Technology Analysis: Converged Charging in 5G

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Summary

Catalyst

2021 was the year when 5G standalone (SA) networks became tangible, with 15 commercial launches by year-end. In 2022 and 2023, these and upcoming 5G SA launches need to become monetizable. As 5G SA networks are completed, the first link in that chain to monetization is the 5G charging system. This means telcos must face up to the significant evolution in charging systems to cloud-native and service-based architectures. They must implement the convergence of online and offline charging capabilities into one network function as per 3GPP specifications. Finally, service providers must evolve their organizations to structures that make these convergent charging systems (CCS) work for them and their customers.

This report includes an overview of CCS for 5G SA, the evolution of the market for these systems, and 11 CCS solution-vendor profiles that outline the strategies of suppliers in this area.

Omdia view

CCS are a fundamental part of operators' monetization roadmap for 5G. The concept is simple: one charging engine to support all telco service types, one charging engine to serve all customers, and one charging engine for all value metrics. Convergence makes charging simpler, faster, and more reactive to the changing needs of the business.

While the 5G standards themselves specify a convergent charging engine, it is not 5G alone driving operators to consider CCS solutions. Many telcos are consolidating their IT estates into one or two stacks to simplify their IT structures and drive better customer and partner experiences. CCS has an important part to play in giving operators the tools to make this consolidation possible in the charging domain.

From a business model perspective, operators are also looking at services that require charging to support new value metrics, such as quality of service (QoS), frequency of IoT connections, and third-party services. CCS solutions can offer this flexibility either through already supporting alternative value metrics, through suppliers' support for telcos to describe their own metrics and more frequent software release cycles. With a broader range of value metrics at their disposal, telcos will be able to innovate and experiment with these new pricing models for services based on network slicing, network as a service (NaaS), IoT, and edge computing.

It is not operators deploying 5G SA alone who are interested in CCS solutions. Omdia sees the launch of mobile network operator (MNO) sub-brands and new mobile virtual network operator (MVNOs) as key markets for CCS solutions where 5G is not necessarily a prime motivating factor at all.

There are many CCS solutions in the market, with suppliers differentiating on:

- Cloud-native maturity of the solution.
- Frequency of CCS software releases and availability of support and managed services.
- Offering CCS on a software-as-a-Service (SaaS) basis.
- Support features for B2B charging hierarchies and B2B2X business models.
- Supplying CCS as part of a broad portfolio of BSS, OSS, and network solutions.

Key messages

- CCS is vital for the successful monetization of 5G.

- Solutions are maturing, with iterative cloud-native roadmaps that facilitate continuous functionality improvement as the 5G services landscape matures.

- It is not just 5G driving the demand for new CCS deployments. Operator strategies to build experience-centric sub-brands and new MVNO entrants will also fuel fresh CCS investments.

- Many CCS solutions are beginning to be offered on a SaaS basis, but few operators are currently choosing to consume CCS in this way. CCS SaaS solutions will be most attractive to greenfield sub-brands and MVNOs/mobile virtual network enablers (MVNEs).

Recommendations

For telcos

- **Telcos do not need to wait for 5G SA to benefit from CCS.** Even where 5G SA is not on the immediate roadmap, operators can deploy CCS to streamline their charging estate and widen the range of services and business models they can serve.

- **Consider new BSS stack sub-brands as a way to trial innovative CCS charging models.** With a CCS untethered from the problems of legacy BSS integration, these organizations have the best chance of generating innovative charging models.

For CCS vendors

- **Everyone says they are cloud-native—CCS vendors need to prove it.** Decomposition of CCS solutions into microservices, support for dynamic scalability, evidence of lower total cost of ownership, and certification to run across a range of public and private clouds are all necessary proof points.

- **Telcos do not just need CCS; they need inspiration on how to use it.** While operator executives can appreciate the innovative business model opportunities that CCS offers, staff lower down telco organizations will need inspiration on how to use CCS solutions to innovate new pricing paradigms. The more configurable blueprints and templates that CCS vendors can offer, and the more examples they can provide of customers using their solution to drive new charging models, the more likely it is that operators will be able to realize the benefits.

Technology overview

Charging systems are a fundamental part of the monetization of products in any industry, particularly those offering services at mass-market scale. Once service providers have built out their 5G networks, the natural next step is to deploy a charging system to monetize this infrastructure. As 2021 saw more commercial 5G networks launch, operator executives are now considering the long-term monetization of these networks. In Omdia's *OSS/BSS Evolution Survey – 2022*, 5G charging and policy control were identified as top

investment priorities to improve monetization in 2022 (**Figure 1**). Yet this survey also indicates telcos do not want to invest in 5G monetization alone, as monetizing existing legacy networks in 2G, 3G, and 4G also ranked highly.

1. Figure 1: Telco BSS priorities

What are your top investment priorities to improve monetization over the next 18 months? (Select 3.)

5G charging and policy control — 48%
Billing systems to support new business models — 42%
AI and analytics to improve automation — 37%
Migrate systems to the cloud — 35%
Upgrade charging and policy control to extend monetization of legacy (2G–4G) networks — 35%
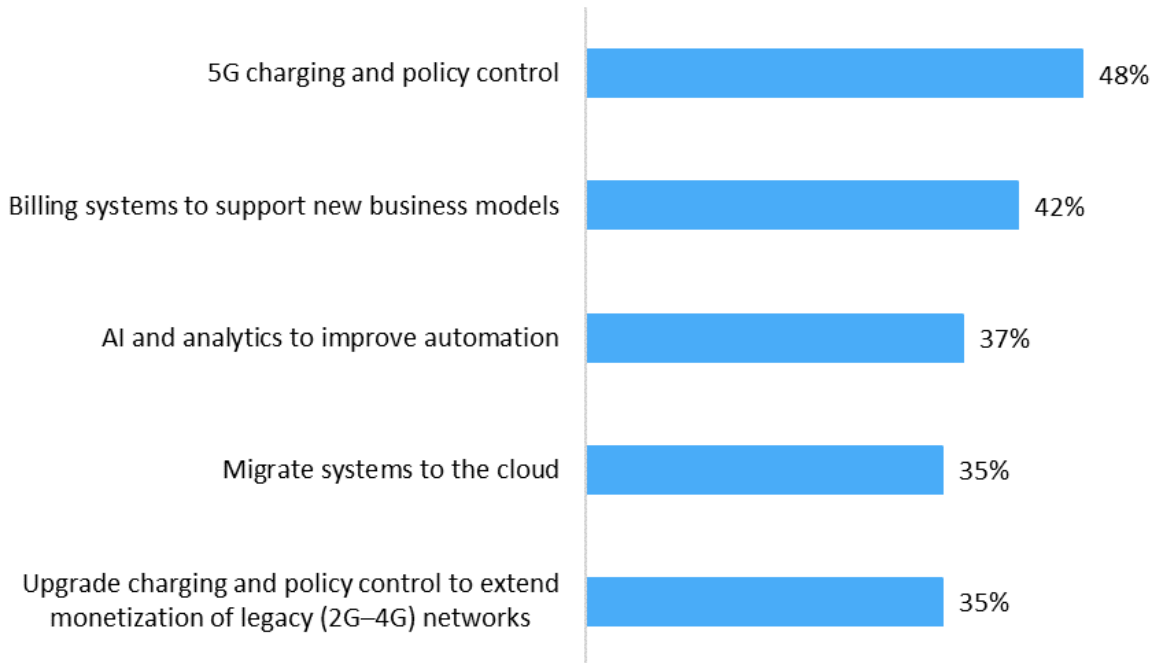
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Source: Omdia OSS/BSS Evolution Survey – 2022

This is where CCS comes in. Architected to not just converge the capabilities of online charging functions (OCF) and offline charging functions (OFCF) into a single function, they are also designed to support a wider variety of chargeable services. By converging both the technical functionality and the support for a broader array of services, CCS offers operators a way to simplify their charging deployments, and a flexible tool to explore more complex charging models. Ultimately, many solution providers intend their CCS to charge for much more than just telecoms services. This comes from either already supporting additional industries such as utilities, transportation, and retail with the same charging engine or in suppliers' understanding that 5G revenue will be more tied into different metrics of value than just minutes, speeds, bandwidth, and data volumes.
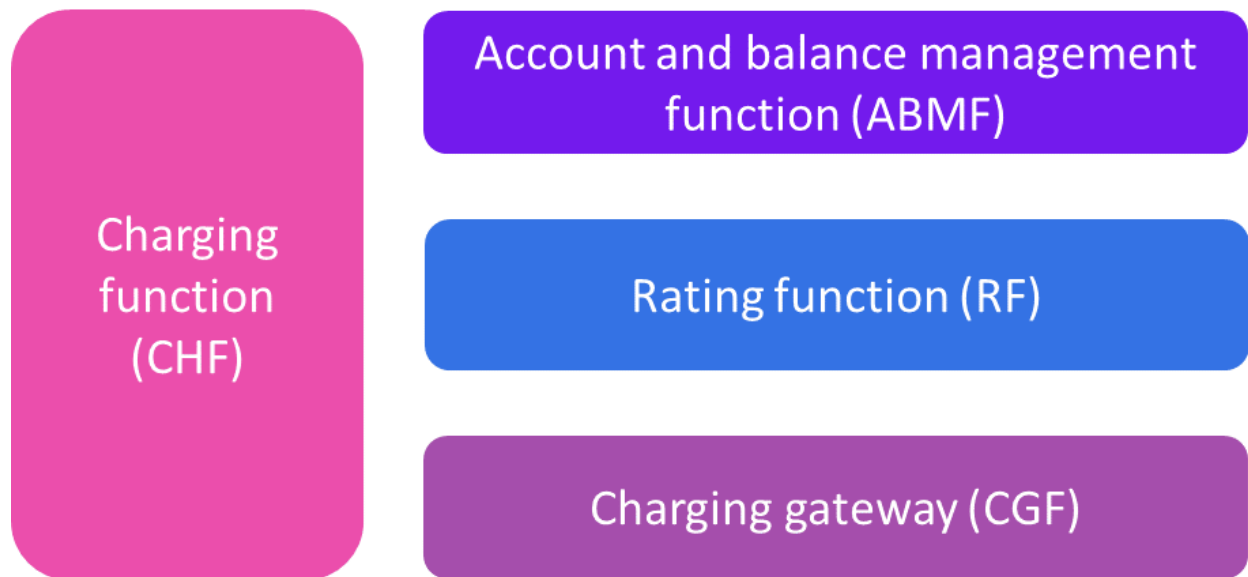
Elements of a 5G CCS

There are four core elements of a 5G CCS: charging function (CHF), rating function (RF), account and balance management function (ABMF), and the charging gateway (CGF) (**Figure 2**).

