements

Handling the complexities of more complex business models, namely B2B

Charging is a priority for telcos to evolve with 5G, as new use cases are deployed, and dynamic charging models adopted over the next 2-3 years:

Billing also needs to evolve, particularly as telcos look to enable more complex B2B solutions with multiple partners:

Network slicing

- The ability to charge according to different parameters and meet stringent SLAs
- Requires **real-time processing**, reliability, transparency, capacity and quality connectivity

Converged charging

- Charging for both online and offline sessions with a single system
- Requires **real time processing of huge amounts of data**, flexibility, scalability and reliability

Complex B2B solutions

- E.g., telcos may have to bill for solutions provided by multiple partners
- Requires more complex billing capabilities to **integrate multiple systems** and partners into an invoice

Evolving charging systems will put telcos in a strong position to monetise their networks with dynamic new solutions and differentiated offerings

With 5G bringing new **B2B solutions** and an increase of **B2C data usage**, charging systems will need to be able to process **significant amounts of data** with reliability and ultra low latency and adapt to new 5G capabilities such as network **slicing.**

This presents an **opportunity** for revenue growth as telcos can move up the value chain to offer solutions beyond connectivity and **monetise** different features of their networks such as latency or QoS.

For example, in the B2B2X space, telcos can grow partnerships with game developers to monetise and charge by the provision of features such as low jitter.

In parallel, since Release 15 have outlined standards for expected changes to charging systems due to 5G such as for enabling network slicing, charging by new parameters and the deployment of converged charging systems.

There is an opportunity to monetise the network based on many different configurations such as latency, QoS, coverage, capacity and reliability.

Enterprise Architect, UScellular

Figure 3. New 5G services enabled by evolved charging systems
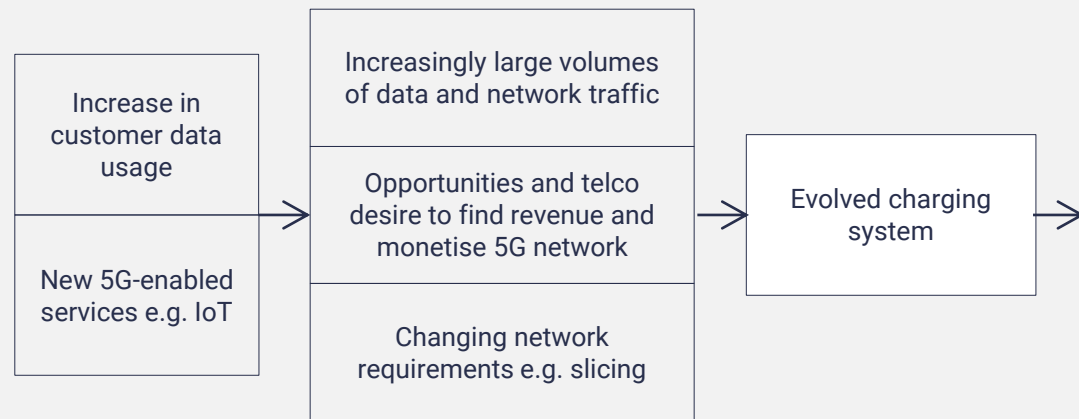
5G applications		Low latency	Accuracy	Reliability	QoS
	Predictive maintenance	x	x	x	x
	Gaming	x		x	x
	Water monitoring		x	x	x
	Drone detection	x	x	x	x
	Mission-critical operations	x	x	x	x
	Fleet management		x	x	x

Increase in customer data usage

New 5G-enabled services e.g. IoT

Increasingly large volumes of data and network traffic

Opportunities and telco desire to find revenue and monetise 5G network

Changing network requirements e.g. slicing

Evolved charging system

Source: STL Partners interviews, 2021

Network slicing could be a key opportunity– though it is still 2-3 years away from maturing, there are steps you can and should take now to prepare

The timeline for network slicing is dependent on the rollout of 5G SA. Telcos should use this time to evaluate their supporting systems and begin to identify and define how they might exploit this opportunity and use it as a way to enable new, more lucrative, business models.

67% of interviewees identified slicing as a key opportunity and driver to evolve charging.

Operators need to think about the roadmap for how data is collected from the charging system to generate new visibility for them to make decisions

Solution Director OSS/BSS, Huawei

Slicing is still far off, but there will be an eventual tipping point when there will be a real business need for systems to support it – we will need to be ready

Enterprise Architect, UScellular

Work with internal teams to identify and evaluate charging options
- You should consider the options for charging for slicing e.g. by slice, capability (e.g. latency, QoS, reliability), or consumption
- There will need to be communication and collaboration with other teams (e.g. strategy/product) to define opportunities: business strategy/product teams can validate demand for new services from customers, while the IT can identify how to charge for these

Evaluate current vendors and partners to identify capability gaps
- Once you have clear understanding of your requirements and existing capabilities, you should seek to understand whether your current (and prospective) partners are able to support this
- For example, whether their systems will be able to dynamically charge according to new parameters, and whether this will have the real-time capabilities required to charge for every single event

