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# Convergent charging systems can transform CSP operations

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# 1. Executive summary

Billing and charging systems have attracted significant investment from communications service providers (CSPs) since the mid-90s, driven by the explosive growth in the number of mobile subscribers, as well as the emergence of new use cases which demanded new types of monetisation systems. Over this period, most CSPs deployed multiple billing and charging systems from different vendors for specific use cases. The end result has been a complex framework of legacy systems that is interconnected to other support systems but functions as information silos.

As CSPs prepare to better engage with the digital economy and become digital service providers themselves, it is essential that architectural silos are broken down and information flow between systems is seamless. Crucial to CSPs' endeavours to develop a new set of offerings that can be taken to new customers in new markets is a unified, real-time charging engine.

The key benefits of deploying a convergent charging solution include:

- Ability to offer more service types, which leverages a finer segmentation of customer needs and can generate additional revenue.

- Reduction in the time to market and the operational cost of new services, which enables CSPs to react more swiftly to market changes or opportunities.

- Improvement of customer experience by providing real-time charging capabilities that offer up-to-date usage and account information.

- Reduction in total cost of ownership by integrating prepaid and postpaid service charging, and unifying customer experiences.

In the past, many CSPs delayed the deployment and adoption of convergent charging systems primarily because the cost, complexity and risk associated with such a project were perceived to be very large compared to the anticipated benefits. However, this approach is changing at most CSPs as digital transformation programmes get underway, which emphasises the importance of unified, real-time software platforms for successful transition to a digital service provider (DSP). This white paper discusses the key considerations for CSPs in adopting a convergent, unified charging system.

# 2. Current state of play for charging systems

Since the early days of mobile telephony, telco charging systems have seen multiple waves of investment driven by CSPs' focus on monetising their services effectively. Many of these systems, designed on the traditional software methodologies that were relevant at the time, continue to be in use today, although most of them now support far fewer services even as the CSPs continued to deploy new systems for supporting emerging use cases. This has led to a myriad of legacy billing and charging systems from multiple vendors interconnected to several adjacent systems, which has resulted in an elaborate and complex architecture framework. This legacy architecture significantly limits CSPs' ability to support digital economy services or provide digital engagement for customers. The main factors that led to the creation of such a complex framework of charging systems are described below:

- Until a few years ago, CSPs mostly favoured a **best-of-breed approach** to system transformation, which led to multiple vendor solutions within the CSP infrastructure. Some of these systems were not interconnected and functioned as information silos. In addition, many of these systems were driven at the departmental level, focusing on a limited set of requirements without taking into account the overall architecture. In these cases, new systems were deployed adjunct to the mainstream systems in order to address specific use cases, which added yet another silo to the architecture.

- **CSP mergers and acquisitions** often resulted in the merged company inheriting a disparate charging system infrastructure. Too often, the cost and complexity of streamlining these systems meant CSPs continued with these systems in the medium to long term.

- **CSPs' business priorities** also played an important role in how they approached streamlining their disparate infrastructure. For instance, regulations or strict SLAs with existing customers can force CSPs to continue to support existing platforms as the alternative could disrupt ongoing operations.

Since the mid-2010s, almost all new charging systems deployed have been convergent in nature. However, many of these systems continue to be deployed in a prepaid-only or postpaid-only scenario without assimilating other charging systems into a single platform. While this approach was supposed to future-proof the CSPs' architecture, it did little to improve efficiency of ongoing operations as the full functionality of convergent platform was not being utilised. As digital transformation programmes get underway, CSPs are recognising the importance of a streamlined charging engine in not just reducing the total cost of ownership, but also in enabling new types of digital economy services.

## Drivers and inhibitors for unified charging systems

While there is broad consensus among CSPs on the benefits of deploying unified charging systems, in the past some have delayed their adoption of such systems for a variety of reasons. The key factors that have inhibited adoption are:

- **Cost** – The cost of deploying a streamlined charging system that merged multiple disparate systems was prohibitive as compared to the anticipated benefits from such an exercise. In most cases where cost was an inhibitor, this was so because the CSP viewed the transformation primarily as a cost-saving exercise rather than one to support new revenue growth.

- **Complexity** – The complexity of existing legacy infrastructure was another factor that delayed CSPs' transformation initiatives because of the risk of disrupting ongoing operations. This was especially true if any of the CSPs' enterprise customers were likely to be affected.

- **Uncertainty** – The uncertainty in the market over future use cases and emerging architecture frameworks such as cloud-native models has also caused CSPs to delay their investments in updating their charging systems. CSPs prefer to wait for more clarity on emerging technology frameworks rather than invest in systems that are not future-proof.