- **CHF**: Responsible for converged online charging and offline charging functionalities.
  - It provides the quota, re-authorization triggers, notification when the charging domain determines rating conditions are affected or when CHF decides to terminate the charging service, receives service usage reports from network functions consuming its services, and generates charging data records (CDRs).

– The CHF is exposed to other relevant network functions, such as the AMF, SMF, and NEF, which can request charging services through the Nchf service-based interface. All the suppliers we have spoken with support diameter interfaces so that the CCS can also support charging services for legacy networks.

- **ABMF**: An element of the CCS that is designed to track the remaining credit a subscriber has on their account.

- **RF:** The element of the CCS responsible for determining the rate at which credit should be reduced.

- **CGF:** The element which acts as a mediation engine that filters, validates, enriches, aggregates, and correlates usage data received in CDR files from the CCS.

Some vendor solutions decompose some of these elements further or couple them more closely with pre-existing solutions. For example, where many established vendors couple the CGF with their existing mediation products. Looking forward, another element that many vendors are working on or have already developed is the **charging enablement function (CEF)**. The CEF supports the CHF in charging for network slices on the basis of network slice performance and analytics information, which it can obtain from the network data analytics function (NWDAF—*see further reading*).

2. Figure 2: Common elements of 5G CCS

Charging function (CHF)

Account and balance management function (ABMF)

Rating function (RF)

Charging gateway (CGF)

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Source: Omdia

Vendor maturity

There are many mature CCS solutions available to telecoms operators, with solution providers having had over 18 months to bring their solutions in line with the latest 3GPP Release 16 specifications frozen in July 2020. The backgrounds of suppliers vary from traditional IT software providers with large BSS and OSS portfolios—including Amdocs, CSG, Netcracker, and Oracle—to the large network equipment vendors such as Ericsson and Nokia, and challengers such as Mavenir that have complimentary, end-to-end BSS, OSS, and

network solutions. There are also well-established smaller charging and BSS solution providers—including Cerillion, MATRIXX, Optiva—and newer challengers such as LotusFlare with more focused product offerings.

Many of these providers initially evolved their CCS solution from their original 4G online-charging system. Some have since developed a new CCS product from the ground up so as to design the initial codebase as cloud-native. For example:

- Netcracker built its current CCS solution from scratch in 2016.
- LotusFlare launched its CCS as part of its Digital Network Operator stack in 2018.
- Mavenir launched its CCS offering as part of the Mavenir Digital Enablement portfolio in 2021.

Assessing vendor suitability

For operators looking to assess the suitability of CCS solutions for their needs, Omdia recommends considering the following differentiating factors:

- **Cloud-native maturity of the solution:** This factor is less important if the operator itself is not ready to deploy and manage cloud-native solutions.
- **Rest of suite offering:** If an operator is less concerned by a best-of-breed BSS implementation, then they should consider the wider portfolio of BSS, OSS, and network solutions that a vendor provides.
- **Cadence of software updates:** All operators should consider the frequency of CCS software releases and how much it matters to them to be on the most recent version of a supplier's CCS product.
- **Service availability:** The availability of implementation support and managed services support for their operational needs.
- **SaaS capability:** This factor is more important if a telco is starting a new BSS stack, perhaps as part of a new MVNO brand or sub-brand of an existing MNO.
- For service providers, in particular, evaluating CCS for B2B and B2B2X services, they should consider:
  - Availability of features for B2B account hierarchies
  - Support for complex charging arrangements across a mixture of traditional and alternative value metrics
  - Availability of configurable charging use case templates to quickly trial new services
  - Ability to host tenants such as MVNOs or B2B2X partners on the solution who will look to set up their own charging use cases.

CCS and enhanced customer experience

A final consideration is how does a service provider see their charging system fitting into the delivery of a holistic customer experience. Solution providers such as LotusFlare and Oracle are vocal on how they see charging solutions improving the end-user experience. This could be through the CCS providing data that telcos can use to generate deeper insights into customer buying behavior. Or the solution could be configured to trigger notifications and automated campaigns to improve customer care, such as when a

prepaid account is nearly empty. In this case, the CCS could trigger a reminder to top-up the prepaid account, and an automated campaign to incentivize a customer via a personalized offering.

The CCS also has a valuable role to play in customer experience if a service provider operates a loyalty scheme, or where there are multiple different objects of value credited to a customer account. For example, a consumer may have credited their prepaid monetary balance for one-off purchases, their data volume entitlement, and any loyalty credits they have earned. In these cases, it is crucial that the CCS keep track of these different credit lines and expose updates to the billing system and customer service portal where a customer can check them in real-time.

Key CCS adoption trends

Migration from 5G NSA to 5G SA

The implementation of 5G SA networks is a key driver for the adoption of CCS. For operators to fully monetize their 5G SA investments, they need CCS. By the end of 2021, most of the 172 commercial 5G launches Omdia had recorded were 5G NSA, largely based on eMBB. Omdia recorded only 15 commercial 5G SA launches at end of 2021 (**Figure 3**).

3. Figure 3: Summary of commercial 5G launches up to the end of 2021
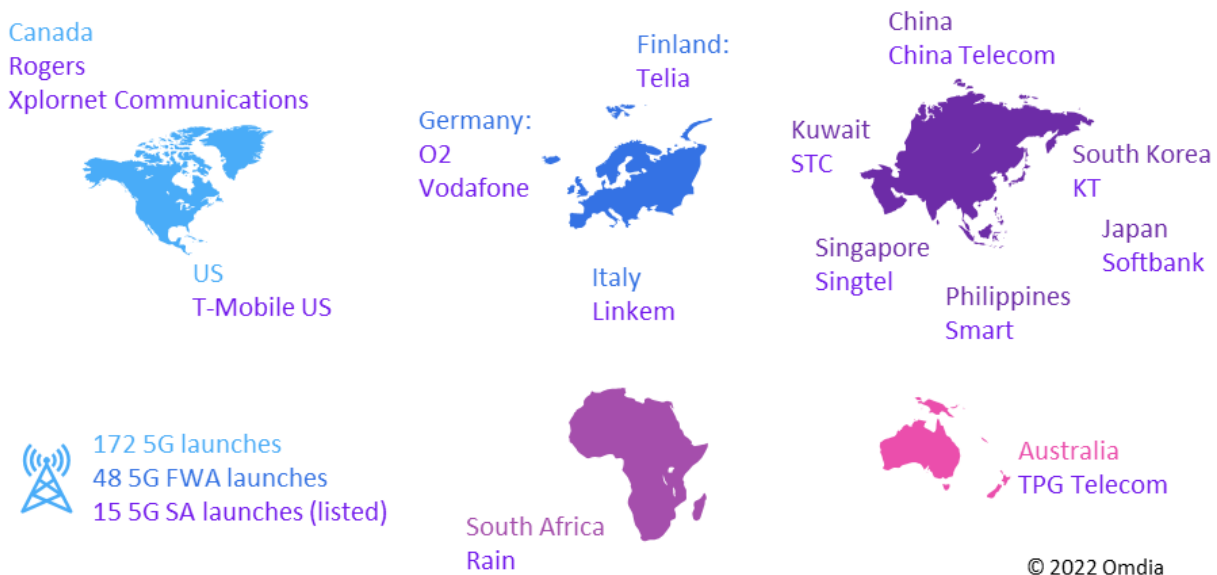
Source: Omdia 5G Service Provider Tracker – 4Q21

Many of those operators who deployed 5G NSA networks in 2020–21 will now be in the process of deciding on their 5G CCS vendor. Some have delayed decisions because of a lack of clarity on which business models will actually drive new revenue growth and returns on investment. Others will have already completed proofs of concept and trials and are progressing to deployment. There are examples of these early adopters across the globe, but especially in more mature 5G markets, including China, Japan, the US, and Europe.

In theory, CCS should enable operators to use one solution for all of their customers. In practice, there are operators who will tender for multiple charging systems as they keep some organizational silos and lines of business separate. The most obvious distinction will be a split between consumer- and enterprise-focused

charging. Examples include T-Mobile US, which in February 2022 confirmed it was extending its BSS and managed services partnership with Netcracker for its wholesale business, which includes the MVNO and IoT markets. Similarly, Vodafone Business uses Oracle's Cloud Scale Charging Engine while Vodafone's national OpCos have multiple different CCS suppliers. Smaller operators are more likely to opt for a single converged solution due to their lower complexity.