**Evaluate integration requirements with enterprise applications**
- Finally, you should explore the different types of applications and enterprise systems you may need to "plug into" for slicing, particularly if you are hoping to provide solutions for multiple customers across different industry verticals
- You should evaluate the associated integration requirements, for example whether it is possible to use APIs to charge

The convergence of charging systems offers telcos flexibility and efficiencies, and the opportunity to maximise ROI from new use cases

Figure 5: 3GPP's understanding of a converged charging architecture
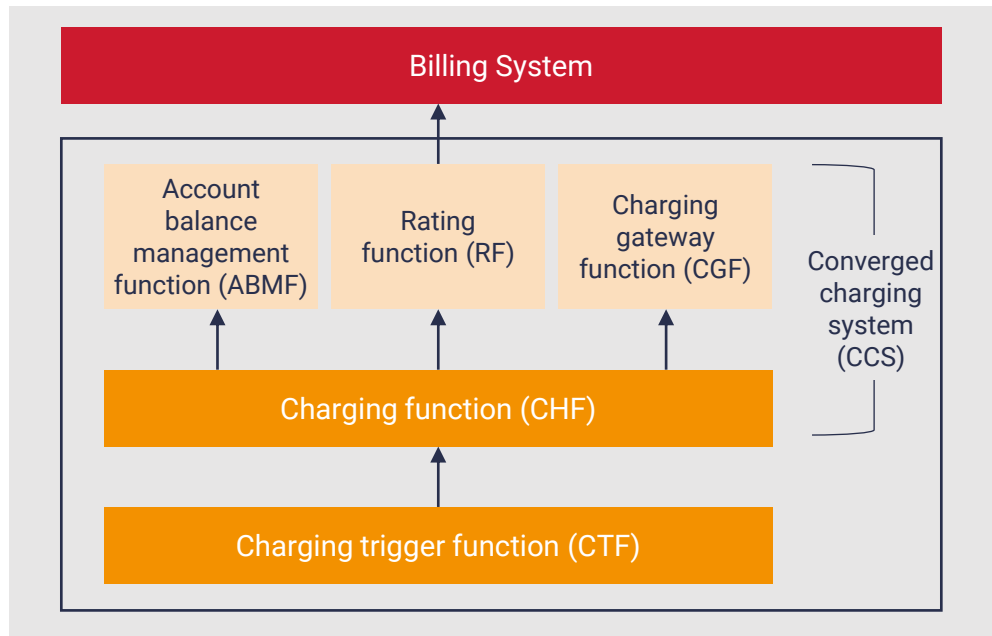
Source: 3GPP
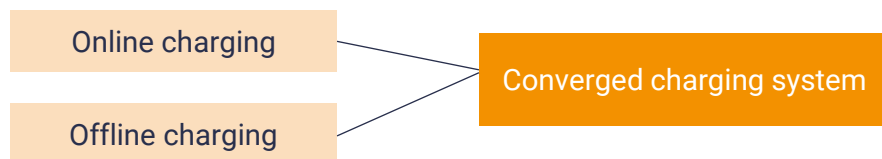
Older charging systems are comprised of **multiple** charging and rating functions, all using separate infrastructure and databases, resulting in **inflexible** architecture which lacks real-time processing. This legacy architecture prevents telcos from being able to adapt to new business models quickly.

Converged charging systems do not separate offline and online charging – features such as account balance management, rating and the charging gateway function are unified into a **single system**. This system is fully **cloud native** enabling **5 9s** processing speeds, **flexibility**, **scalability** and **availability**.

This enables telcos to **maximise their ROI for new use cases,** for example those that require charging requests to be authorised and responded to in milliseconds.

The key benefits of this converged charging system are::

Efficiency: A converged system removes duplicate charges, eliminating separated offline and online workflow. This ultimately reduces costs.

Flexibility: The system will need to grow new revenue streams and monetise 5G use cases, by enabling real time charging and personalised offerings.

