

Comviva Ngage CNPaaS-
**A Complement to
Network Slicing!**

Executive Summary

The emergence of 5G technology brings with it the promise of unparalleled connectivity and transformative innovation. At the heart of this evolution lies network slicing, a groundbreaking concept introduced by the 3rd Generation Partnership Project (3GPP). Network slicing allows for the creation of virtual networks tailored to the specific needs of diverse applications and user groups, promising a customized and isolated network experience.

However, despite its potential, the implementation of network slicing presents formidable challenges. Efficiently allocating and optimizing network resources across various slices with diverse requirements is a complex task, demanding careful orchestration to avoid inefficiencies and service disruptions. Moreover, the lifecycle management of network slices – from creation to decommissioning – requires advanced automation and coordination to ensure seamless operations.

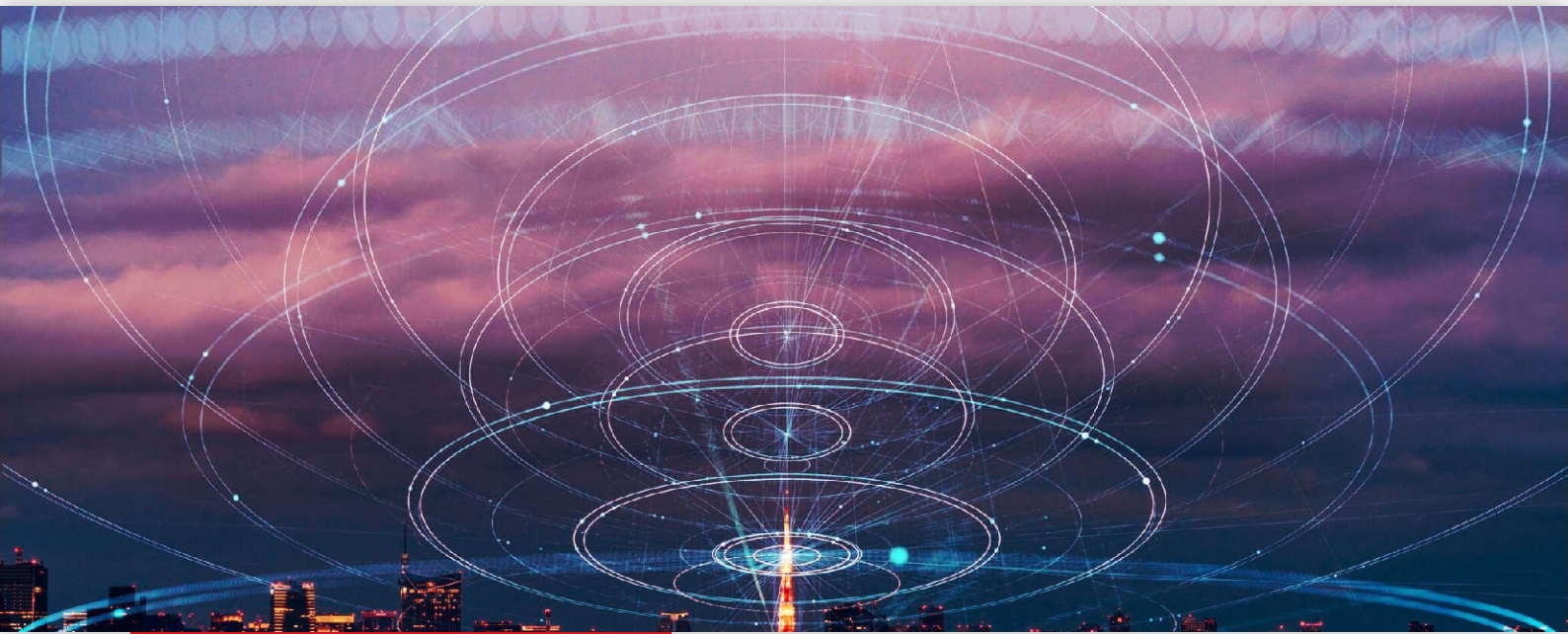
Furthermore, as telecom operators seek to diversify revenue streams beyond traditional offerings, the monetization of network slicing becomes imperative. Yet, realizing this potential requires innovative business models and close collaboration with industry stakeholders to unlock new revenue streams.

In response to these challenges, Comviva introduces Ngage CNPaaS, a comprehensive platform designed to complement network slicing and address critical pain points. Ngage CNPaaS facilitates the exchange of value among ecosystem stakeholders, enabling the seamless delivery of business-to-business (B2B) and business-to-business-to-anything (B2B2X) use cases across industries.