New brands & MVNOs

A second key trend driving the deployment of CCS is growing interest in MVNO/E business models and the growing number of MNOs launching sub-brands to target specific consumer and enterprise segments. Omdia's sub-brand tracker shows a high penetration of sub-brands in North America and Western Europe. Between 2020 and 2021, Omdia tracked significant growth in the number of MNO-owned sub-brands across Europe and the Middle East.

4. Figure 4: Adoption of sub-brands by MNOs around the world
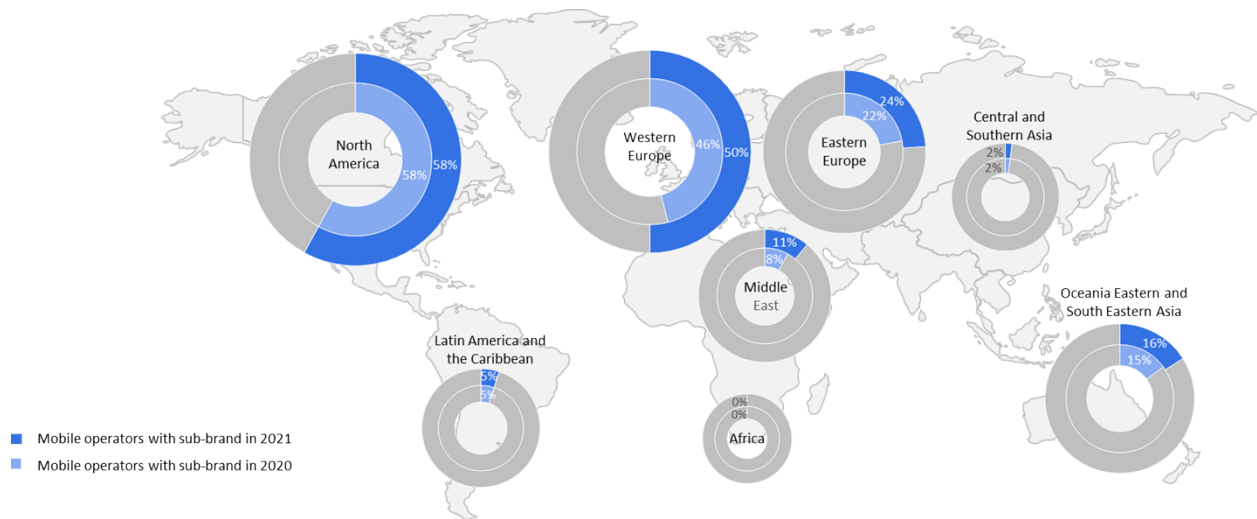
Source: Omdia Multi-Brand Strategy

From a BSS perspective, the arguments for setting up a greenfield BSS stack for a new sub-brand, or MVNO, including a new CCS, include:

- New brands need to be flexible and responsive to their core audience, particularly in the early days as they refine their proposition. Relying on or integrating with legacy BSS systems would kill that agility.

- These new brands often have a mandate to innovate and trial new business models and partnerships. They require a charging system that facilitates fast innovation cycles.

- They need the capability to charge for values that matter to the brand's core customers, and these values may not be traditional telco charging metrics of speed, bandwidth, and data volume. Instead, they might include QoS or IoT-based value metrics.

- Many of these brands are set up to be experience-driven. They want to control all aspects of the customer experience. Therefore, they require modern charging solutions which can offer greater observability and feed data into the brand's wider analysis of holistic customer journeys.

Where telcos are launching these sub-brands anecdotally, there seems to be a strong interest in SaaS consumption models for CCS and new BSS stacks. Key factors being lower capital expenditure, speed of deployment, and dynamic scalability of the solution to meet potentially uneven subscriber growth periods. Without having to integrate with lots of legacy systems, SaaS solutions are also more feasible for these new entities. Parent brands, in contrast, may face challenges due to brittle integrations between legacy systems and a frequently updated SaaS system.

Market outlook

Omdia expects vendor revenue from the entire telco charging market to grow at a CAGR of 5% between 2021 and 2026 to reach $1.56bn. This growth will be driven entirely by CCS as legacy charging system sales decline. Even in regions where operators are still to deploy a 4G offering—such as in some African markets—or where operators such as Vodafone Idea have many customers on legacy networks (more than 50% of VI's customer base is on 2G), operators are more likely to prefer 5G-ready CCS offerings rather than opt for pure-play 4G OCS. This avoids the need for an additional upgrade when they deploy 5G SA.

5. Figure 5: Forecast for vendor charging revenue growth, 2020–26 ($m)
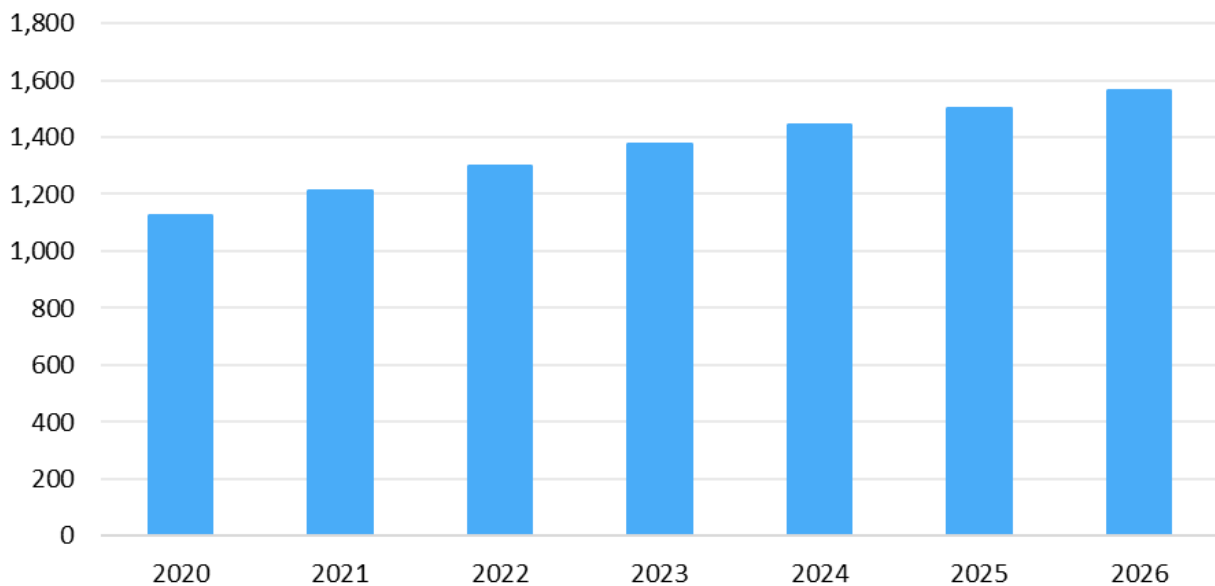
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Source: Omdia Telecoms IT Vendor Revenue Forecast 2021–26

Key suppliers

Amdocs

Solution overview

Amdocs' 5G CCS solution is an offering that combines newly acquired Openet charging technology with existing Amdocs charging capabilities. The solution integrates closely with Amdocs wider BSS/OSS portfolio, including catalog, billing, and Openet Policy (PCF), and sits at the center of Amdocs' solution suite it calls the

5G Value Plane. The solution aligns with both 3GPP and TM Forum standards, with Amdocs being active in the development of the 3GPP standards roadmap. Amdocs' 5G CCS solution supports charging across prepaid and postpaid models for 3G, 4G, and 5G mobile, fixed, IoT, content and other digital services. Amdocs 5G CCS solution is available on any public or private cloud, and can also be provided as SaaS.

Key customers include AT&T, A1 Telecom Austria Group, BT, and Globe. More than 15% of Amdocs' charging customers have already adopted (or are in the process of adopting) the 5G-ready CCS.

6. Figure 6: Overview of Amdoc's converged charging system
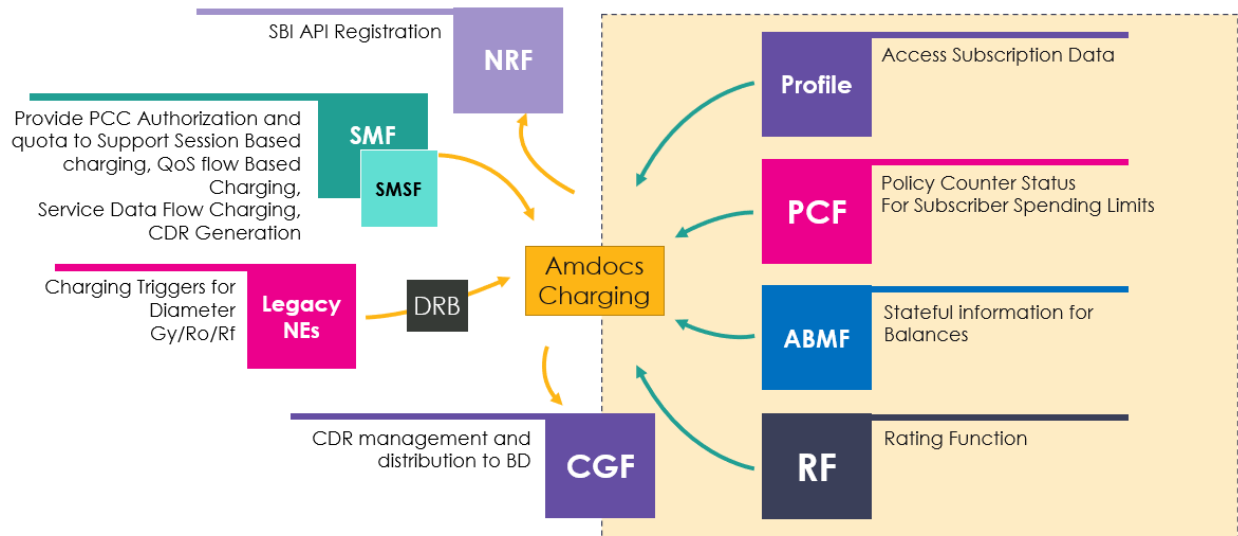
Source: Amdocs – Charging Solution

Product strategy

Amdocs supports multiple deployment options, from charging addons to full replacement. This flexibility in deployment options is so that Amdocs can enable operators to capture emerging 5G opportunities swiftly, and couple them with complimentary solutions as supported by Amdocs' fully convergent platform. In development, Amdocs' 5G CCS prioritizes updatability (via microservices) and configuration over customization. For charging they are moving to a quarterly major release cycle, with smaller updates available more frequently. Amdocs offers support aligned with its Rapid Cadence delivery model. To support enhanced configurability, usability, and ultimately reduce the time to value for their end users, Amdocs has invested in their UX team to enhance the solution's user interface. Amdocs' large customer base, including world-leading Tier 1 and Tier 2 mobile operators and groups, influences the direction of the roadmaps to meet their customers' 5G business needs and enterprise market requirements.