Visibility: This system means charging is more easily auditable and potentially improve customer satisfaction by resolving charging issues on a single platform.
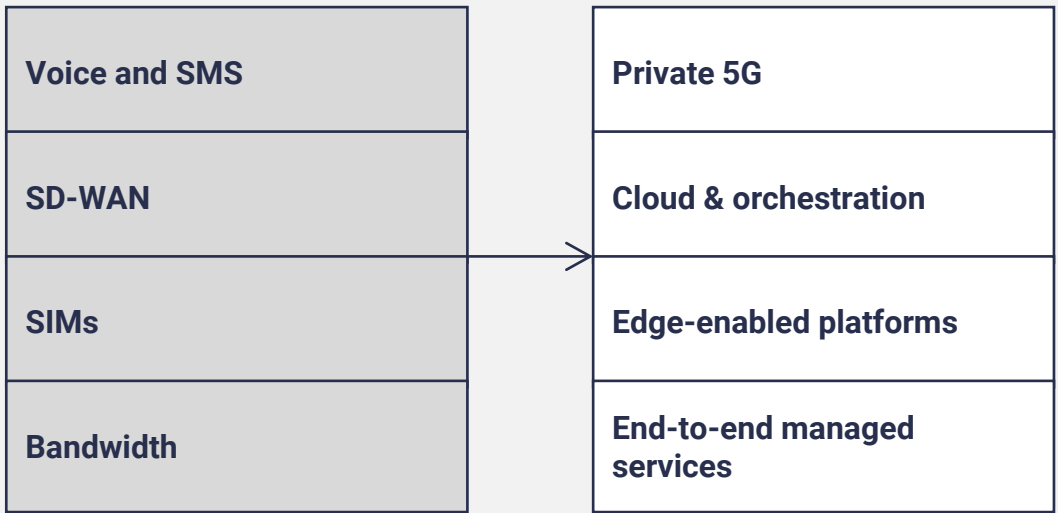
Scalability: Architecture is more agile and can be extended in real time. Flexibility to run on premises, on cloud or through a hybrid approach, supporting a wide range of use cases.

Billing systems will also need to evolve to support more complex B2B solutions with multiple partners

Telcos are moving from product-based to more service-based solutions with 5G. They will not just be selling single connectivity products, but seeking to offer solutions that will help them move up the value chain and expand their B2B capabilities, often with partners.

Voice and SMS	**Private 5G**
SD-WAN	**Cloud & orchestration**
SIMs	**Edge-enabled platforms**
Bandwidth	**End-to-end managed services**

Cloud-native infrastructure and cloud-ready solutions will give telcos more flexibility and scalability, and make networks and other services more programmable to meet enterprise requirements.

This creates complexities when it comes to billing, as different components will need to be integrated into a single bill, and multiple partners may have provided different parts of the solution which will need to be accounted for when billing.

It is important to understand these complexities and identify the requirements that a 5G-ready billing system will need to have to handle them. For example:

Visibility for customers over components within the bill, despite complexities

Transparency for partners who might be providing different parts of solutions

5G-ready billing

Ability to integrate different pricing models and provide an accurate bill from this

Ability to support multiple systems (e.g. hybrid billing for legacy and new)

There should be end-to-end visibility from when a transaction happens to when it is settled, even for more complex settlements (e.g. between enterprises, B2B)

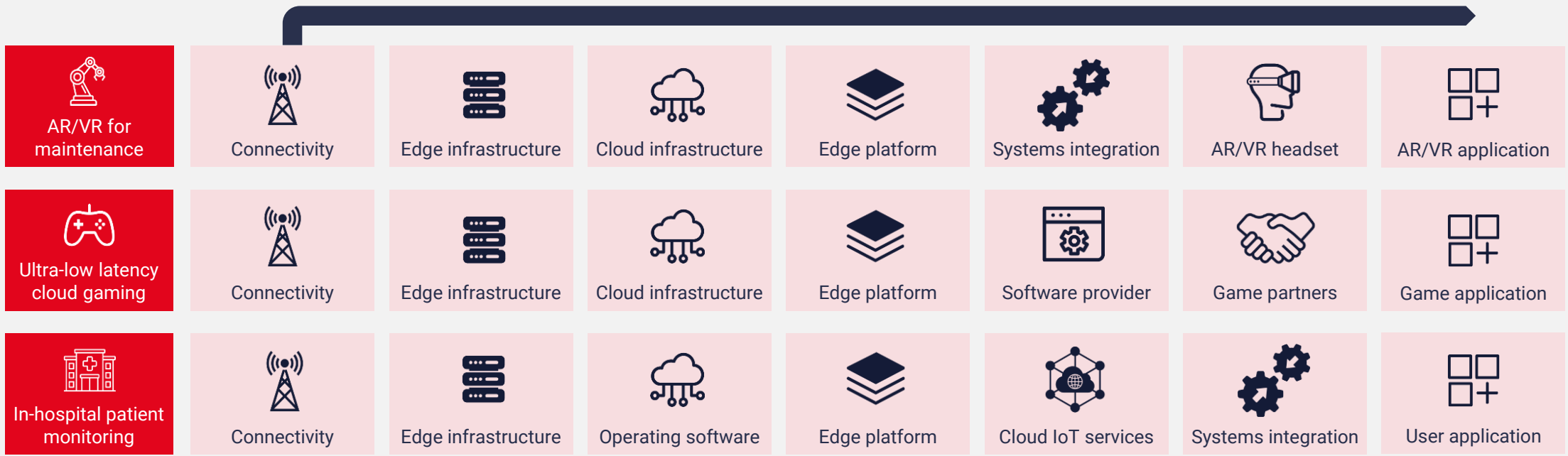**Senior Director, Telecommunications, SAP**

Telcos are already pursuing these more complex B2B solutions, therefore systems should be evaluated now

Traditional telco business models centre on them providing connectivity, or networking services from partners that they can re-sell as a managed service. However, going forwards telcos will seek to adopt business models where they can play a role higher up the value chain, which will require them to work with a more diverse range of partners and think about how to bill their new customers.

