The Key Role of Converged Charging in Telco Enterprise Service Delivery

Executive Summary

Many telco enterprise divisions wrestle with a combination of inward-facing legacy BSS platforms, poor customer engagement and limited agility, resulting in a long time to market for new offers and high operating costs.

Technology developments such as 5G will exacerbate this situation, lowering barriers to entry for new market players and for innovative business models, such as those that are real-time, on-demand and OPEX-based. This is a wholesale change from the existing 30 to 60 day "revenue collection" billing relationship models.

5G will also allow new entrants to target non-mobile revenue streams such as fixed, content and applications services. In parallel, however, traditional telco "cash cow" revenue streams such as MPLS VPNs will be under threat from SD-WAN and private network developments which could disintermediate the telco role.

These challenges are non-trivial. Telco enterprise divisions must transform to deliver 5G readiness, zero-touch provisioning, faster time to market with new offerings, new charging models and advanced customer self-management.

A new approach needs to rapidly emerge – the real-time consumerization of enterprise.

The 5G Enterprise Growth Imperative

The global 5G enterprise market is forecast to be $31Bn by 2027, growing at an impressive 57.2% CAGR between 2020 and 2027[*]. This makes it a major opportunity target for both telcos and new players in cloud and new private networks.

5G new radio and the standalone core will provide the foundation for new offerings, service ideas and business models. These are crucial if telcos are to maximize their return on network investment.

SMB and enterprise markets seem likely to offer the greatest revenue opportunity for telcos, an opportunity which will only be realized if telcos exploit 5G's potential to be a convergent, content-enriched connectivity platform for fixed, mobile and application services for consumers, businesses and upstream content, application and cloud partners.

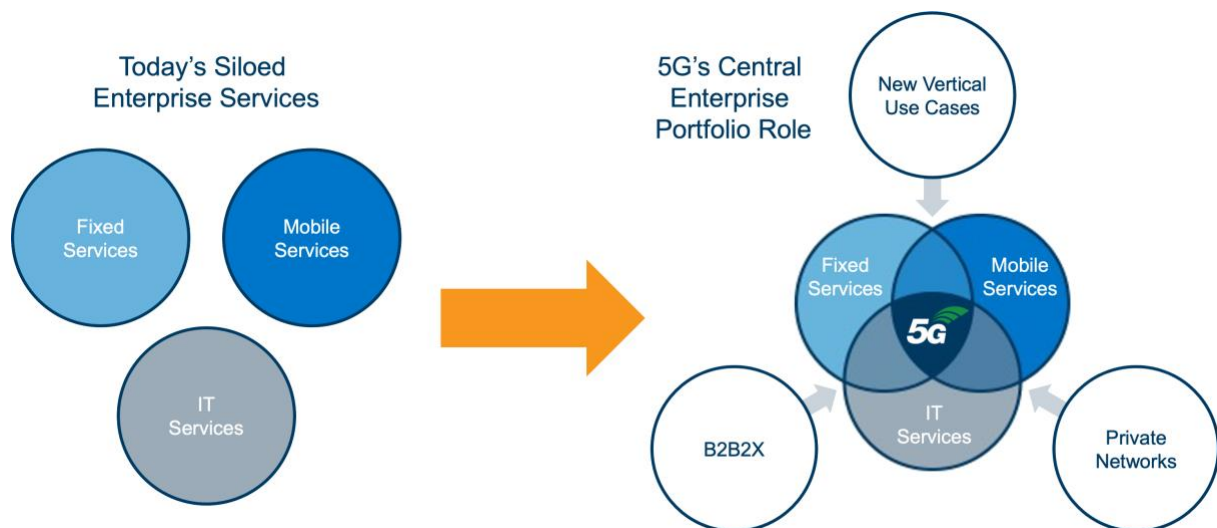[*]Polaris Market Research

Figure 1: 5G's Central Role in Telco Enterprise Service Delivery

This is driven by two key factors:

1. The six "monetization levers" of 5G that support service offerings that lend themselves to service-level agreements (SLA) and outcome-based services that will attract both SMB and enterprise customers. These include:

   - **Latency** – Sub-10ms e-2-e latency puts 5G at the heart of mission-critical, ultra-reliable vertical service offerings and opens up edge computing opportunities.

   - **Bandwidth** – With potential speeds of up to 1Gbps, service future-proofing the enterprise becomes a reality.

   - **Capacity** – With support for up to one million devices per square km, 5G becomes a viable platform for dense IoT services.

   - **QoS** – Rich, granular QoS capabilities support specific application and session delivery requirements, underpinning service-level agreements. This is beyond what 4G/LTE can deliver.

   - **Spectrum** – Support for both C-band and mmWave band spectrum along with shared spectrum opportunities gives 5G massive flexibility to support converged, network-intensive services.

   - **Network Slicing** – Virtualizing the network allows for a broad set of highly targeted "network of one" services tailored to specific enterprise and vertical market needs.

2. The scalable cloud native architecture of the 5G standalone core, designed as a series of micro-service-oriented, functional building blocks that support operational responsibilities across several new elements. For example, the converged charging system (CCS), network exposure function (NEF) and network analytics function (NWDAF) open up a number of exciting opportunities for new services and business models, covered later.

Historically, telco's managed service offerings to SMBs and enterprises have been monetized by a simple "messages, megabytes and minutes" approach to mobile services and a site/device/bandwidth subscription approach for fixed services, supported by a combination of inflexible, legacy BSS

solutions and monolithic network transport options. Perpetuating that monetization model, given the huge investments being made in 5G, is a strategic misstep.