Amdocs intends to increase the range of "5G currencies" the solution supports which operators can use to rate for value in new services such as network slicing. Examples of these currencies include quality of experience and frequency of connection for IoT devices.
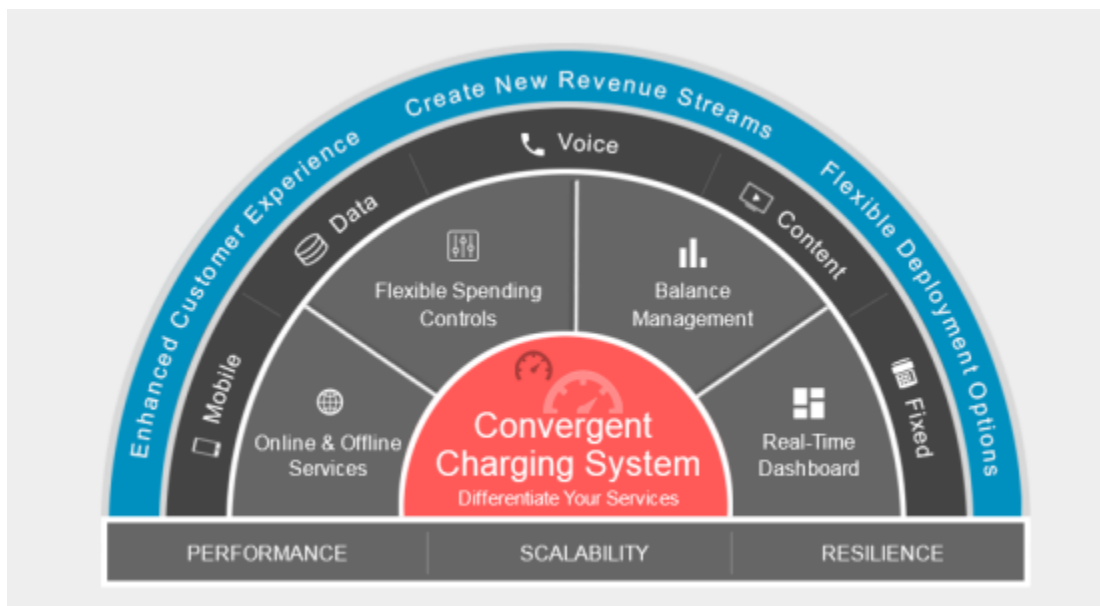
Cerillion

Solution overview

Cerillion first launched its CCS in 2014, with its first customers deploying in 2015. It is available as a best-of-breed solution, a component of Cerillion's end-to-end Enterprise BSS/OSS suite, or as part of Cerillion Skyline. The solution was built from the ground-up based on the 3GPP charging specifications and continues to be updated to align with new 3GPP releases as they evolve. Cerillion offers unified charging for all network types, service types, and payment methods, including postpaid, prepaid 2G, 3G, 4G, 5G, fixed, consumer, and business services.

Cerillion CCS currently serves 15 customers, including Three Broadband (UK) and SWAN Mobile (Slovakia). Cerillion CCS also counts a 4G MVNE in South Africa, which uses the multi-tenancy capabilities of the CCS to host 10+ MVNOs. The solution is also used by non-telco customers such as G4S, who use Cerillion Skyline to support cash management.

7. Figure 7: Overview of Cerillion's converged charging system

Source: Cerillion – Converged Charging Solution

Product strategy

Cerillion's CCS is on a six-monthly major release cycle, which is the same as the wider Cerillion Enterprise BSS/OSS suite. It is a single product kernel, with all customers using the same CCS product. Currently, the solution supports 250+ transactions per second per node, and 95% of online requests achieve a response time of <50 milliseconds. Development focus is on delivering new features and architectural updates to support the ongoing evolution of the 3GPP specifications, as well as more advancement and sophistication around tariffs, discounts, and promotions.

Cerillion offers its CCS as both SaaS and on-premises/integrated deployment options. It is a cloud-agnostic solution, with Microsoft Azure as a preferred hyperscaler.

CSG

Solution overview

First launched in 2020, CSG 5G CCS is a cloud-native converged charging solution offering real-time charging, rating, and policy control for 4G & 5G mobile networks for all services and all subscriber types (prepaid, postpaid, and enterprise). CSG 5G CCS supports advanced 5G services such as network slicing and edge-based charging and policy as well as AR/VR, gaming, massive IoT, and critical IoT. The solution is deployable in public and private cloud environments with hybrid and multi-cloud options.

CSG anticipates that their existing OCS customers will move to their CCS solution when they are ready to go live with 5G. The solution provides a stepwise migration path from 4G/5G non-SA to 5G SA for customers and services. One example is a Tier 1 EMEA CSP, which is currently deploying CSG 5G CCS. The CCS will support all the CSP's 5G B2C and B2B offerings across postpaid and prepaid with continuing support for 4G plans and customers across 14 million subscribers. Initially, the CSP will focus on 5G B2C consumer-led use cases by launching fixed wireless access (FWA), enhanced mobile broadband (eMBB), and voice over new radio (VoNR).

8. Figure 8: Overview of CSG's converged charging system
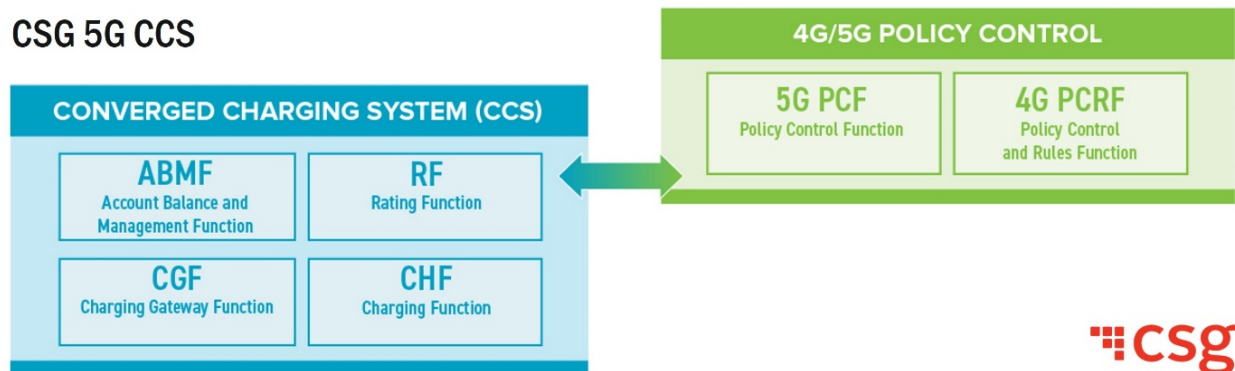
Source: CSG – Converged Charging Solution

Product strategy

The cloud-native solution adheres to open architecture standards consistent with 5G software-defined network principles and service-based interfaces/APIs, leveraging TM Forum, 3GPP, Cloud Native Computing Foundation (CNCF), and Open Container Initiative (OCI) standards.

CSG 5G CCS has minor releases every two weeks and major releases every quarter. Key capabilities on CSG's development roadmap over the next 12–18 months include adoption of CNCF framework to support a standard deployment model that can span public, private, and hybrid cloud deployment options; continued adherence and compliance to the latest 3GPP specification standards for 5G; and adding support for a rules-based outbound communication channel, allowing clients to target message end customers.