Digital transformation initiatives worldwide have had a huge impact on how CSPs approach their systems architecture. It has accelerated CSPs' plans to unify their charging systems mainly because CSPs anticipate a significantly higher payoff from being able to support emerging digital economy use cases from a common platform. The primary drivers for a shift to unified charging systems include:

- **Agility** – As digital transformation takes centre stage, CSPs are positioning themselves for the opportunity to provide new offerings to new customers in new markets. Business models are rapidly evolving and many CSPs are falling behind in their ability to effectively support and monetise emerging use cases. Agility requires a flexible, scalable and extendible architecture framework that can rapidly respond to changing market conditions. From a rating and charging perspective, it demands a unified, real-time charging platform based on a microservices framework and capable of being deployed in independent containers in a public cloud environment. These systems should also be able to support low-latency use cases. Legacy charging systems, deployed as disparate monolithic systems within a legacy framework, are not agile enough to meet the requirements demanded by emerging digital economy opportunities.

*Figure 1: The next-generation monetisation platform has a central role to play in the evolution of a typical CSP to a digital service provider [Source: Analysys Mason 2018[1]]*



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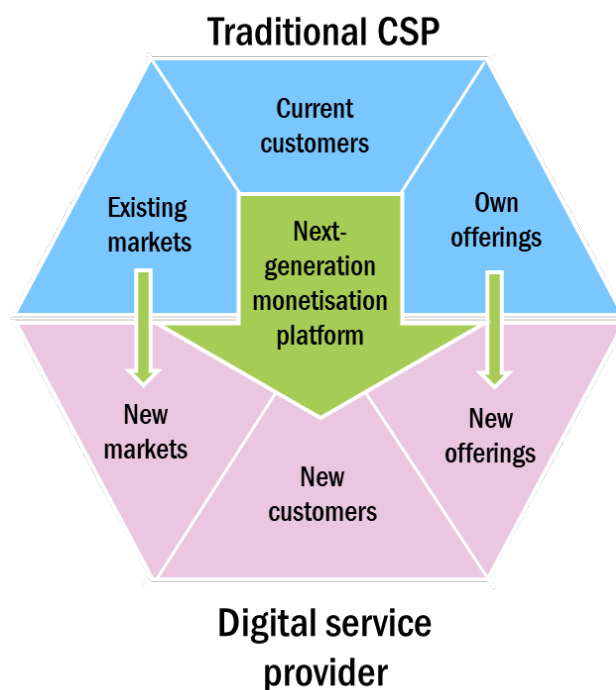
[1] Report reference: "CSP digital transformation: preparing for the monetisation platform of the future".

- **Cost** – The total cost of ownership is a key consideration for CSPs as they embrace new technology models. Billing and charging systems account for a substantial portion of the overall support and maintenance spend on software systems, mainly because of the large number of legacy systems that continue to be in use at most CSPs. Based on Analysys Mason's annual revenue management market share[2] data, the support and maintenance of existing billing and charging systems accounts for over 70% of the total spend on billing and charging systems. From a CSP's perspective, the ongoing spend on these high-maintenance systems is a big concern as it not only offers limited ability to support emerging use cases, but it also eats into CSP resources that may be used to support the broader digitisation programme.

*Figure 2: Support and maintenance as a percentage of overall CSP spend on billing and charging systems [Source: Analysys Mason 2018[3]]*
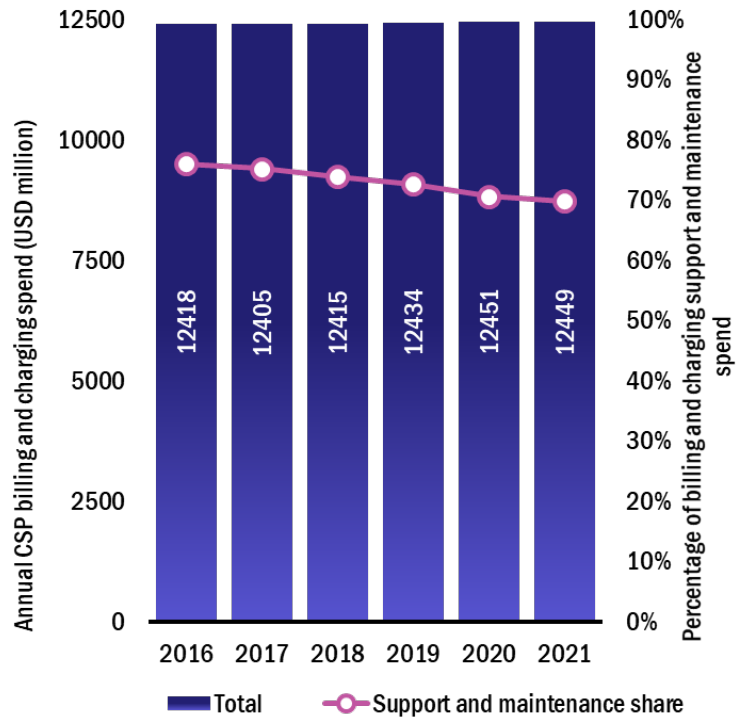