A more dynamic and agile model is required that will give operators the flexibility to adapt and deliver services more dynamically and quickly.

A number of market forces point to a platform approach as the optimal way for telcos to compete and thrive in a 5G-centric world, transforming the monetization model from "messages, megabytes and minutes" to "content, context and convergence."

Those "four forces of discontinuity" include:

- **Technology disruptions** such as 5G, SD-WAN and NaaS, which will change the dynamics of end-customer and upstream partner relationships, along with developments such as private networks and shared spectrum; both will lower the barriers to entry for new players and could disintermediate telcos.

- **Enterprise IT costs** communication services which are the single biggest spend item in the enterprise IT budget; enterprise CIOs will seek greater value for money and commercial agility from telco providers.

- **Competition** that is already surfacing from cloud providers for newer edge services, fixed and application/content service substitution. 5G's value to those competitors is its comprehensive, full-service "pipe" capability.

- **Operational** inward-facing legacy BSS platforms that drive poor customer engagement and limited business agility, resulting in very slow time to market and high operating costs that limit telco potential to drive return on large 5G investments.

Combating these forces is challenging but doing nothing carries greater risk. A phased transformation to the role of an e-2-e ecosystem orchestrator, underpinned by a content-enriched connectivity platform, should be the mid-term destination, combining content and connectivity into an automated and low-touch digital marketplace offering that can be monetized on demand.

The Enterprise Market

The enterprise ICT services market is forecast to contribute a significant percentage of overall telco revenue within the next five to ten years. Driven by the four forces of discontinuity outlined above, telcos have an opportunity to get one step ahead by adopting a progressive approach to enterprise service delivery and monetization. With 5G expected to account for a significant percentage of mobile deployments by 2025 (source GSMA Intelligence), now is the time to plan for the impact of that deployment.
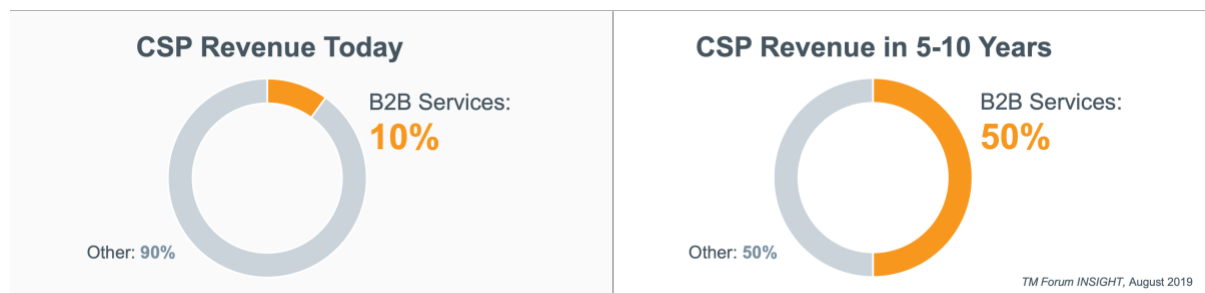

Figure 2: The Increased Contribution of B2B Services in the 5G Era

Early, predominantly consumer deployments of 5G relied on conventionally charged service offers that struggled to provide a return on network investment. However, the arrival of the 5G standalone core, combined with a number of key features in 3GPP releases 16/17/18, puts telcos in a much stronger position to enrich their enterprise portfolio service offering.
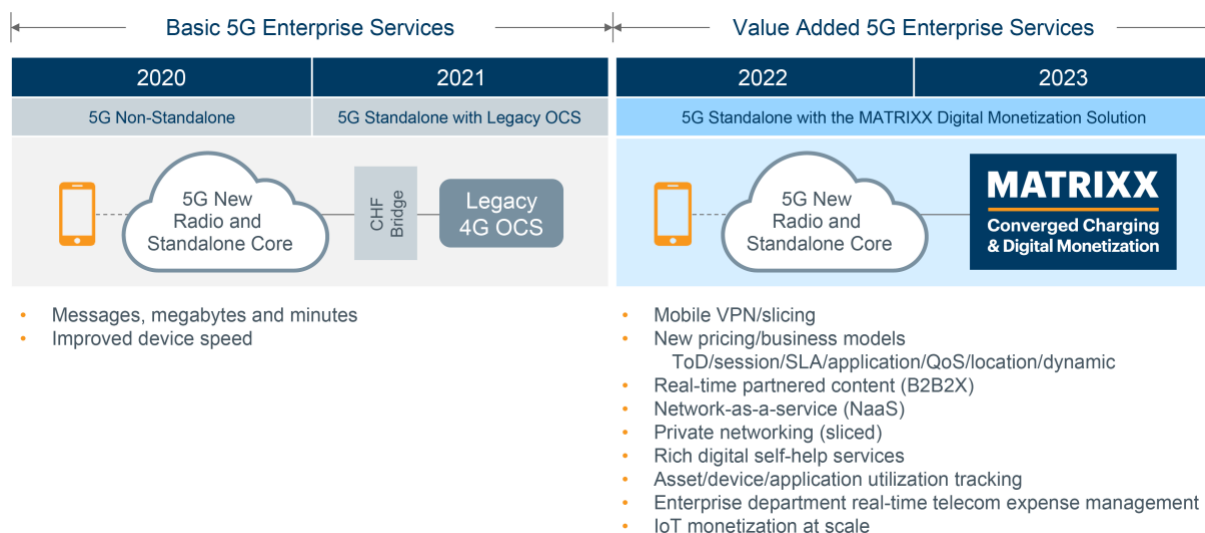