Telcos can exploit 5G and other emerging technologies to move up the value chain with partners, but this brings complexities to billing the end customer. In addition, telcos may work with hundreds or even thousands of partners which will make manual onboarding and management unviable and will therefore require automation.

Figure 6: Next-gen services will be a big opportunity for telcos, but will also bring complexities to how they bill customers and manage partner stakes

AR/VR for maintenance	Connectivity	Edge infrastructure	Cloud infrastructure	Edge platform	Systems integration	AR/VR headset	AR/VR application
Ultra-low latency cloud gaming	Connectivity	Edge infrastructure	Cloud infrastructure	Edge platform	Software provider	Game partners	Game application
In-hospital patient monitoring	Connectivity	Edge infrastructure	Operating software	Edge platform	Cloud IoT services	Systems integration	User application

Engaging vendors and partners to learn and co-develop will be a fundamental step to achieving this

Vendors and partners can be a great aid to telcos as they develop their charging and billing systems

In-house telco skills are rarely focused in billing and charging and so partners can ensure key requirements such as low latency, reliability and data processing are delivered.

Through a consultative process, telcos and vendors can work together to co-develop bespoke solutions that integrate with, upgrade or replace legacy billing and charging systems. Telcos are increasingly looking for these solutions to be modular based and using different players for varying parts of the stack can ensure solutions fit telco needs and aspirations.

We are looking to use a patchwork or plaster approach as we reinvent our stack
Ecosystem Architect, EMEA CSP

Our default approach is to buy from partners as we don't think we can compete on a global scale otherwise in terms of price and capabilities
SVP, Head of Network Architecture, EMEA CSP

There are a range of players and partners telcos are seeking to work with to develop their billing and charging systems.

Internal teams: Some telcos are looking to develop their in-house skills as this process of upskilling allows telcos to shape charging and billing systems to their own requirements and target use cases effectively. This often leads to a tighter integration between IT and enterprise teams in the creation and deployment of new charging and billing systems.

Traditional telecom vendors: Some telco vendors have packaged or standalone solutions that evolve and upgrade billing and charging systems.

Billing and charging specialists: Telcos are looking beyond traditional partners to consider specialists who will ensure the necessary capabilities for this IT system are delivered.

Application and solution providers: These small solution partners fit into the modular approach many telcos are taking and are often easy to integrate into existing stack elements.

Systems integrators: as telcos are increasingly adopting a modular architecture approach, SIs can help various partners and parts of the stack work as a seamless system.

However, telcos must work to overcome differences to their partners to provide effective solutions

Some are trailblazers in building their 5G stacks, but most telcos still only have non-standalone 5G and are cost constrained
Strategic Product Manager, EMEA vendor, BSS platform provider

There can often be a disparity between the language used by telcos and their partners when discussing 5G and evolving billing and charging systems. Furthermore, the technologies and strategies of vendors are often much more advanced than telcos currently. Both parties must understand the other's language and strategy to form an effective plan to co-develop systems.
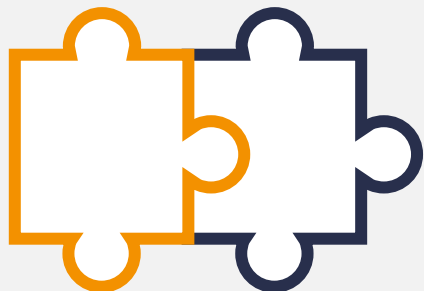
Telcos must clearly articulate their pain points to vendors, who are increasingly willing to offer bespoke rather than 'one size fits all' approaches. Many telcos are wanting to upgrade or change certain IT components rather than transforming their whole BSS stacks. This ensures investment is spread out over time and allows telcos more flexibility and control over their stack.

Engaging vendors and partners to learn and co-develop will be a fundamental step to achieving this

Charging function CHF

Policy control function **PCF**

Network slicing: This convergence will compliment network slicing in particularly where there is a crucial need for transparency over features such as QoS to ensure accurate charging in real time.

This convergence is crucial for **mission critical use cases** in industries such as healthcare and provisioning where often service will have to be provisioned prior to charging and rating processes.

CHF and PCF will be more tightly coupled

This will increase visibility about network behaviour and resource allocation, enabling better decision making

This will enable more real-time, accurate and granular billing and charging

We need communication between charging and billing for mission critical use cases
Solution Director, Huawei

It is inevitable that policy and charging will become more closely linked
Enterprise Architect, UScellular

New use case business models such as charging by end use connectivity requires tight collaboration
Senior Director, SAP

The transformation of **policy and QoS services** will be explored further in Chapter 2 of this report.