- **New revenues** – For CSPs, having a unified charging platform can enable better personalisation and more effective bundling of services. This will drive greater opportunities to upsell and cross-sell, and can improve average revenue per user. In addition, partner-enabled services which can drive significant growth and loyalty for CSPs in the future require a unified real-time charging platform for seamless onboarding and settlements. This calls for a software-driven framework that is interoperable with other platforms and networks.

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2    Report reference: "Revenue management systems: worldwide forecast 2017–2021".

3    Report reference: "Cloud-native architecture: an essential ingredient of future CSP monetisation platforms".

*Figure 3: CSPs' future revenue growth will depend on effective monetisation of third-party enabled services [Source: Analysis Mason 2018[4]]*
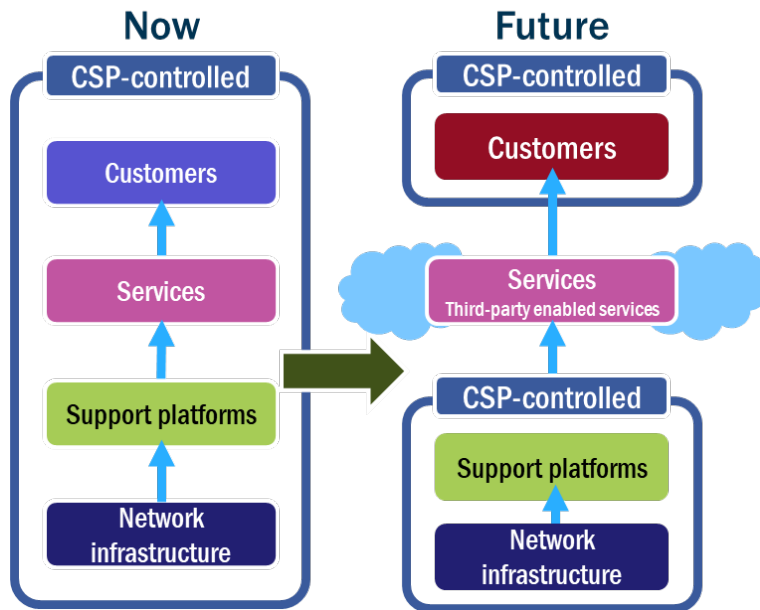


4    Report reference: "CSP digital transformation: preparing for the monetisation platform of the future".

# 3. The case for convergent charging systems

Convergent charging platforms can support prepaid, postpaid and hybrid plans from a single system instance and include an online charging system (OCS) for real-time charging of services. Modern convergent charging systems offer several advantages over more traditional charging systems:

- **Reduced costs and shorter time to market** – Separate charging silos for prepaid and postpaid are a constraint on CSPs and stifle service delivery and innovation. This results in unnecessary duplication of effort and a longer time to market for marketing offers and new services. A convergent OCS platform also eliminates separate workflows for prepaid and postpaid teams. The reduction in support costs means a convergent platform provides a better return on investment, while also providing carrier-grade performance and reliability.

- **Support for new revenue streams** – Although variations on existing revenue streams will remain the most significant sources of revenue for CSPs in the short and medium term, in the longer term they will increasingly need to earn revenue from non-traditional service types to drive up ARPU, especially in saturated markets. These can include services that leverage real-time usage data for highly personalised offerings or mobile advertising, multi-sided business models based on third-party content or services, innovative bundles, etc.

- **Ability to manage new and existing services** – Operating in near real time allows CSPs to provide a wider breadth of services, such as offering temporary speed boosts or data passes or allowing postpaid subscribers to share balances with prepaid accounts and offering different levels of quality of service for particular service types. Dynamic pricing models are also supported, where users can purchase additional entitlements and have them charged and provisioned in real time. These services require a real-time understanding of data types that provide differentiated pricing based on content.