Figure 3: The Inherent Value of Converged Service Delivery Driven by the 5G Standalone Core

5G should be seen as a catalyst for change. Its potential to fundamentally enhance, cannibalize or substitute existing enterprise service portfolio elements is real. It will become a significant and strategic means of service delivery for enterprise ICT services and cannot, therefore, be seen as "just another G."
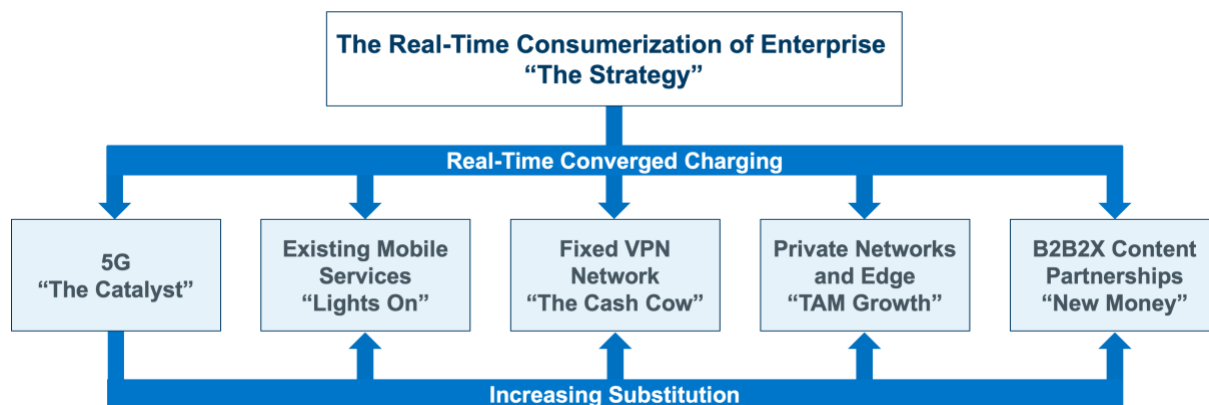
Figure 4: The Real-Time Consumerization of Enterprise Strategy

Telcos should view the 5G era as one of increasingly converged service delivery, in which the real-time consumerization of enterprise is seen as the high-level strategy, enabling a common and differentiated business approach across multiple network and application delivery channels.

Small-Medium Sized Businesses (SMB)

Historically, the SMB sector (<1000 employees) has been underserved by telcos. It has sat awkwardly between the consumer market and the large enterprise sector. The lower revenue base and the high cost to serve have left many treated as part of the consumer market, resulting in loss of revenue and brand reputation.

Monetizing the SMB sector in the 5G era requires a highly automated, self-help, on-demand serving model – a "consumerization of the SMB" approach that combines digital marketplaces, channels and 5G's monetization levers into a composite offering, reducing cost to serve and increasing customer satisfaction.
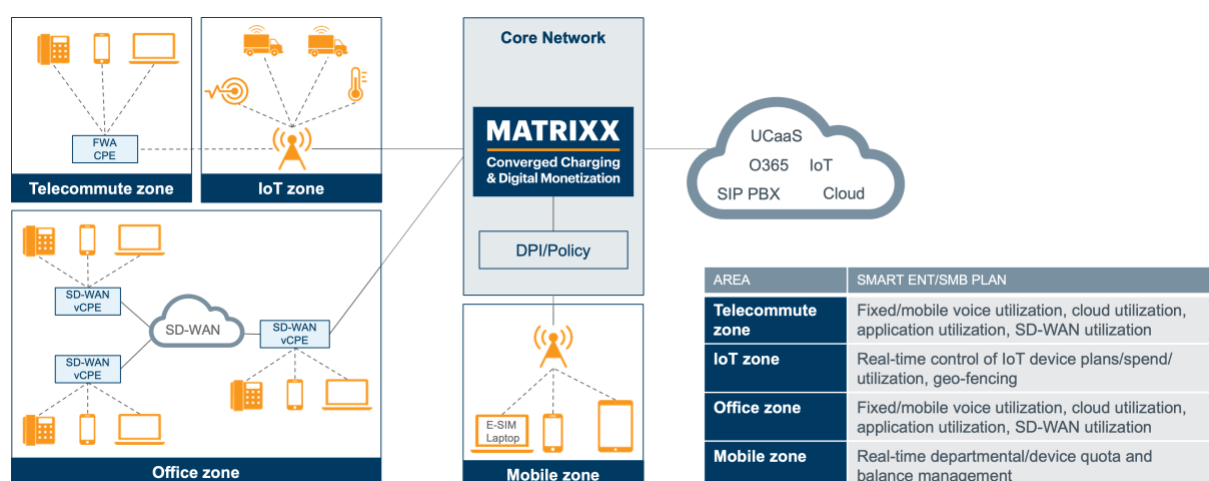


Figure 5: The Smart SMB in a Box

The self-help "SMB in a box" offering, outlined in figure 5, shows how 5G-based capabilities could be combined with other existing service elements and new business models. These could be based on geo-location, application usage by QoS, cloud utilization (storage, compute, network), per session flows, fixed voice and SD-WAN utilization as examples. Within the mobile zone, controlling the distribution and apportionment of quota and balance information across mobile devices, departments, groups and individuals through group sharing in real-time is another key value add that most charging platforms cannot deliver.

The critical role of converged charging in this example is presenting real-time data from each zone as actionable monetary business intelligence to the end-user or other IT systems.