By empowering application developers to harness network currencies with unprecedented ease, Ngage CNPaaS drives innovation and accelerates time-to-market for new applications and services. Crucially, Ngage CNPaaS does not replace 5G network slicing but enriches the ecosystem by simplifying access to network APIs and streamlining intent-driven decision-making.

With its emphasis on simplicity, scalability, and vendor-agnosticism, Ngage CNPaaS represents a pivotal advancement in network-driven applications and services, poised to unlock new realms of possibility in the 5G era and beyond.



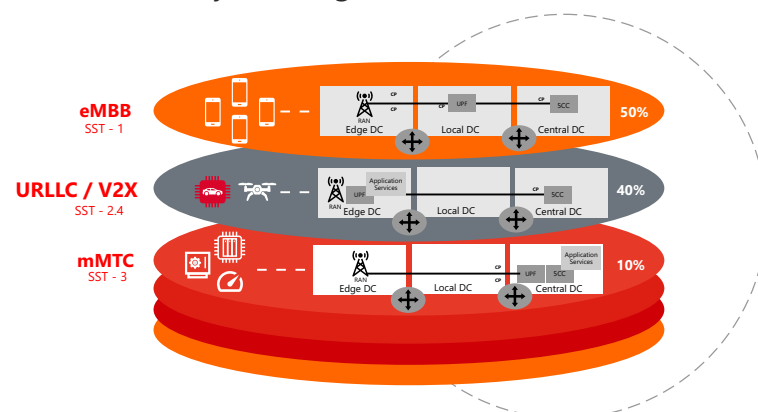


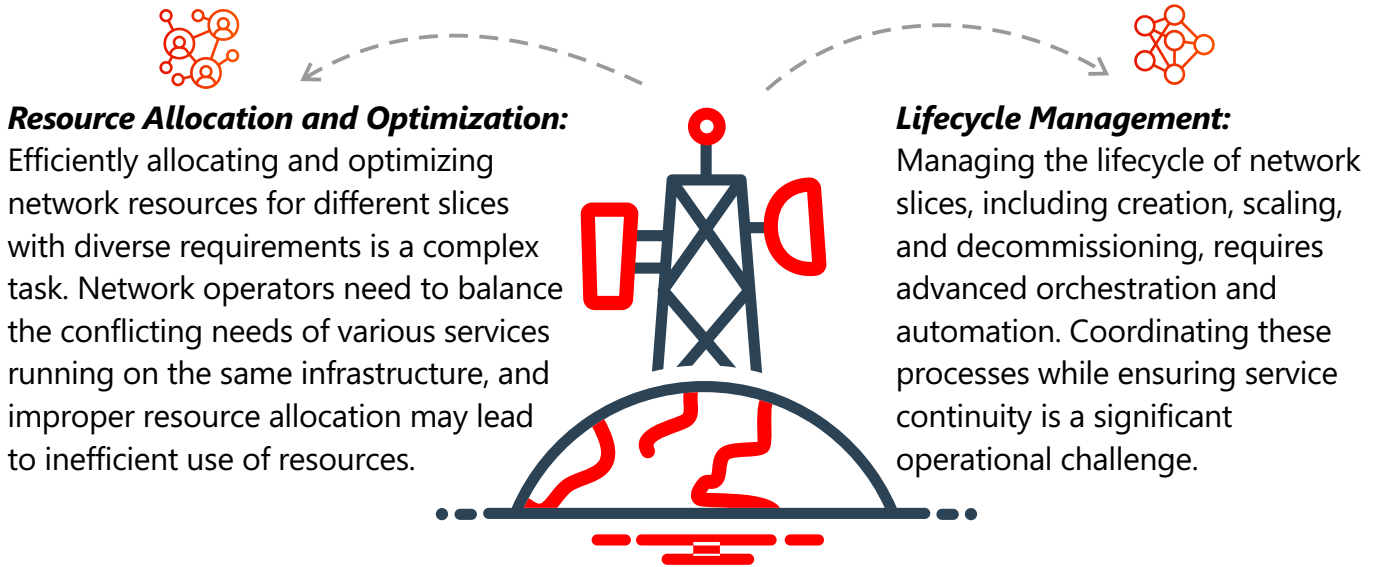
Challenges and Opportunities in Implementing Network Slicing

The 3rd Generation Partnership Project (3GPP) introduced Network slicing in Release 15 around June 2018. Network slicing is a key concept in the realm of 5G (fifth generation) mobile networks. It involves creating multiple virtual networks (slices) on top of a shared physical infrastructure. Each network slice is customized to meet the specific requirements of different applications, services, or user groups, providing a tailored and isolated network experience.