- **Improved customer experience** – Customers' expectations have evolved considerably, driven by their experience in engaging with internet-based companies. Customers today demand services that are tailored to their particular requirements, such as access to self-service (with real-time billing and account information), and the ability to quickly resolve account, service and payment issues. By providing customer account information in near real time, convergent platforms help CSPs better control and manage the customer experience.

- **Support for increasing data service subscribers** – Developing markets continue to expand their mobile broadband subscriber base, while CSPs in developed markets are gaining subscribers for new data services such as streaming video and music offerings. Modern convergent charging systems enable CSPs to support a larger number of subscribers on fewer systems.

- **Improve scale and extendibility** – Modern convergent charging systems offer a higher degree of architectural agility that allows for horizontal extendibility and real-time scaling. These systems, which can be configured to run on-premises or in hybrid or fully cloud-based environments, can support a greater number of use cases based on configuration rather than customisation, which makes it more time and cost effective in the long term. In addition, these systems support standardised programmable interfaces for third-party developers, which makes them more extendable and future-proof.

Convergent platforms have become the norm in all new deployments in the past three to four years, although there continue to be instances where CSPs deploy convergent platform to support purely prepaid or postpaid scenarios. Key differences between these systems are captured below.

*Figure 4: Comparison of some key features of prepaid, postpaid and convergent platforms [Source: Analysys Mason 2018]*

| | Prepaid platform | Postpaid platform | Convergent platform |
|---|---|---|---|
| Traffic rerating | ✗ | ✓ | ✓ |
| Account hierarchy | ✗ | ✓ | ✓ |
| Discounting/promotion management | ✗ | ✓ | ✓ |
| Policy-based billing | ✗ | ✓ | ✓ |
| Bill-shock management | ✗ | ✓ | ✓ |
| Enterprise account support | ✗ | ✓ | ✓ |
| Bring-your-own-device (BYOD) support | ✗ | ✓ | ✓ |
| Real-time charging | ✓ | ✗ | ✓ |
| Balance management | ✓ | ✗ | ✓ |
| Active mediation | ✓ | ✗ | ✓ |
| Hybrid plans | ✗ | ✗ | ✓ |

# 4. Use cases: Driving gains in efficiency and customer experience

Convergent charging systems help transform CSPs' monetisation system frameworks with a number of benefits over more traditional systems, although improving customer experience and reducing cost are often the biggest drivers for investing in these systems. Figure 5 captures a selection of use cases that highlight the benefits of deploying convergent charging systems to replace multiple legacy charging systems.

*Figure 5: Summary of selected convergent charging use cases [Source: Vendor and CSP briefings]*

| CSP | Background | Benefit |
|---|---|---|
| Western European telco | Wanted to consolidate different versions of prepaid and postpaid systems from multiple vendors. | Significant reduction in support costs from decommissioning 52 IT stacks. Net promoter score (NPS) improved from −71 to +48 over 18 months. |
| Tier-1 South-East Asian operator | Deployed real-time charging system for over 130 million subscribers, 97% of whom were on prepaid systems. | Significant savings in support and maintenance cost as 70 separate instances were replaced by a single platform. The new platform also improved customer experience with support for real-time notifications, spending limits and hybrid plans. |
| APAC CSP with over 15 million subscribers | Was reliant on batch-based charging, which meant customer spending and usage were around 48 hours out of date. | The CSP is now able to offer real-time usage information to its subscribers, which has significantly improved its NPS score and reduced call-centre traffic. The CSP has also met new regulations on providing real-time usage notifications. |
| Western European cable and mobile CSP with over 2 million subscribers | Wanted to develop capability to design and launch multi-play bundles in a short time span. | The CSP was able to improve ARPU through offering personalised multi-play bundles. There was also cost savings from moving to a single platform. |
| Tier-1 South Asian CSP | Wanted to deploy convergent systems to help launch new services quickly. | The CSP was able to launch hundreds of new offerings per year and provide instant activation of packages. Also, the billing operations cost declined by 20%. |
| Tier-1 Western European operator | Wanted to reduce opex and improve time to market. | Faster time to market for new offers significantly improved upsell opportunities. Real-time offers and account information also improved NPS score. |
| XL Indonesia | 60 million subscribers (at the time), 98% of whom were prepaid. | Improved customer experience by offering flexible allowance plans and real-time data boosts, as well as enabling split charges for SMB and residential customers. Also reduced XL's time to market for new offers from 9 months to 4 weeks.<br>Reduced XL's capex by 25% and its opex by 70%. |