Large Enterprise

With communication services being the single largest spend item within large enterprise IT budgets, the business outlook for telcos in this space is finely balanced between future risk and opportunity. The COVID-19 pandemic has challenged enterprise IT in terms of its readiness to handle business continuity hurdles and its ability to adapt to new working practices. Combined with the technology disruptions outlined earlier and an eagerness from competition to tap into that spend, continuation of the incumbency currently enjoyed by telcos cannot be assumed. With an overall forecast of enterprise communication services spend of some $350Bn by 2025 (source Gartner), there is much to play for.

Future success depends on leveraging 5G as the content enriched connectivity platform at the heart of future enterprise communication service portfolios, as depicted in figure 1, taking a phased approach to new offers reflective of business continuity needs and market pressure:
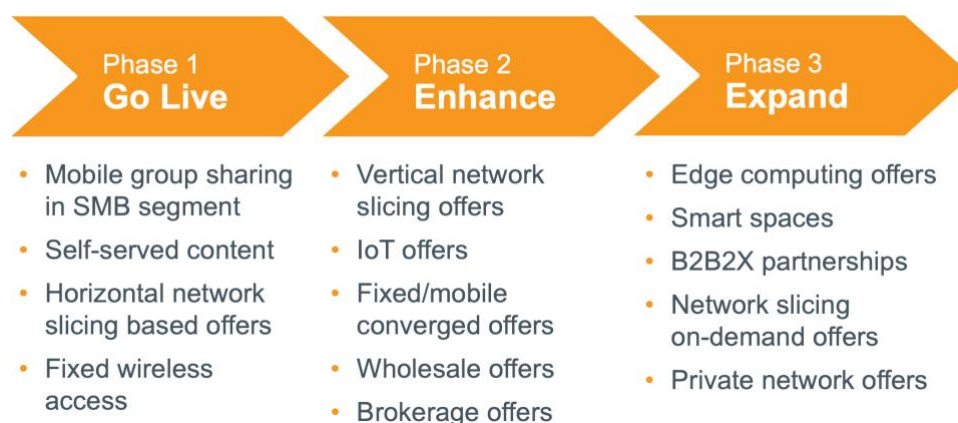
Examples of those offers are outlined below:

Mobile group sharing – Providing businesses with self-help capabilities to define how their mobile quota and balances are allocated throughout individuals, devices, groups and departments across many 100s/1000s of devices. Monetization is typically based on data volume or speed caps.

Fixed wireless access – A potential substitute or replacement for xDSL and some fiber-delivered broadband to both SMB and enterprise, with similar bandwidth and traffic control capabilities. Monetized via data volumes, speed caps and geo-location fencing.

Network slicing – Overlays multiple virtual networks on top of a shared network. Each slice of the network can have its own logical topology, security rules and performance characteristics, within the limits imposed by the underlying physical networks.

Different slices can be dedicated to different purposes, such as ensuring a specific application or service gets priority access to capacity and delivery or isolating traffic for specific users or device classes. Slicing networks enables the network operator to maximize the use of network resources and service flexibility and can be monetized in several ways, from sessions to quality-of-service (QoS), service-level agreements (SLA), business-level agreements (BLA), dynamic rating and finally fixed/mobile offers. A good example of early network slicing offerings could be multi-mode mobile VPN offerings, capitalizing on 5G's unique capability to support layers 1, 2 and 3 encapsulations, as shown in figure 6.
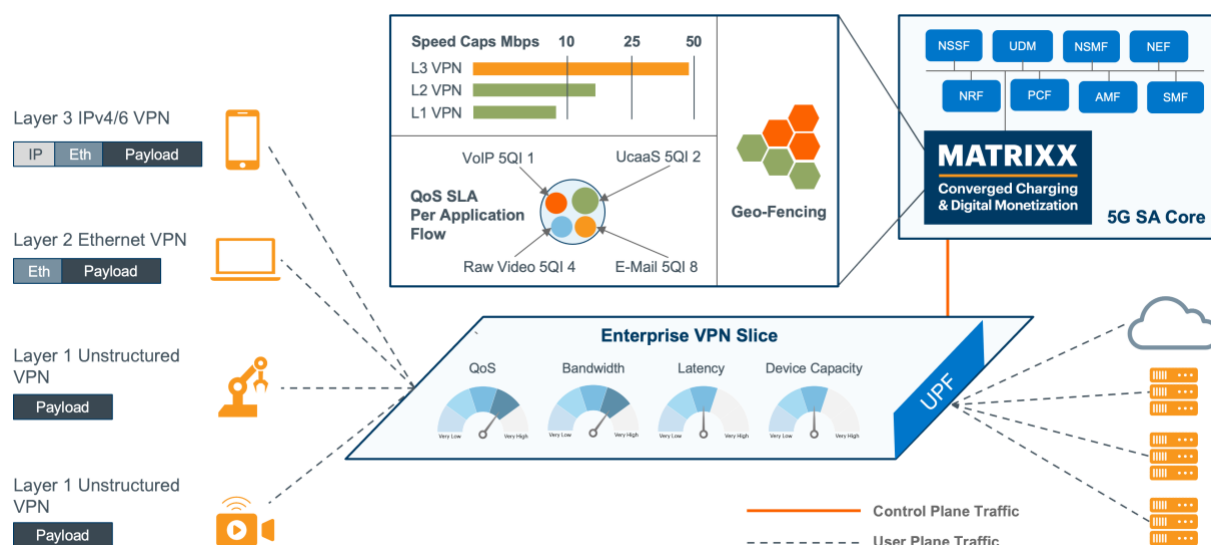

Figure 6: Network Sliced Multi-Mode Mobile VPN Service

IoT – Often defined by large volume and low traffic environments, IoT networks require a high level of automation and low touch commercial intelligence, reflecting the low revenue nature of these offers. The high capacity of 5G networks makes it a viable platform for IoT deployments. Monetizing IoT networks can be based on a combination of geo-location fencing, per session counts, data volume or speed caps.