Agenda

Chapter 2: Policy

Patrick Montague-Jones, Senior Consultant | patrick.montague-jones@stlpartners.com

Michelle Lo, Consultant | michelle.lo@stlpartners.com

Policy is a growing priority IT systems for telcos to evolve in the short term, particularly as 5G deployments mature

OSS/BSS function	5G impact	Latency and availability requirements
Policy Control	• 5G service-based architectures (SBA) and network slicing requires automated control of network resources and network slice configuration, based on dynamic network conditions • Operators may need to centralise policy control for 5G and legacy networks	• Requires sub-millisecond latency e.g., <30ms (source: EMEA tech vendor interviewee) • Real-time decision-making is required to enable slice selection based on dynamic network conditions, type of service and subscriber

Recommendations for telco CIOs to effectively evolve policy for 5G:

1 **Evaluate your ability to integrate metrics and data** from the network and other systems to enable new services

2 **Consider the role of policy to open new revenue streams** particularly in B2B

3 **Change your operating model** to make it easier for product teams to leverage the benefits from 5G policy

The 5G policy function is fundamentally different to 4G, particularly in its relationship with charging and other network functions

Like the charging function, mentioned in chapter 1 of this report, **policy has seen an evolution from 4G/LTE to 5G**. In 4G, the PCRF is often overlapped with the OCS for use cases e.g., data roaming passes, but these functions have become independent of each other, now working as the PCF (Policy Control Function) and CHF (Charging Function).

This split allows for more operator flexibility than before, with different vendors potentially providing technology for each network function. This can increase operational complexity – therefore, operators should carefully evaluate their approach to using multiple vendors.

4G to 5G evolution implications: policy control

Dedicated function: *The PCRF split means independent procurement, modification and scalability of the PCF. There is a clear differentiation between the policy and charging functions with 5G, and functionality should not be duplicated across the PCR and CHR.*

More interfaces: *Policy systems now take inputs from numerous network functions (pictured right), optimising operator decision making for policy application and network resource allocation.*

Greater functionality: *Enforces service access rights and authorisation at point of device/user registration.*

Network slicing: *Drives extra layers of complexity, where the PCF will facilitate and de-activate access and apply policy to network segments in real time.*
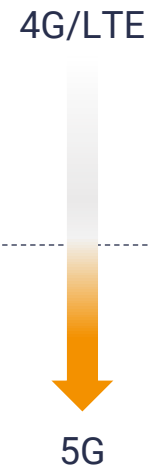
Figure 7. With 5G, the 4G policy and charging function (PCRF) is split into distinct functions, the PCF and CHF

In 4G/LTE, policy and charging rules function (PCRF) is a set of network functions that defines rules around policy and charging in one consolidated block

SPR: Subscriber Profile Repository
AF: Application Function
PCF: Policy Control Function
CHF: Charging Function
NEF: Network Exposure Function

AMF: Access & Mobility Mgmt Function
SMF: Session Mgmt Function
UDR: Unified Data Repository
NWDAF: Network Data Analytics Function

Source: 3GPP

Policy is evolving to enable new, more agile services through greater flexibility and the ability to leverage more data points from different sources

5G brings about new complexities for the network, including increased data traffic, new architecture and new standards. There are more metrics against which operators can adapt network behaviour, due to the disaggregation of the 5G core and changes in policy and charging domains. This means that operators will need to integrate data from different systems or sources for tracking, analysis, and performing actions.

Customers expect differentiated services to be provisioned in real time. In addition to 5G networks having service-based architectures, policy control systems must evolve to be cloud-native and highly automated to manage increasing network complexities, so that operators can monetise 5G effectively:

- Policy control must be flexible and agile – reacting to instantiate and apply policy for new devices and traffic, creating rules without relying on fixed rule table schedules.
- A 5G policy control system must process many more data points on the network, operations and services and enable real-time customer charging.
- Network slicing creates new and complex requirements for policy, which must support custom configurations of low-latency, capacity and QoS of each slice in a granular manner.
- Tracking, reporting and actioning on service performance data on behalf of third-party providers/ partners in the future will only add to this complexity.

Figure 8. Policy must evolve to meet customer expectations, exploit 5G opportunities and manage increasing network complexities

The 5G policy controller needs to...

Configure policy based on new parameters

Monitor new metrics for policy setting and charging

Allow granular service configuration per network slice

Support dynamic, real-time service provisioning

Source: STL Partners

In order to do this, operators must evaluate and specify the key metrics that are most relevant to different use cases and outcomes