| CSP | Background | Benefit |
|---|---|---|
| Tier-3 operator in Eastern Europe | 1.2 million subscribers, 95% of whom were prepaid. | Enabled operator to configure new products and promotions in-house. Improved customer experience by allowing customers to have real-time view of their account information and reduced complaints on bundled offers by 50%. |
| MVNO based in North America | The MVNO was part of a retailer with over 2200 retail stores across 30 US states. | Allowed greater flexibility to combine retail and telecoms offers and loyalty points. Also, improved engagement with end customer by allowing for improved customer segmentation. System downtime was reduced, which improved customer experience. |
| Tier-1 operator in developed APAC with over 10 million subscribers | The operator has multiple brands and offers mobile, broadband and wholesale services including satellite. Improving customer experience was a key driver for investment in convergent charging system. | Helped the operator provide real-time usage notifications, improve data monetisation through innovative real-time offers and support subscriber and account level aggregation. Resulted in a significant improvement in customer experience as threshold notifications improved by 98%. |
| Tier-1 European operator | Serves over 20 million subscribers. | The operator was able to provide its business customers with a single hybrid account for personal and corporate usage. The personal account was prepaid while the corporate one was postpaid. This improved overall revenue generation. |
| Tier-1 European operator | Serves over 15 million subscribers. | The operator was able to enhance its family plans and provide personalised credit limits within a single billing hierarchy. This reduced fraud and also improved customer experience. |
| South-East Asian operator with around 8 million subscribers | Improving customer satisfaction was a key driver for deploying a convergent system. The operator also wanted a more agile system to support multiple lines of business including fixed, mobile and broadband. | Deployed convergent charging system to facilitate rapid launch of 4G services, modernise legacy billing and charging systems and support hybrid plans and multi-hierarchy accounts. This helped the operator offer real-time customer engagement and improve overall experience. |
| Tier-1 operator based in North America | Serves over 120 million subscribers. | Improved customer experience by offering real-time notifications to prevent bill shock. The operator was also able to support automatic data extensions which provides customers with additional data buckets dynamically based on balance in account or cash wallet. |
| Tier-1 operator based in North America with over | Lines of business include fixed, mobile, broadband, digital TV and radio. Wanted a new charging system that would serve as the platform for the | Deployed a new convergent charging system to consolidate separate prepaid and postpaid systems from different vendors. The consolidation reduced |

| CSP | Background | Benefit |
|---|---|---|
| 21 million subscribers | future evolution of multiple lines of business. | overall cost and complexity and offered the operator greater flexibility in providing bundled services. The new system also supports 'billing on behalf of' for IoT use cases. |
| Tier-1 LATAM operator with over 12 million subscribers | Consolidate disparate charging systems from multiple vendors to reduce cost and complexity. | The operator deployed a single charging system across its different lines of business which reduced overall complexity and also streamlined its new offerings. The overall system availability has also improved significantly following the deployment, which is expected to help reduce churn. |

| CSP | Background | Benefit |
|---|---|---|

# 5. Conclusion: Convergent charging systems accelerate digital transformation

CSPs need to take a holistic approach when replacing or upgrading their legacy charging platforms, by considering all of the following factors:

- the importance of cloud-native architecture frameworks and DevOps-based delivery model that can enable faster deployments, seamless upgrades and automated support

- the evolution of consumer services from circuit-switched voice to IP-based voice, video, messaging, and data applications and services

- the lower cost of supporting a single convergent platform that has prepaid, postpaid and hybrid charging capabilities

- the advantages of a network and IT architecture which provides greater flexibility by decoupling BSS and the charging function from the network functions

- the emergence of network virtualisation technologies which can dynamically increase the scalability, availability and performance of charging platforms.

In the past, many CSPs refrained from widely adopting convergent charging systems mainly because of high costs and the risks associated with such a transformation, which did not justify the investment. Instead, many CSPs favoured an adjunct approach, where a new charging system is deployed adjacent to existing systems to support new use cases.

However, as digital transformation takes centre stage, there is greater emphasis on reducing information silos and building an infrastructure based on a unified platform and modern software methodologies that can improve agility, reduce cost and enable new digital services. A real-time, convergent charging engine is an essential ingredient for CSPs' ambitions of becoming digital service providers. It can help CSPs engage more effectively with their customers by reacting swiftly to market changes and providing personalised offerings and innovative service bundles which can improve customer loyalty. In addition, deploying a convergent charging system also has a financial impact in the short to medium term by improving revenue opportunities and reducing support costs.