Fixed/mobile converged offers – Clearly, for most large enterprises, 5G mobile (and 4G) will be one aspect of the service delivery mix. SD-WAN, IoT and telecommuter services, as depicted in figure 5, will also likely weigh heavily. Providing a cohesive, flexible and adaptable monetization offering reflective of changing CIO needs (outlined earlier) is paramount. Monetization plans that encompass elements from geo-location fencing, application usage by QoS, cloud utilization (storage, compute, network), per session flows, fixed voice and SD-WAN utilization will become key competitive weaponry.

Private cellular networks (PCN) – Delivering a private, secure network slice from the main public land mobile network (PLMN) will be a significant portfolio offering. Depending on the application, these networks may include a heavy edge computing element to support low latency or localized data handling requirements. Industrial robotic manufacturing lines are a good example where the deterministic mobility of 5G combined with low latency and high data security is paramount. Monetizing a PCN could be performed using data volume, speed caps, asset or application utilization,

sessions and geo-location fencing. These offers will, in many cases, need to be wrapped into an SLA or BLA.

Edge computing – Driven typically by low latency application demands and data security, it is highly likely that edge computing services delivered off the PLMN will be ring-fenced by network slicing to preserve the secure and deterministic nature of the offer. Edge computing services may be delivered in standalone mode by the telco or in partnership with a cloud facility provider. In the case of the latter, revenue sharing in conjunction with an agreed SLA will be standard practice. Options for monetizing edge applications are very similar to those for PCNs.

Smart spaces – Airports, ports and other transport hubs are often multi-party business environments with complex B2B, B2C, IoT and B2B2X value chains combined with high volume, transient flows of passengers. Acting as a neutral host network provider (NHN), monetizing insights and monetary flows between parties and providing increasingly real-time settlement services between them based on parameters such as data volume, sessions, geo-location fencing, application usage and asset utilization are key components of a successful smart space offering.

Combined ICT offerings (B2B2X) – In providing a 5G-as-a-platform service, the integration and monetization of third-party content via marketplace and digital channel offerings on that platform is paramount. In conjunction with offering automated, on-demand network service offerings, such as a slice-on-demand, B2B2X models will become the hallmark of successful enterprise service delivery. These third-party interactions will become increasingly real-time in terms of set-up, delivery and settlement, improving cash flow and revenue recognition and reducing bad debt risk.

The Major Role of Real-Time Converged Charging

Monetization platforms supporting the rollout of the 5G network will typically have a five to seven year investment lifespan. Within that period, much will develop in terms of market needs and the required enterprise service portfolio to serve them, from fixed-mobile convergence to extensive deployments of edge networking, network slicing, private network deployments, new B2B2X content partnerships and more real-time, consumption-driven business models. Legacy BSS systems will struggle to deliver these dynamic developments.

This is driving a new approach to monetizing all telco services, one that converges ICT services (B2B, B2C, IoT, B2B2X, etc.) around a common real-time digital monetization layer (converged charging) and disaggregates current billing responsibilities. This approach moves all revenue-generating capabilities and service orchestration to the real-time converged charging layer with revenue administration capabilities such as invoicing, dunning and accounts receivable tracking remaining in the traditional billing layer.

Defined by 3GPP as one of the key functions of the 5G standalone core, the converged charging system has a primary role to play in monetizing a
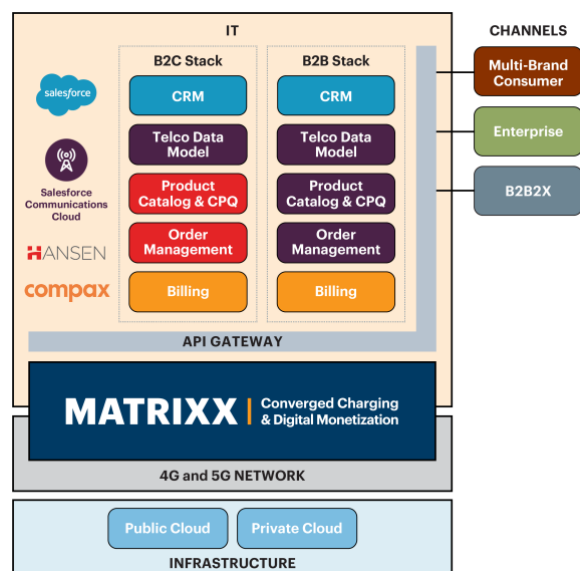
fresh wave of new business opportunities, including those enabled by 5G and converged fixed network and content/application use cases.