Network policy control is the process of creating, implementing and maintaining rules to determine how the network, data or services should behave according to pre-defined metrics.
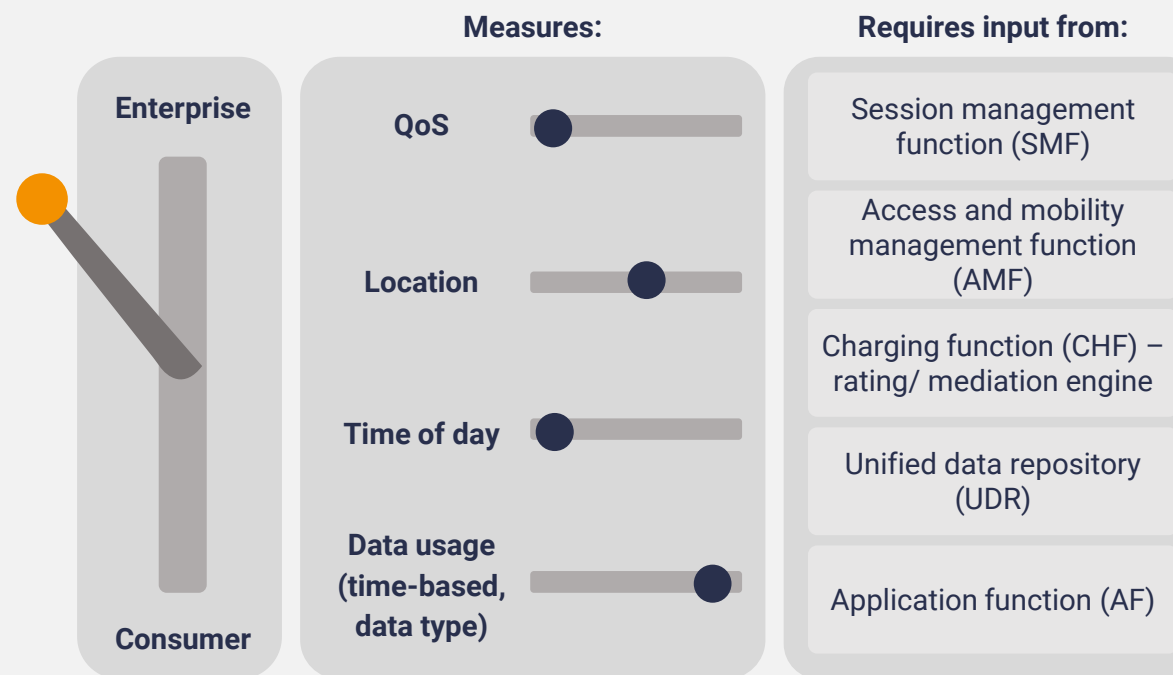
Internal (operator) considerations:

- Operators must understand what network metrics are available to them and how these can feed into the policy engine to enact rules that ensure KPIs and outcomes expected by different customers, e.g. Quality of Service (QoS).

- Metrics should be interlinked with new charging models in order to monetise or discount based on service performance outcomes and translate to behavioral changes in the network.

- Input data will therefore have to be aggregated from different network entities to optimise network resource allocation and policy enforcement.

KPIs and outcomes for customers:

- More dynamic policy control can enable both enterprise and consumer service offerings through network slicing. However, it would be important to differentiate the most relevant metrics for servicing different types of customers.

- For B2B, QoS, latency, and location-based metrics may resonate the most, as a means to differentiate operational performance between enterprise use cases in a more flexible and granular way.

- For B2C, offering flexible data plans and service tiers to consumers based on their real-time data usage may be the most useful for guaranteeing better Quality of Experience (QoE).

Figure 9. These policy metrics will be applied differently depending on the network slice and end-customer, and requires data inputs from the access network, transport, core, end-device, etc.
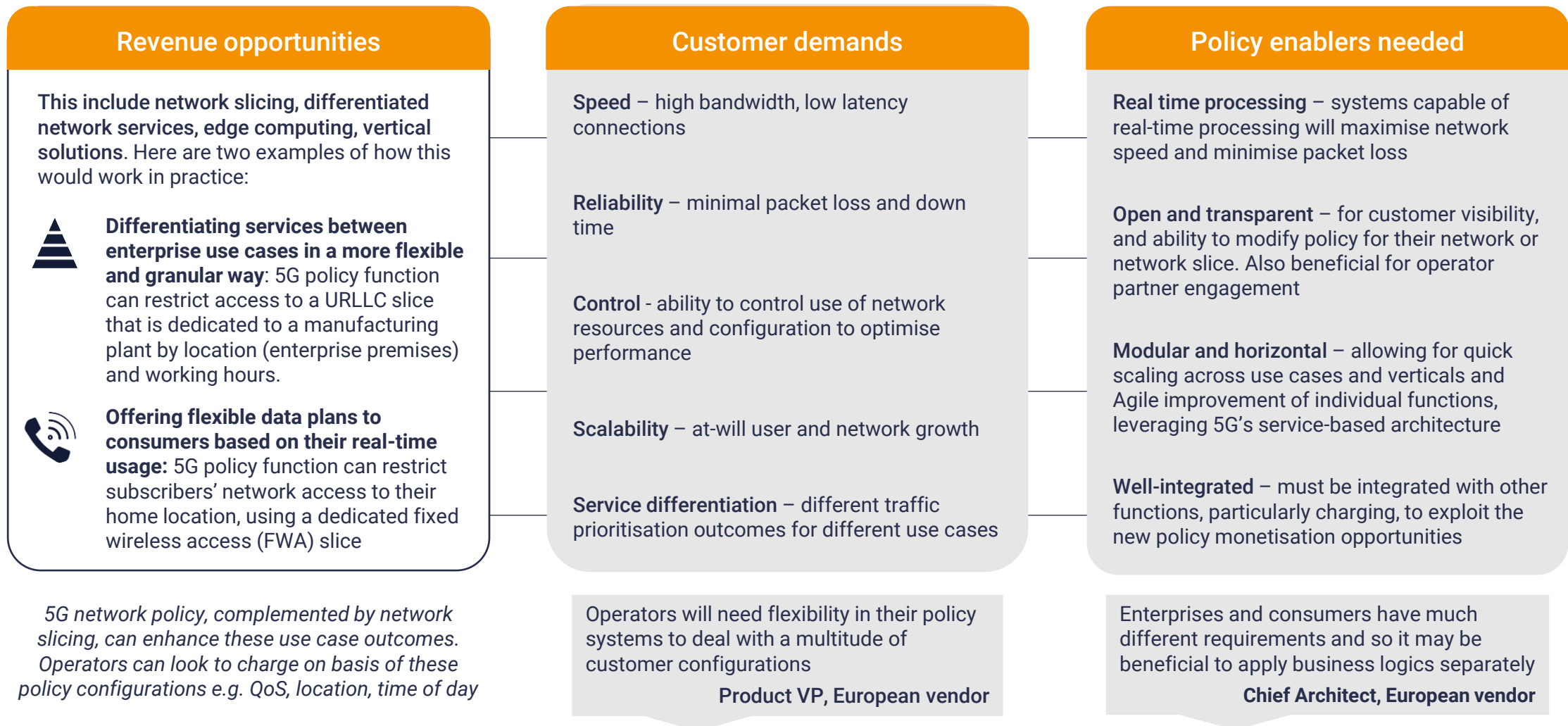
Source: STL Partners