CSG informs this roadmap through a client product advisory board. This also complements the delivery of the solution on a SaaS basis, as each client benefits from a common roadmap driven by everyone.
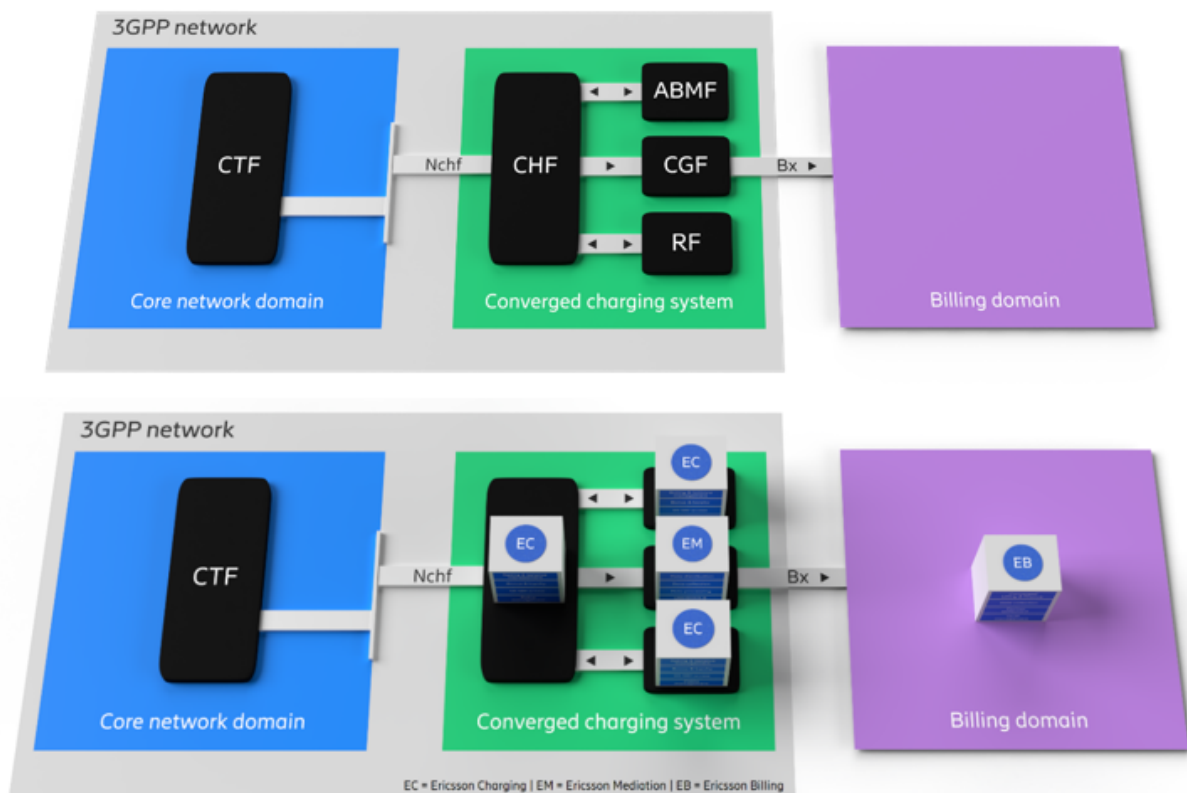
Ericsson

Solution overview

Ericsson's first CCS was launched in December 2019 based on 3GPP 15, the first 3GPP release to specify the CCS. This represents an evolution of Ericsson's pre-existing online charging and mediation products and includes CHF, ABMF, RF implemented in Ericsson Charging, and Ericsson Mediation implementing the CGF. Ericsson CCS is part of its Digital BSS portfolio. The CCS supports online and offline rating and charging for consumers, enterprise, prepaid, postpaid, and 3G, 4G, 5G, and fixed, among others.

Ericsson currently has 10+ CCS deals across different geographies. Live deployments include a Tier 1 telco in North America supporting 5G charging for 170 million prepaid subscribers and a Tier 1 telco in Asia & Oceania supporting 5G Wi-Fi with regular 5G offers expected to launch in 1Q22. Ericsson is also providing the convergent charging solution in the convergent BSS platform implementations of Etisalat (UAE) and WINDTRE (Italy).

9. Figure 9: Overview of Ericsson's converged charging system

Source: Ericsson – Charging Solution

Product strategy

Ericsson differentiates its solution through the pre-integration and verification of the overall 5G platform, including their RAN, core, BSS, and OSS solutions. Ericsson CCS has four releases per year lifecycle, with releases between those based on market needs and customer demands. Releases are managed through a

"one track" CI/CD pipeline so that all releases are backward compatible and can be implemented at any customer site through a software upgrade, independently of the version they are currently running on. The current roadmap includes regular 3GPP release baseline uplifts aligned with the 5GC portfolio, along with support for new 5G-driven use cases, primarily to support new B2B/B2B2X business models.

Ericsson CCS is offered through different commercial models, including turnkey, managed services, and software subscriptions. They partner with cloud providers such as Amazon Web Services (AWS) to certify products are deployable and meet customers' performance needs on any infrastructure they choose.
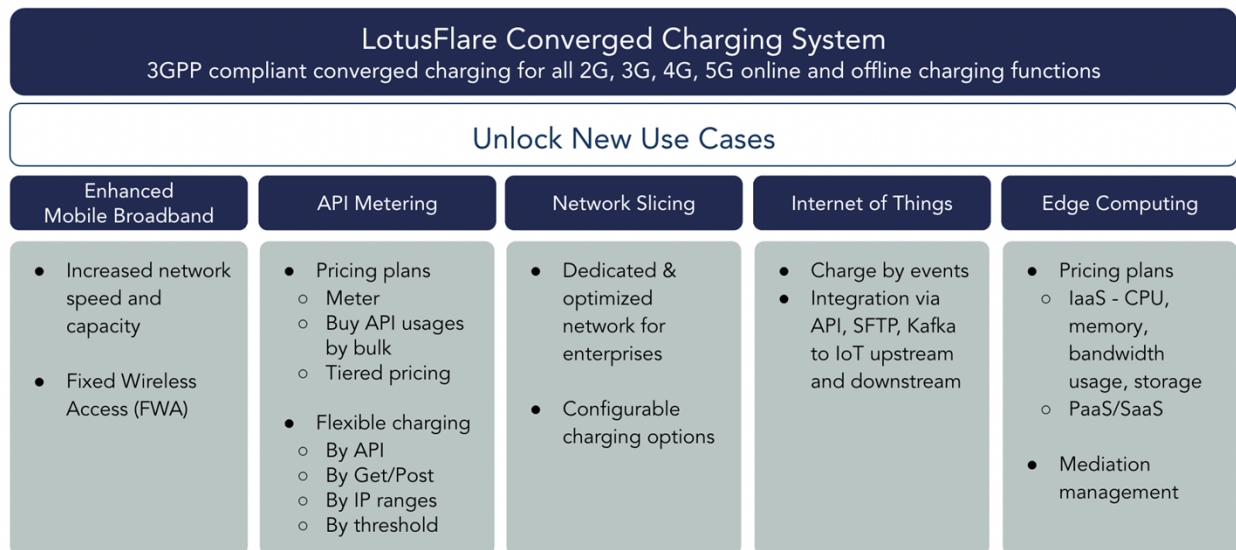
LotusFlare

Solution overview

LotusFlare Converged Charging System (CCS) is a SaaS component of the LotusFlare Digital Network Operator (DNO) Stack that incorporates a charging function, charging manager, and CDR manager, which was launched in 2018. LotusFlare CCS can be deployed as a standalone charging system or within the LotusFlare DNO Stack as a fully-managed cloud commerce and monetization service for communications and media services providers. LotusFlare CCS is developed according to 3GPP standards to support prepaid, postpaid, or hybrid payment models and covers consumer, enterprise, and small/medium businesses, online and offline use cases. It is designed to be an omni-service, so it can be used for fixed, mobile, satellite, non-connectivity third parties, and for services outside of telecoms. LotusFlare CCS is built on cloud-native infrastructure, advocates the deployment of LotusFlare CCS in the public cloud, and supports private cloud and other deployment configurations.

LotusFlare has launched multiple deployments of LotusFlare CCS in Asia, North America, and the Caribbean for operators' new brands or existing CCS replacements. Its largest CCS deployment supported over 2 million subscribers.

10. Figure 10: Overview of use cases supported by LotusFlare's converged charging system

Source: LotusFlare – Converged Charging Solution

Product strategy

LotusFlare CCS is updated frequently based on customer needs and roadmap requirements on a CI/CD basis. LotusFlare first seeks to differentiate its offering by designing the DNO Stack "from experience down," and by its focus on developing charging capabilities using cloud-native technology. Second, LotusFlare also differentiates through its commitment to public cloud as its preferred deployment environment. Finally, LotusFlare's long-term vision is to design and advance a SaaS charging capability that is cross-industry.

LotusFlare is seeing the most interest from network operators looking to launch new digital sub-brands or new entrants into MVNO markets. Regionally it is focused on North America, with strong customer links in Asia and Oceania and new customers in EMEA.
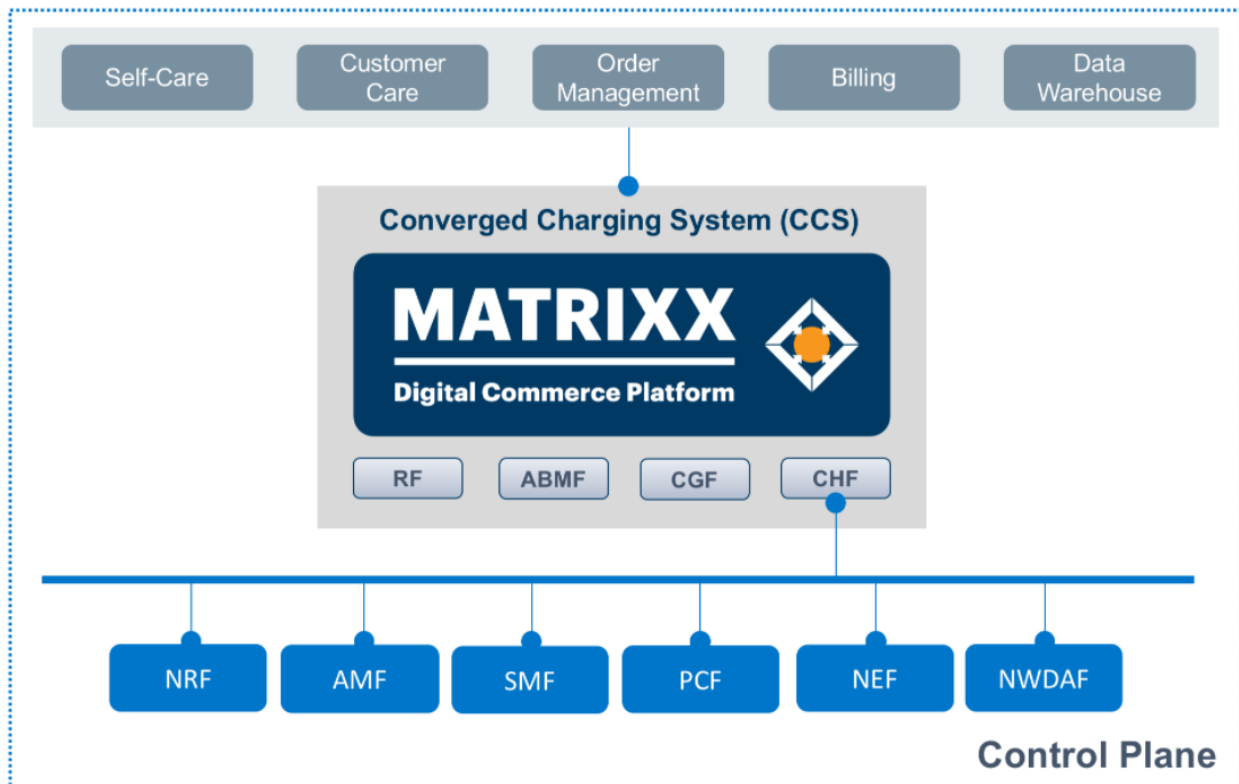
MATRIXX Software