That primary role reflects its strategic positioning, bridging between core network gateways and IT systems (such as CRM and billing). Its ability to gather network-level events at a massive scale and transact monetary business intelligence in real-time, either directly monetized via a digital channel to end-users or content partners or forwarded to other systems in the IT stack for further computation, is at the heart of the platform's value.
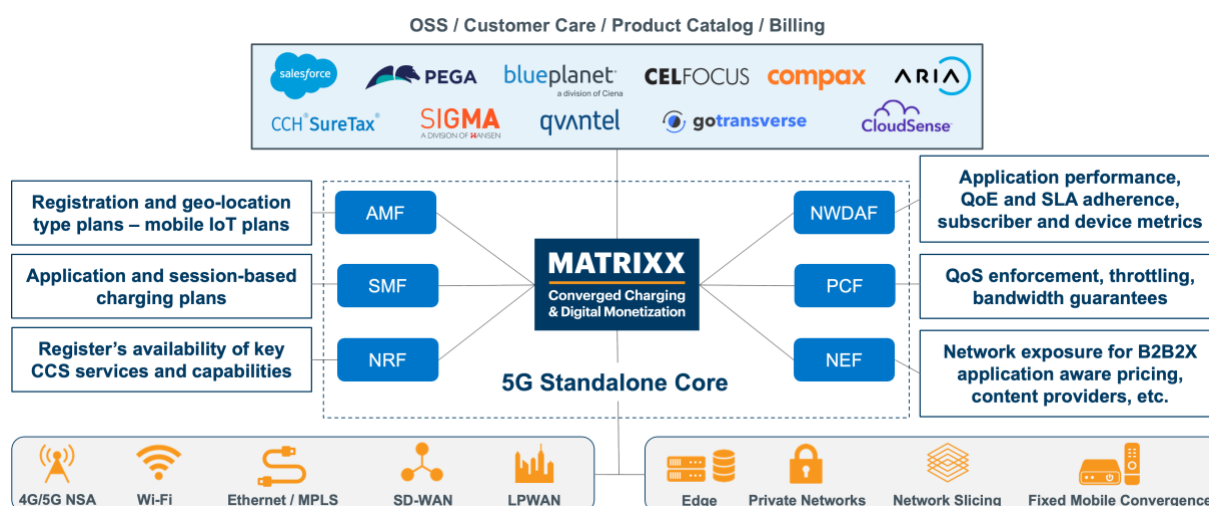

Figure 7: The Strategic Role of Converged Charging

Through its interfaces to other 5G standalone core functions, such as the access and mobility function (AMF), session management function (SMF), policy and control function (PCF), network data and analytics function (NWDAF) and network exposure function (NEF) amongst others, the CCS gathers high volumes of network and application/content events and transacts monetary intelligence, creating actionable, business model parameters which can be utilized across the entire enterprise service portfolio.

Examples of those models include:

- **Geo-location fencing** – Ideally suited to fixed wireless access and IoT deployments where the ability to approve or restrict service delivery and charging is based on cell ID or tracking area location.

- **Speed caps** – 5G's inherent high bandwidth per device (dependent on spectrum used) opens up opportunities for plans based on speed tiers (20Mbps, 50Mbps, 100Mbps as examples) with no data volume cap. Opportunity exists for differentiated rating and charging of burst capacity.

- **Application utilization** – Charging based on how particular applications are being consumed in real-time by device, department or groups, allowing for granular on-demand and consumption-oriented application usage plans to be offered. An example could be charging by enterprise department for the utilization of the Zoom video conferencing application, based on sessions, speed or data volume.

- **Infrastructure utilization** – Actionable insights on how elements such as cloud delivery platforms are being utilized, with comprehension into storage, compute and network utilization – an important capability for edge computing.

- **Quality-of-service** – 5G offers a much greater degree of granularity on per-flow/session quality-of-service handling of key applications. Marrying this capability with the previously outlined application utilization model opens up mobile-centric service-level agreement opportunities, which are crucial for many mission-critical vertical services. QoS mechanisms could be deployed independently of (or as part of) a network-sliced offering. A premium slice offering might include per session or per device QoS as part of the SLA.

- **Session** – With large, low-volume IoT estates as an example, a more appropriate monetization model could be monetizing based on the session count instead of traffic volume levels; monetizing the offer based on the network control plane loads less on user plane traffic. Session monetization may also include the separated monetization of services from a single device, where there is a need to monetize individual services differently. For example, session A is a straightforward volume charged application session, session B is a revenue-share application with a partner, and session C is a tariff-free session for sponsored telco content.

- **Dynamic rating** – Through the combination of network analytics and AI, rating and pricing for network utilization in real-time based on prevailing network conditions. An example could be to offer a burst capability to mobile devices, available when the network is quiet and monetize that burst utilization at a lower rate per GB or lower Gbps speed rate to normal traffic levels.

- **B2B2X** – Opening up the network to requests for services from third-parties (such as a slice on-demand for 5000 devices for a major enterprise multimedia event) or providing third-party content/application services from a marketplace via a digital channel. This model could support numerous business models such as revenue sharing, one-off finder fees, graduated recurring charges, one-time charging and sponsored access. The retail/wholesale relationship between a telco, partner and end-customer is also flexible with the example value chain below based on an IoT application provider providing a full application/network service to the end-enterprise via an SLA/BLA relationship with the telco and then instigating a percent revenue share based on that SLA/BLA.
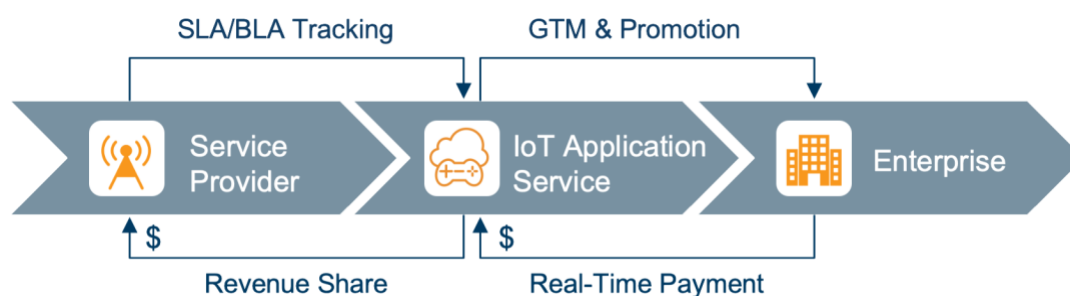
- **Network-as-a-service** – Offering more flexible, on-demand commercial models for network and application elements will become key. New vendor commercial offerings such as Cisco Plus are defining that new era of commercial flexibility. The increasing number of network-based applications being served up as software only on universal network platforms, such as security, lend themselves to being deployed as virtual network functions (VNF), which can be monetized as one-off events at download or on an ongoing utilization basis.