27

To meet customer expectations for 5G agility, operators consider how their policy control function can enable the monetisation of new use cases

Revenue opportunities

This include network slicing, differentiated network services, edge computing, vertical solutions. Here are two examples of how this would work in practice:

Differentiating services between enterprise use cases in a more flexible and granular way: 5G policy function can restrict access to a URLLC slice that is dedicated to a manufacturing plant by location (enterprise premises) and working hours.

Offering flexible data plans to consumers based on their real-time usage: 5G policy function can restrict subscribers' network access to their home location, using a dedicated fixed wireless access (FWA) slice

5G network policy, complemented by network slicing, can enhance these use case outcomes. Operators can look to charge on basis of these policy configurations e.g. QoS, location, time of day

Customer demands

Speed – high bandwidth, low latency connections

Reliability – minimal packet loss and down time

Control - ability to control use of network resources and configuration to optimise performance

Scalability – at-will user and network growth

Service differentiation – different traffic prioritisation outcomes for different use cases

Operators will need flexibility in their policy systems to deal with a multitude of customer configurations

Product VP, European vendor

Policy enablers needed

Real time processing – systems capable of real-time processing will maximise network speed and minimise packet loss

Open and transparent – for customer visibility, and ability to modify policy for their network or network slice. Also beneficial for operator partner engagement

Modular and horizontal – allowing for quick scaling across use cases and verticals and Agile improvement of individual functions, leveraging 5G's service-based architecture

Well-integrated – must be integrated with other functions, particularly charging, to exploit the new policy monetisation opportunities

Enterprises and consumers have much different requirements and so it may be beneficial to apply business logics separately

Chief Architect, European vendor

Policy will be brought to life when commercial teams are able to create new services using the 5G technology