Solution overview

MATRIXX CCS for 5G launched in October 2019 and is part of the MATRIXX Digital Commerce Platform, which launched in 2012. The solution supports online and offline charging across the 5G, 4G, 3G, 2G, fixed, consumer, enterprise, prepaid, and postpaid segments and is ready to support new business models such as NaaS, network slicing, and edge computing. The CCS solution is available to all MATRIXX customers (the functionality is standard in the product).

MATRIXX CCS aligns to industry standards for convergent charging as documented through 3GPP and combines this with a range of digital commerce functionality such as payments, taxation, enterprise sharing, contract management, and event streaming. MATRIXX plays an active role in key standards bodies and open-source communities related to next-generation charging, including 3GPP (where MATRIXX leads the charging group and is vice chair of SA5 Telecom Management); Linux Foundation, where MATRIXX CTO, Marc Price, is co-chair for the Cloud Native Open Verification Program (CN OVP); and the Telecom Infrastructure Project (TIP).

11. Figure 11: Overview of MATRIXX' converged charging system

Source: MATRIXX Software – Converged Charging Solution

Product strategy

MATRIXX CCS continuously evolves, with multiple releases every year. MATRIXX works closely with standards bodies and customers to shape its roadmap (to which all customers have access). The CCS is deployable for production out-of-the box and differentiated by "click not code" principles (driven by MATRIXX' patented high-speed decision engine); high elasticity, broad scalability, and ultra-low latency (driven by MATRIXX' patented non-blocking database); and by cloud-native support for multi-cloud implementations by being a single product supporting various cloud-native infrastructures.

MATRIXX offers a commercial subscription model for the product that includes support and access to all product functionality. It has a direct-to-market commercial strategy alongside close channel partnerships with systems integrators and technology companies.
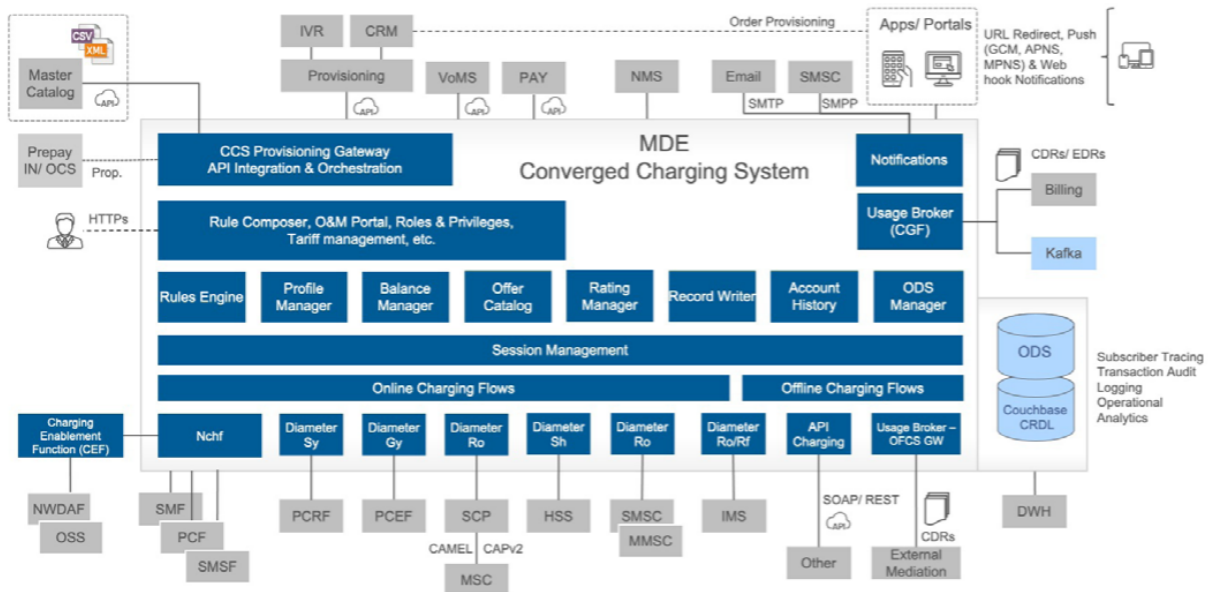
Mavenir

Solution overview

Mavenir's CCS is part of its digital enablement portfolio, which was launched in 2021. This modernized Mavenir's portfolio by building a cloud-native charging solution from the ground-up which conforms to 3GPP release 15 & 16 defined specifications. Mavenir CCS was developed as a set of cloud-native stateless microservices and OpenAPI-based architecture, which enables it to support on-demand scaling, automated operations, and high resiliency with 5 9's availability. The solution leverages Mavenir's shared infrastructure

management services foundation that runs across all digital enablement and network software solution portfolios. Mavenir CCS solution converges various 3GPP technologies and notably supports charging for 4G & 5G network transactions as well as traditional CDR-based offline-only and diameter-based online-only charging models.

To date, Mavenir is fulfilling several customer contracts, including with a Tier 1 MNO in Germany with over 15 million subscribers and several Tier 2 CSPs in Latin America & the Caribbean. Mavenir is also engaged in several PoC and active sales engagements across all geographies.

12. Figure 12: Overview of Mavenir's converged charging system

Source: Mavenir – Converged Charging Solution

Product strategy

Mavenir's technological framework for CCS is centered around Agile delivery and DevOps practices ingrained into the development strategy. For enhanced usability, they have invested in a no-code user interface to support ease of use by different Telco stakeholders. To support ease of distribution at the edge of the network and a scalable pay-as-you-grow model, Mavenir has focused on making the solution lightweight. Updates are delivered using automated CI/CD pipelines that can be as frequent as every two weeks. Key customers in Germany and Latin America & the Caribbean help to drive Mavenir's CCS roadmap.

Mavenir CCS is available in traditional on-prem license-based deployment model and as SaaS. Mavenir has a strategic go-to-market with AWS where the entire Mavenir 5GC, including the CCS, is available via AWS console to purchase by any MVNO/ISP/CSP customers. Mavenir is also actively engaged with major SIs across the globe to further expand their sales and delivery channels.
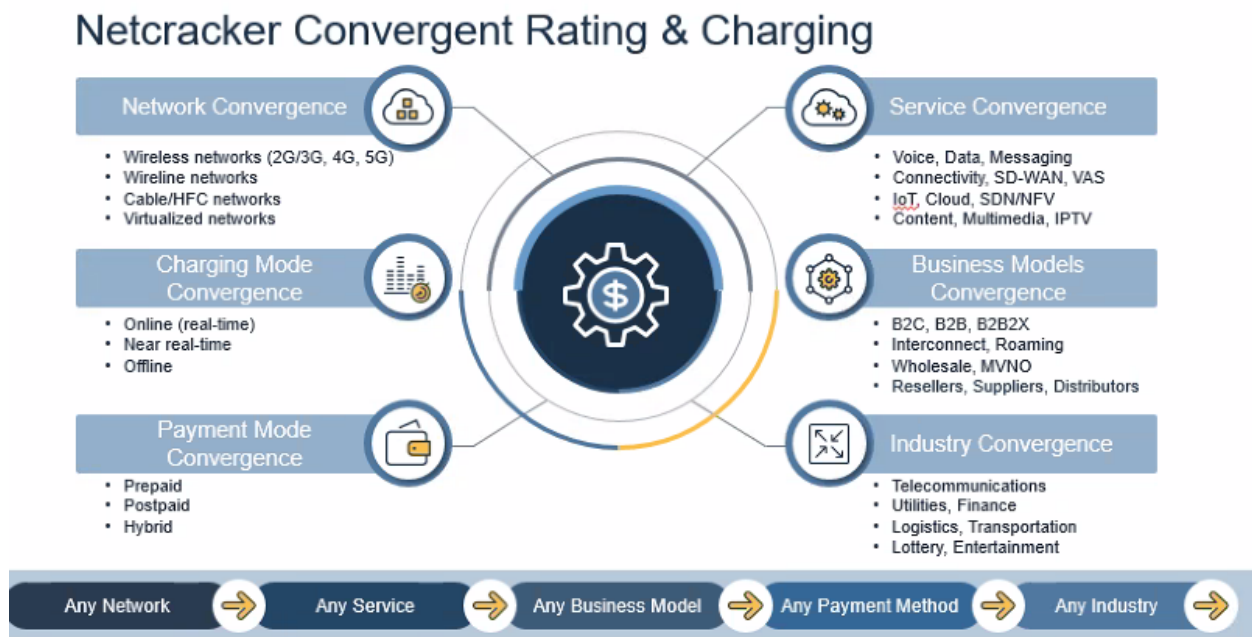
Netcracker

Solution overview

Netcracker's convergent rating and charging system was built from the ground up and launched in 2016. It sits both as part of Netcracker's Monetization suite and as a SaaS-based solution in Netcracker's Revenue Management Cloud product. It follows the relevant 3GPP and TM Forum specifications and can be deployed on any public or private cloud. Along with supporting charging functionality for mobile and fixed access networks, consumers, enterprise, prepaid, postpaid, and more in the telecoms industry, the charging platform also supports other industries, including utilities, finance, logistics, and transportation.