# About the author

**John Abraham** (Principal Analyst) is part of the BSS practice in Analysys Mason's Telecoms Software and Networks Research team. He leads our Monetisation Platforms programme and our research into digital experience for monetisation platforms, as part of the Digital Experience programme. John also contributes to our research into cloud-native architecture models, which is covered as part of the Software-Controlled Networking programme. John has been part of the telecoms industry since 2006, and joined Analysys Mason in early 2012. He has worked on a range of telecoms projects for operators in Africa, Europe, India and the Middle East. Before joining Analysys Mason, he worked for several years for a BSS vendor and before that for Dell Inc in India. John holds a bachelor's degree in computer science from Anna University (India) and an MBA from Bradford University School of Management (UK).

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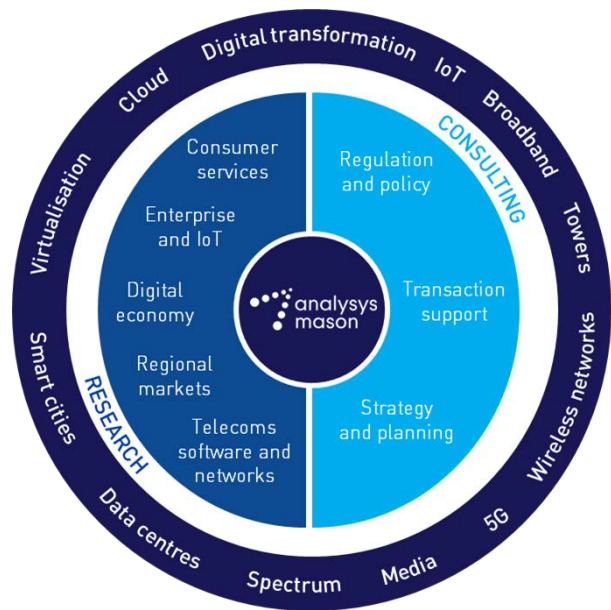
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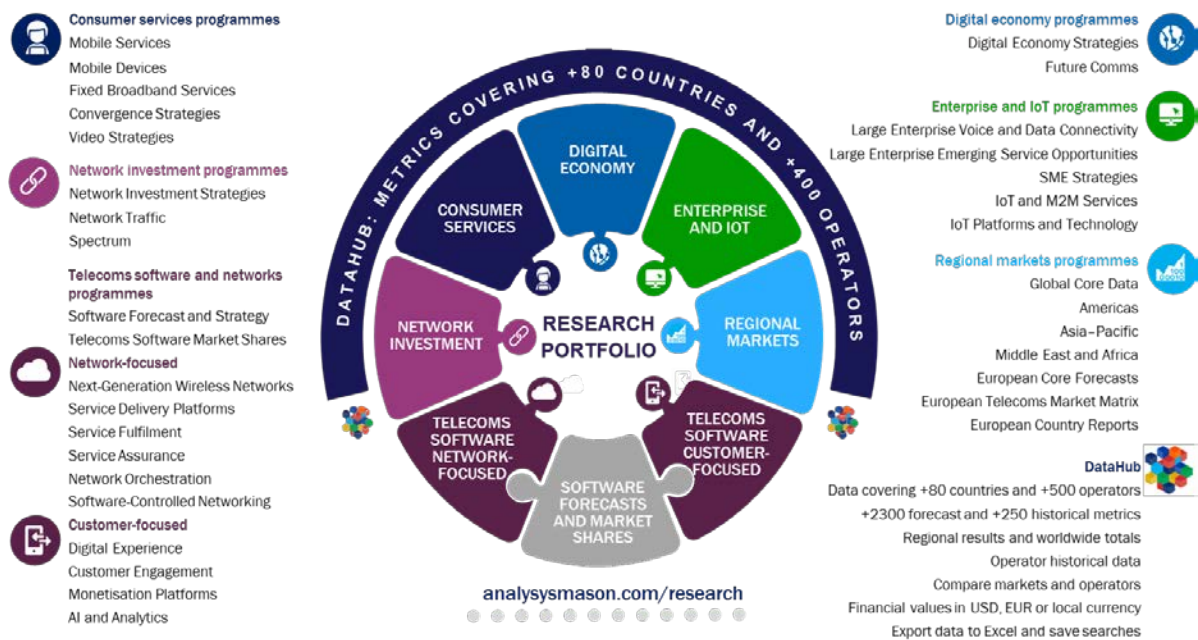


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