Figure 10. CSPs can open up their network functions (including policy) to internal stakeholders through APIs
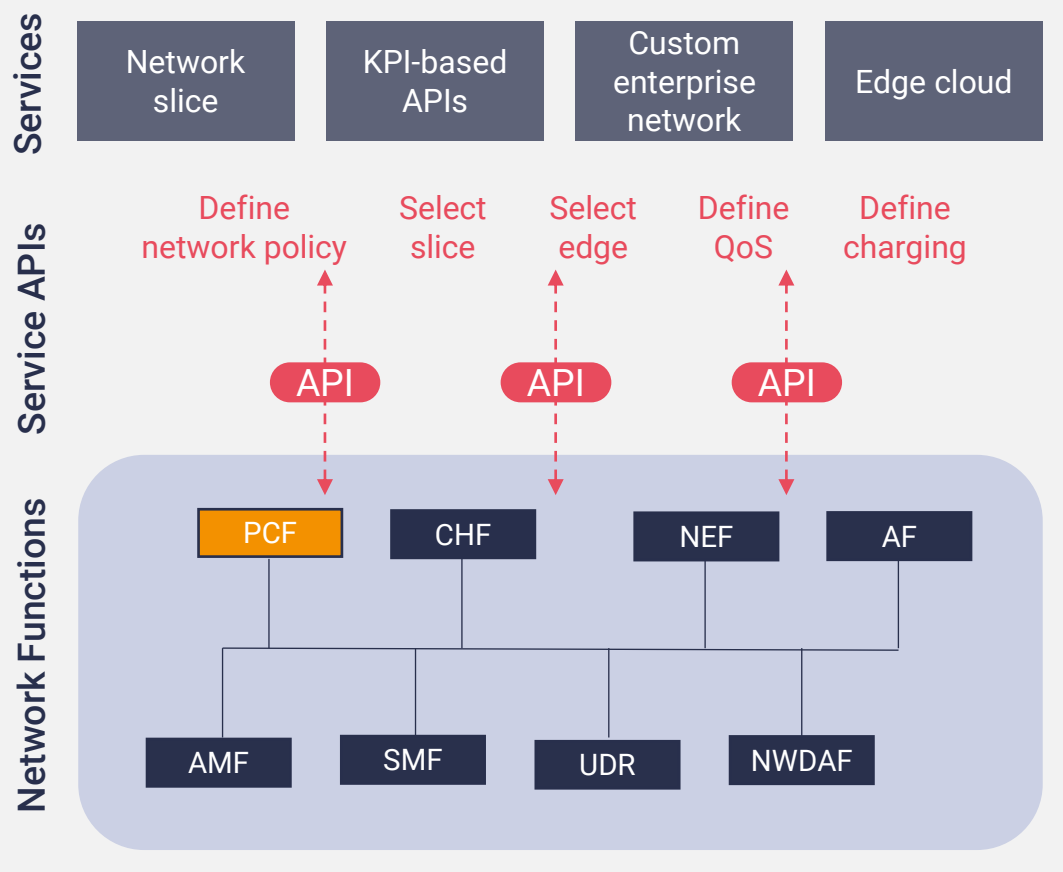
In order to bring these 5G policy capabilities to fruition, CSPs must be able to use them to generate revenues from new services. Ultimately, the CSP needs to understand what policy (and other 5G core functions) can do and how this meets specific customers' needs.

One way to do this would be to make sure internal teams can easily interact with the underlying network functions through service APIs, or a platform that integrates these service APIs. Internal product and development teams, would then be able to build new services that take advantage of the flexible 5G policy mechanism.

For example, product teams could develop a service and define the policy for a network slice for low latency applications. This would ensure application KPIs were met by monitoring and orchestrating network functions, i.e. pushing the associated SMF and user plane function (UPF) to the edge for the slice.

However, this would require a new way for commercial teams to interface with the network, employing easy-to-use tools for non-network specialists. It would also have implications on the skillsets needed to implement this, potentially increasing IT skills within product teams or ensuring there are supporting teams in place that connect network teams to the commercial teams.

> Upskilling is everyone's challenge, there are not enough people with the right skills – we are learning as we go.
>
> **Ecosystem Architect, MEA operator**

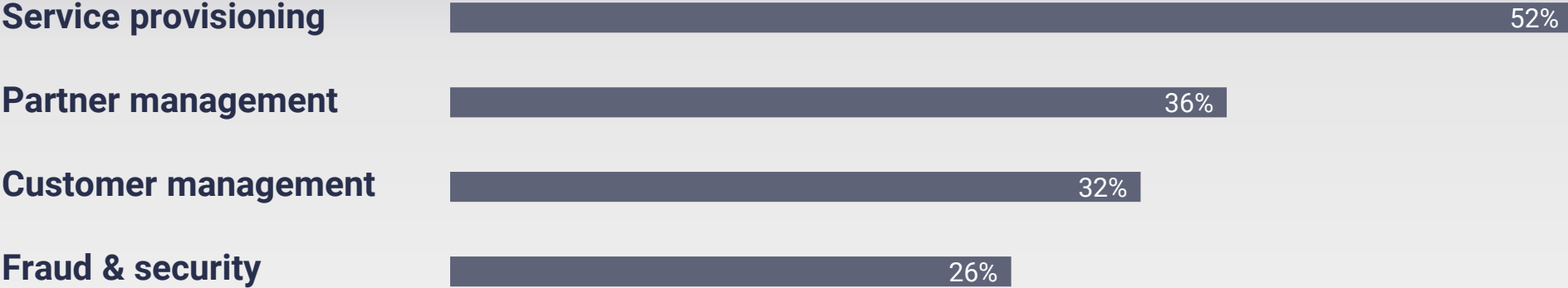Let us know which IT system you would like to see us focus on in our upcoming report chapters on the next page

© STL Partners | Proprietary and Confidential

Upcoming chapters

Chapter 1: Billing and charging

Chapter 2: Policy

Upcoming chapters:

While producing this report, we surveyed **65 telcos and vendors** to understand which IT system they would like to learn more about in future chapters:

Service provisioning — 52%

Partner management — 36%

Customer management — 32%

Fraud & security — 26%

In addition, we intend to explore horizontal themes that will impact telco's IT evolution (e.g. edge computing and cloud-native networking)