70% of Netcrackers' charging customers currently have licenses for the 5G CCS, but they are not all active as not all customers have launched 5G services yet. Customers who are currently utilizing Netcrackers' 5G CCS include Rakuten across all of its 70 industries, Telenet, du, Zain, Vodafone Oman, T-Mobile US for their wide range of enterprise services, Bouygues Telecom in France, and many other customers across the globe.

13. Figure 13: Overview of Netcracker's converged charging system

Source: Netcracker – Converged Charging Solution

Product strategy

Netcracker's CCS is built on a single codebase that is continuously updated to add functionality and maintain adherence to the relevant standards as they continue to evolve. For most deployments, Netcracker operates on a quarterly release cycle; however, for those BSS customers using the SaaS-based offering, updates can be weekly. Netcracker is focused on delivering additional capabilities to support emerging use cases, including private networks, remote healthcare, and network slice as a service. It has also invested in additional capabilities for source-agnostic data collection, including from Apache Cassandra, and in supporting alternative payment methods such as cryptocurrencies.

Netcracker's go-to-market is driven by its ability to supply and simplify end-to-end BSS (and OSS) estates through a single converged BSS platform which is configuration-driven. The CCS serves many different verticals, so Netcracker is already equipped with templates for rating value with non-telco metrics, supporting varied account hierarchy structures, and providing views of additional non-monetary account balances, such as loyalty points.
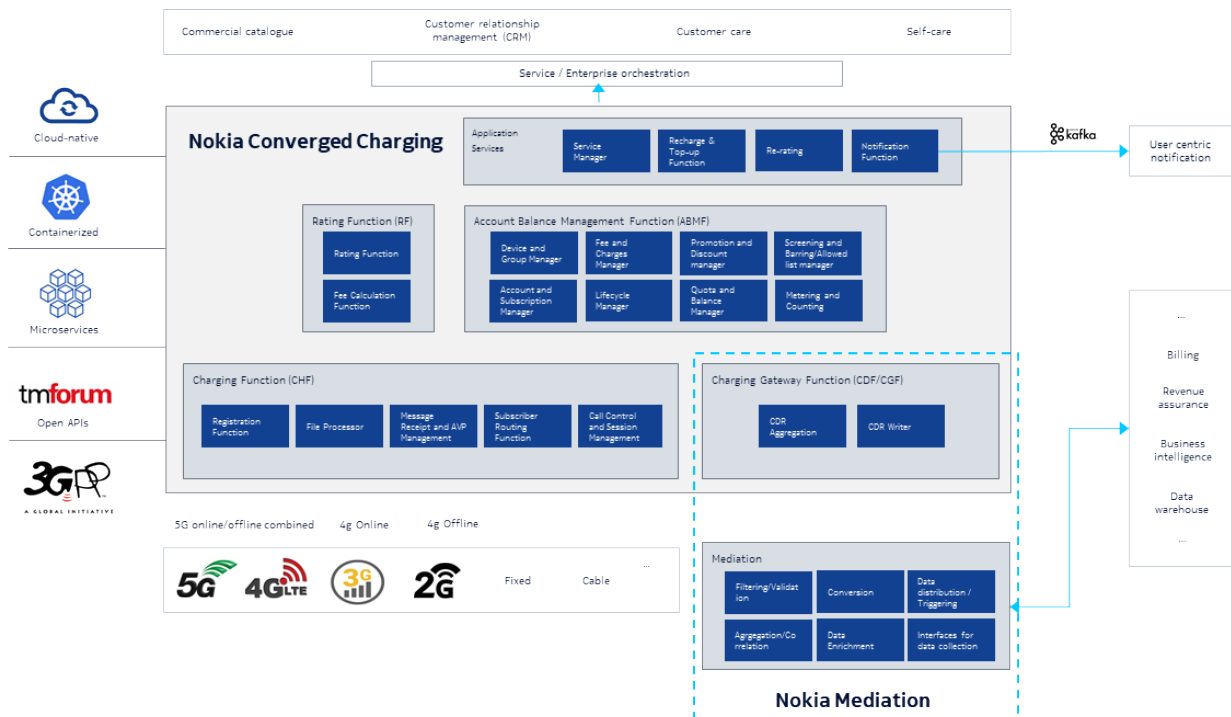
Nokia

Solution overview

Nokia's 5G Converged Charging solution was launched in 2019 and forms part of Nokia's BSS Monetization portfolio. It follows the relevant 3GPP, TM Forum, and CNCF specifications and has been certified to run on AWS, and Google Cloud Platform (GCP). Along with supporting charging functionality for mobile and fixed access networks, consumers, enterprise, prepaid, and postpaid, Nokia provides operators with flexible configuration tools to develop alternative "currencies" with which to derive value for new use cases such as IoT, network slicing, and premium gaming subscriptions.

Nokia has 20 CCS contracts, including live deployments with a Tier 1 Asia & Oceania operator with over 30 million subscribers, and a contract with a Tier 1 Telco with a multinational footprint set to go live later in 2022.

14. Figure 14: Overview of Nokia's converged charging system

Source: Nokia – Converged Charging Solution

Product strategy

Technologically, Nokia has focused on ensuring their CCS is cloud-native, open, and able to be widely distributed across a telcos infrastructure. Nokia has also invested in no-code configuration functionality to enhance usability and accelerate the creation of new product offerings. Nokia's six annual releases are targeted at enabling monetization of new 5G "currencies," improving support for partner-based business models, expanding support for TMF APIs, 5G network slicing monetization, and charging as a service.

Nokia's CCS go-to-market is supported by its adjacent BSS, OSS, and extensive networks portfolios. In the BSS specifically, it also relies on a partnership ecosystem comprising global system integrators, complementary ISVs, and in deepening its relationships with hyperscalers such as AWS and GCP.

Optiva

Solution overview

Optiva Charging Engine is Optiva's flagship multi-industry convergent charging solution. The solution follows 3GPP, TM Forum, and CNCF specifications. The main components of the Optiva Charging Engine include real-time rating and charging, configurable pricing and product scheme management, campaigns, and loyalty programs with event-triggering execution. The charging engine supports consumer, enterprise, prepaid, postpaid, 5G, 4G, 3G, 2G, and fixed services, as well as OTT/video subscriptions and charging services for utility and railway industries. The solution is available across public clouds and in operators' private clouds.

Optiva Charging Engine has live implementations in more than 30 telecom operators, including Vodafone India (200 million subs), KDDI Japan (55 million subs), Claro Peru (12 million subs), BT, Omantel, and Truphone. Customers also include non-telcos such as BMW, Meralco (prepaid energy), and PTV/Australia (railway). More than 50% of Optiva Charging Engine's existing customer base has embarked on a journey to upgrade to the latest cloud-native product version.

15. Figure 15: Overview of Optiva's converged charging system
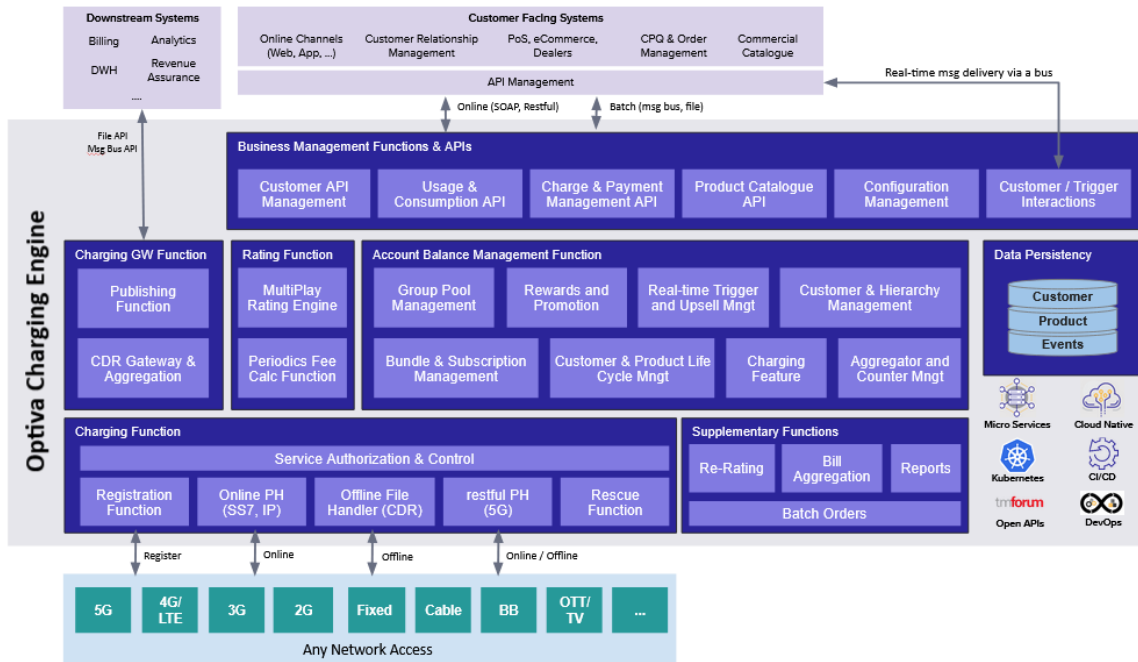
Source: Optiva – Charging Solution

Product strategy

Optiva Charging Engine is centrally managed as a single version, with quarterly cadence updates. It is enabled for installation across the cloud-native-based installations, using an automated CI/CD pipeline with high-quality gates to de-risk any live traffic interruptions. For instantiations not on the public cloud, Optiva provides a prepackaged and configured set of infrastructure tools. This is so Telcos can still receive new software updates fast, enable operators to gain experience with cloud software, and supports them to deploy new software releases quickly through Optiva's automated testing framework tool.