- **Group sharing** – Providing businesses, particularly SMBs, with self-help capabilities to allocate their mobile quota and balances across individuals, devices, groups and departments will be vital to reducing the cost to serve.

- **Fixed/mobile** – Converging fixed and mobile into a set of consolidated offerings will be a strategic step. Real-time monetization of services such as SD-WAN, unified-communications-as-a-service (UcaaS), communications-platform-as-a-service (CpaaS), cloud and fixed voice, alongside mobile services, will be a critical differentiator.

- **Wholesale** – Exposing key network and application/content assets to partners such as MVNO/A/Es, cloud providers and other network providers, and charging based on combinations of sessions, asset utilization, data volume, outcome-based objectives, NaaS, dynamic rating or network slicing will bring both commercial value and increased network utilization.

- **Brokerage** – Possible brokerage models include those where the telco provides service linkage between a content/application provider and downstream customer and claims a one-off "finder fee" with a sponsored content arrangement where the specific traffic from that source is treated as tariff-free for its session duration. Another model is one where the telco plays a central role in aggregating services from a number of upstream vendors (cloud network providers as an example) into a single source offering to the downstream enterprise. In this scenario, the telco is responsible for gathering charging and pricing data from the cloud providers, possibly along with its own cloud offering, synthesizing that data and presenting an aggregated, real-time view to the end-customer. The model could be based on infrastructure utilization (storage, compute, network), session utilization, speed caps or data volume, depending on the nature of the upstream business.

- **Outcome and value-based pricing** – An example of outcome/value-based pricing could be one where the telco, in conjunction with a business partner, provides a guaranteed working-time directive compliance service for large transport fleets, monitoring tachograph activity to agreed limits. Through the provision, monitoring and reporting on truck location and hours driven, the offer from the telco is positioned as a real-time guaranteed working-time directive compliance service, not simply the provision of SIMs and data volume plans. This is an example of how the customer relationship can be moved to one based on strategic business value outcomes, not commodity network service provision.

5G is a catalyst that will change the dynamics and make-up of enterprise services and reduce barriers to entry to some competitors. Getting ahead of that threat and using an incumbent first-mover advantage to release a series of innovative service offerings is a strategic imperative for telcos. The converged charging system will provide the underpinning engine.

The MATRIXX Digital Monetization Solution

Complexity is always the enemy of progress. The full business potential of the 5G platform will only be achieved if extensive service delivery automation and self-help are embraced, increasingly centered on real-time consumption/OPEX-based business models. This will be heavily dependent on a modern, flexible, disaggregated, best-of-breed BSS strategy. The unique value of the MATRIXX digital monetization solution as a real-time business orchestration engine lies in its ability to massively scale the transaction of network, device, application and cloud events into real-time, actionable monetary business intelligence, both to downstream enterprise customers and upstream business partners.
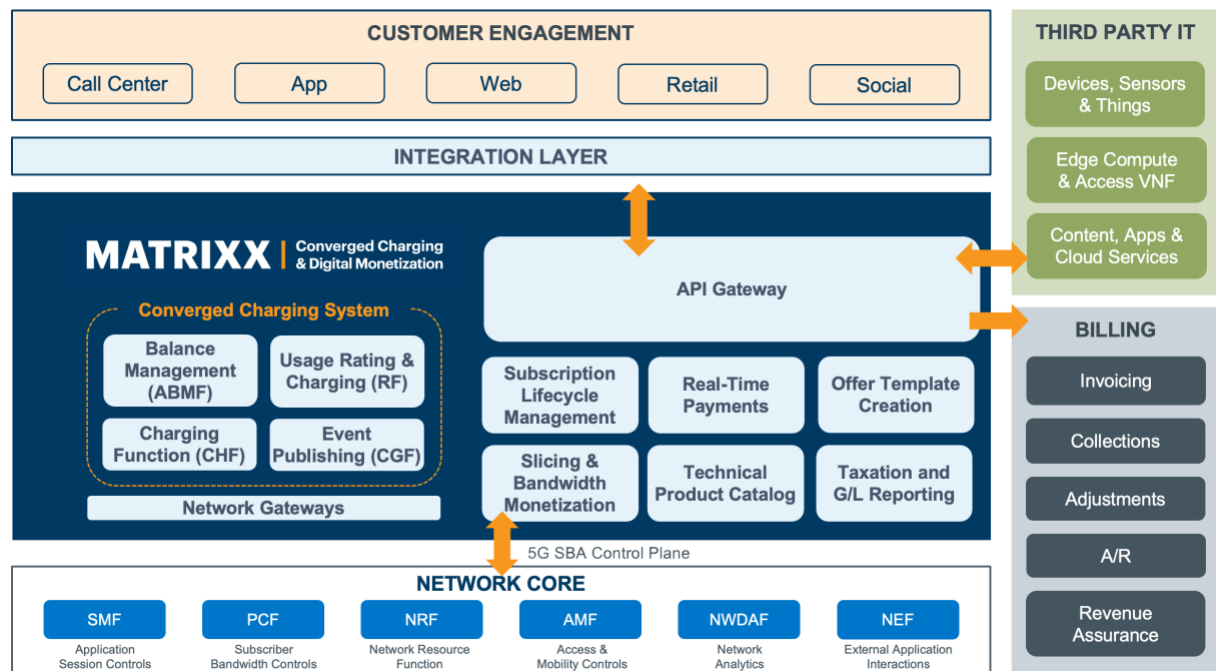

Figure 8: The Central Role of Converged Charging in Future BSS

MATRIXX delivers real-time service control, monetization and subscriber enablement functions that are key to empowering modern service providers deploying new digital infrastructure in support of 5G, as per figure 9. It provides unmatched agility, performance, scalability and reliability in a highly configurable and flexible convergent charging solution across fixed and mobile ICT services. MATRIXX was an early innovator in leveraging cloud native technology to support deployment on both leading-edge cloud-based infrastructure and more traditional on-premises options.

With MATRIXX, telcos can refine their value proposition and continuously deliver digital products and services to highly engaged customers via a modern platform that enables a simpler, more agile operating model that is easily customized and supports on-demand access and precise, real-time visibility and control.

MATRIXX combines the flexibility and configurability of traditional IT-based rating platforms with the predictability and reliability of network-based solutions. Business users can configure many new services, products and pricing concepts through user-friendly pricing and configuration GUI. The configuration result is then automatically distilled into highly efficient, patented algebraic data for processing by the execution engine.

By distilling data into mathematical equations for efficient execution, the system provides maximum business flexibility without requiring the service provider to add custom code or write complex scripts. This approach reduces the service provider's reliance on either MATRIXX or a third-party SI to implement new business functionality. In turn, it shortens the development cycle and eliminates expensive project upgrades when deploying new business models or services. The result is better IT responsiveness to business and marketing initiatives and less aggregate cost to roll out those initiatives.

MATRIXX is the market-leading, real-time charging, rating and policy platform, supporting prepaid, postpaid, hybrid subscription models and flexible group structures, including real-time support for multi-tier enterprises and large groups. Customers serviced by the MATRIXX digital monetization solution, be they enterprise group employees or individual subscribers, can share complex shared or aggregated balances and receive real-time support via threshold notifications and credit limit enforcement across their relationships.
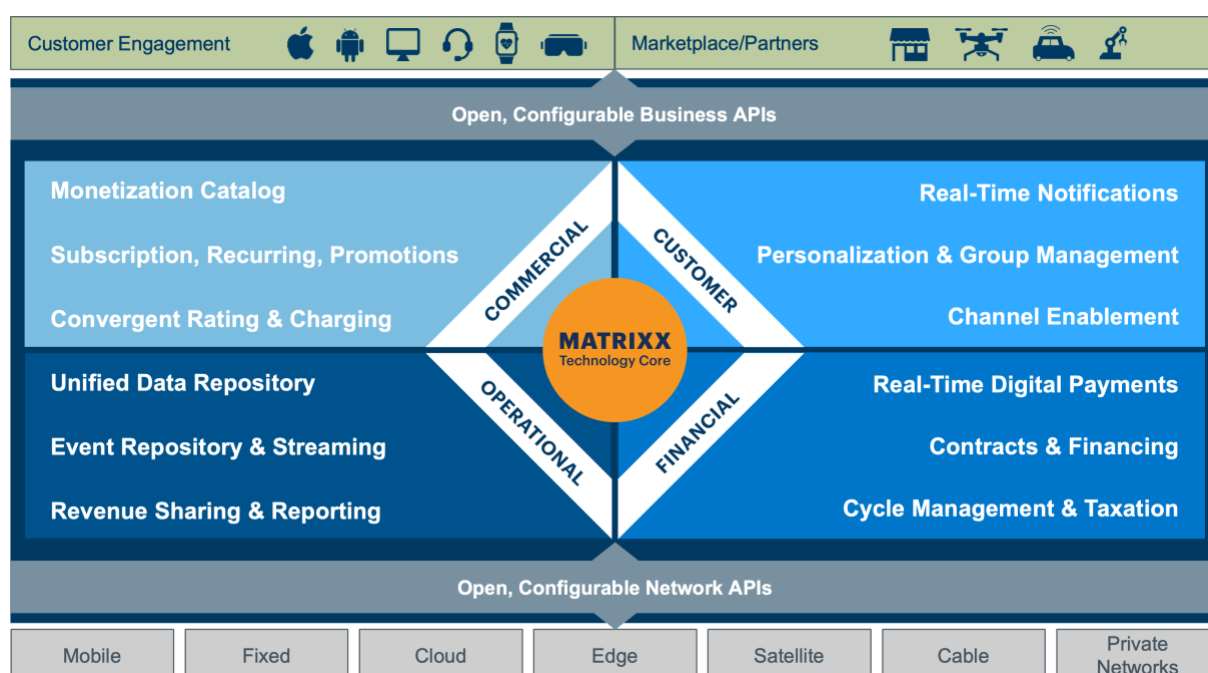

Figure 9: A Digital Platform for Modern Monetization

About MATRIXX Software

MATRIXX Software delivers a modern converged charging and digital monetization solution proven at scale. Global operators like Telefónica and Telstra, IoT providers like Tata Communications and network-as-a-service (NaaS) providers like DISH rely on the platform to overcome the limitations of traditional Business Support Systems (BSS). With MATRIXX, service providers can rapidly configure, deploy and monetize personalized, innovative offerings. Its cloud native platform delivers accurate, real-time information that improves customer engagement. MATRIXX enables commercial innovation and real-time customer experiences that drive revenue and growth opportunities across multiple markets.

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