Optiva's technical roadmap includes continued investment in low-code/no-code capabilities and prepackaging for enhanced TTM; support for flexible commercial models to support new services for consumer, enterprise, and partner ecosystem use cases; and dedicated functionalities to support the cloud economics required in high-traffic volume use cases such as massive IoT, and optimized experiences on the edge.

Optiva's long-term strategy is to fully adopt a SaaS charging engine offering on public cloud. With the understanding that the telecom industry is slow to adopt such an approach due to reasons from technical to financial, Optiva is providing an interim offering of subscription (services included) on private cloud implementations with a semi-based SaaS approach. To support this commercial model, Optiva is also investing in software management, services, functionality technology, and more. Optiva is also partnering with hyperscalers, such as Google, for a joint offering and go-to-market.
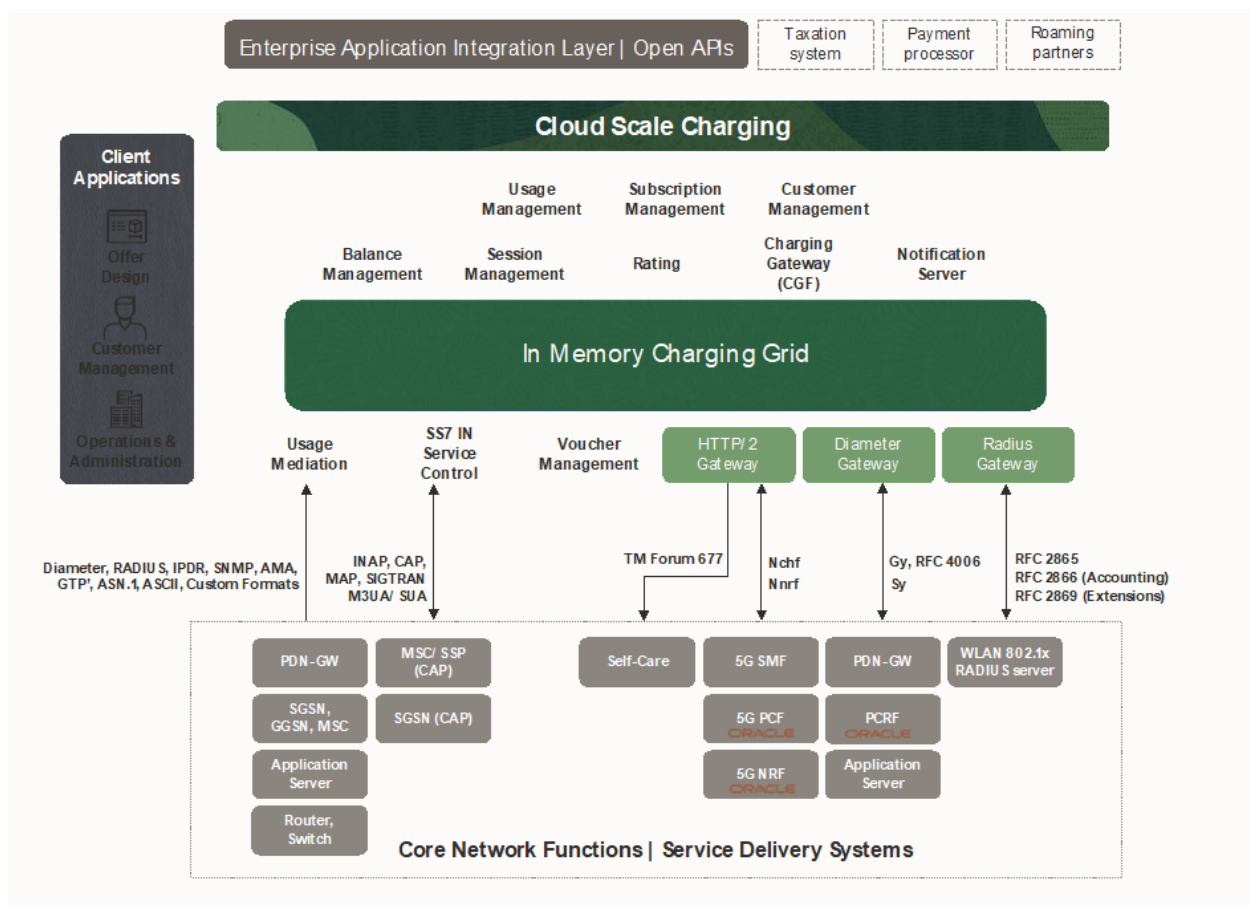
Oracle

Solution overview

Oracle relaunched its charging solution as Oracle Cloud Scale Charging in January 2022 as a strategic solution within its Cloud Scale Monetization portfolio which supports charging and billing for mobile and fixed access, enterprise, consumer, IoT, and for non-telco industries, including finance and media and entertainment. The relaunch marks the continued cloud-native evolution of Oracle's convergent charging solution as operators move forward with 5G. The solution adheres to 3GPP & TM Forum specifications, with Oracle playing a particularly active role in the development, certification, and tooling of the TM Forum Open APIs and Open Digital Framework.

Key customers include Vodafone Business in a global deal which currently supports over 130 million connections, and which is expected to eventually accommodate over 1 billion SIMs; a multi-country implementation with Telenor in Asia, which is replacing legacy systems to support charging for ~80 million pre/post-pay subscribers; and a Tier 1 European telco where Oracle already supports 10 million prepaid subscribers and are currently onboarding an additional 20 million+ postpaid subscribers. London Heathrow is an example of a recent customer win from outside the telecoms industry.

16. Figure 16: Overview of Oracle Cloud Scale Charging

Source: Oracle – Cloud Scale Charging Solution

Product strategy

Oracle currently updates its Cloud Scale Charging solution on a quarterly release cycle, incorporating guidance from regular customer advisory boards, product strategy reviews, and inputs from its customer success program to decide and vet the roadmap. In January 2022, Oracle announced the results of its latest cloud scalability testing, where it simulated the workloads of 100 million subscribers, managing to achieve on-average single-digit latency on over 41,000 rated events per second. Latencies were further reduced when the solution was distributed across two sites. Oracle is investing in the cloud-native and service-based architectures of its solution. This includes further decoupling its solution by building an independently deployable microservice-based CHF that can be effectively deployed in a distributed 5G network environment. Oracle is also investing in solution interface improvements with customer-facing elements of the BSS via TM Forum Open APIs to drive a more intuitive customer experience.

Oracle offers Cloud Scale Charging through traditional software licenses, and can be deployed on Oracle Cloud Infrastructure (OCI), dedicated OCI cloud regions (Oracle Cloud@Customer), third-party public and private cloud, and on-premise. Oracle Communications Consulting implements and manages many Cloud Scale Monetization programs. Additionally, Oracle has a network of more than 36 partners, including Accenture, Tech Mahindra, and Infosys, that support Oracle in developing opportunities, solution selling, implementations, and managed services.

Appendix

Methodology

This report is based on a mixture of primary and secondary research; interviews with industry stakeholders, including network operators and CCS solution providers; telecommunications results from the annual Omdia IT Enterprise Insights survey of more than 4,000 enterprise IT influencers and decision-makers from around the globe; results from the Omdia *OSS/BSS Evolution Survey – 2022*, which surveyed 95 operators from around the globe; and additional Omdia proprietary datasets including revenue trackers, forecasts, and IT contracts that were also consulted to support the analysis.

Further reading

Amdocs – Charging Solution

Cerillion – Converged Charging Solution

CSG – Converged Charging Solution

Ericsson – Charging Solution

LotusFlare – Converged Charging Solution

MATRIXX Software – Converged Charging Solution

Mavenir – Converged Charging Solution

Netcracker – Converged Charging Solution

Nokia – Converged Charging Solution

Optiva – Charging Solution

Oracle – Cloud Scale Charging Solution

5G Service Provider Tracker – 4Q21 (January 2022)

2022 IT Enterprise Insights in the Telecoms Industry (January 2022)

Telecoms IT Vendor Revenue Forecast 2021–26 – Data (August 2021)

Multi-Brand Strategy: A Shift in Global Service Provider Customer Segmentation – 2021 (December 2021)

Critical Service Provider BSS Capabilities for 5G SA (October 2021)

OSS/BSS Evolution Survey – 2022 (August 2021)

Global Mobile Sub-Brand and Digital Brand Tracker by Country – 2021 (August 2021)

NWDAF – Standardizing Mobile Network Data Collection and Analytics (September 2020)

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