Full E2E network slicing includes implementation in the radio access network (RAN). While network slicing is possible on non-standalone (NSA) 5G networks leveraging legacy 4G LTE

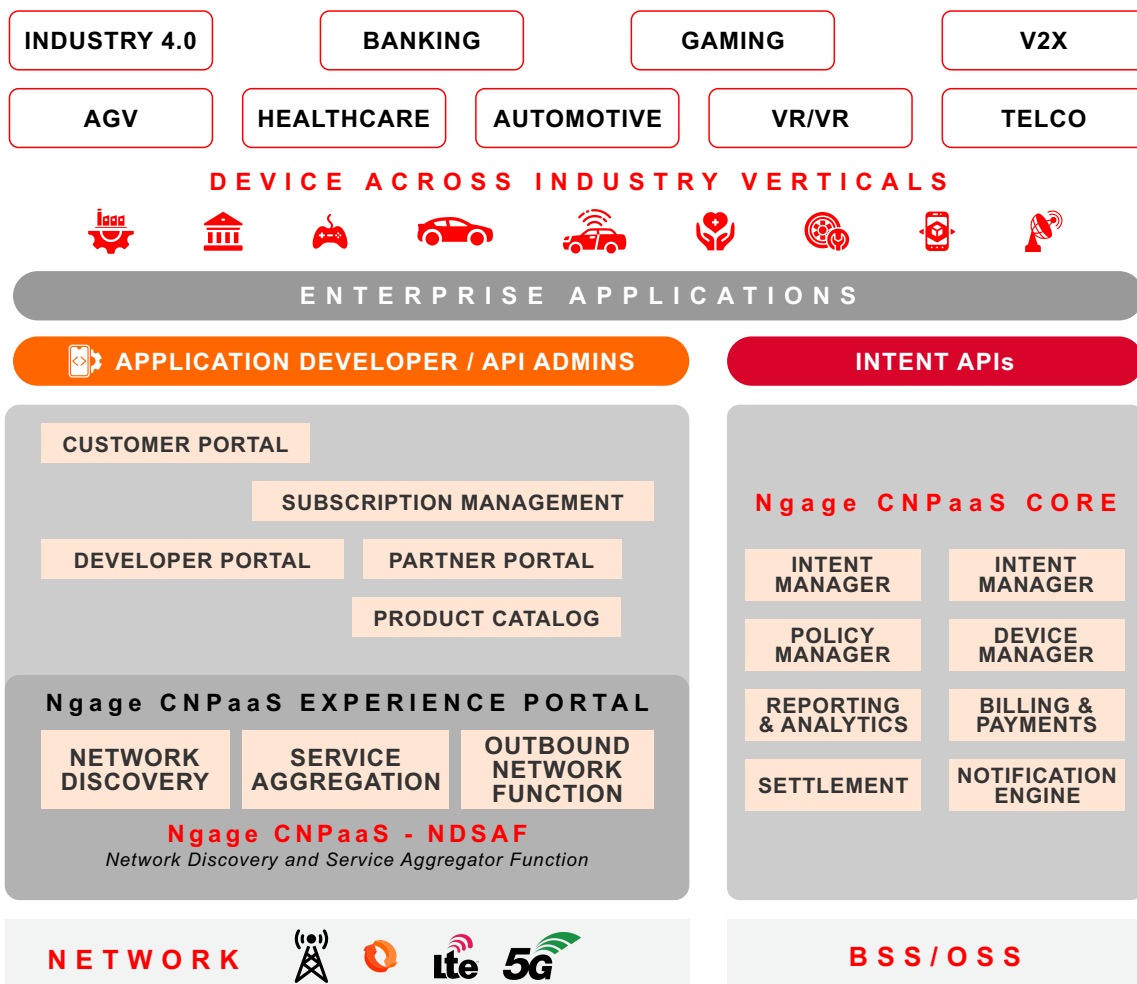
architecture, standalone (SA) RAN architecture is required to enjoy the full benefits. To date, leading telcos across the globe have adopted network slicing as it offers a range of benefits, but in contrast, there are also challenges and pain points associated with its adoption. Currently, there are many such as complexity, security concerns, interoperability, service assurance, regulatory and compliance, etc. but some of the key challenges are:





Operators are keenly looking for B2B2C opportunities to monetize networks in order to gain early ROI apart from retail B2C. Monetizing network slicing requires a flexible and innovative approach, tailoring offerings to the specific needs of different industries and applications. Additionally, collaboration with industry stakeholders and a keen understanding of market demands are crucial for the success of network-slicing monetization strategies.

Ngage CNPaaS

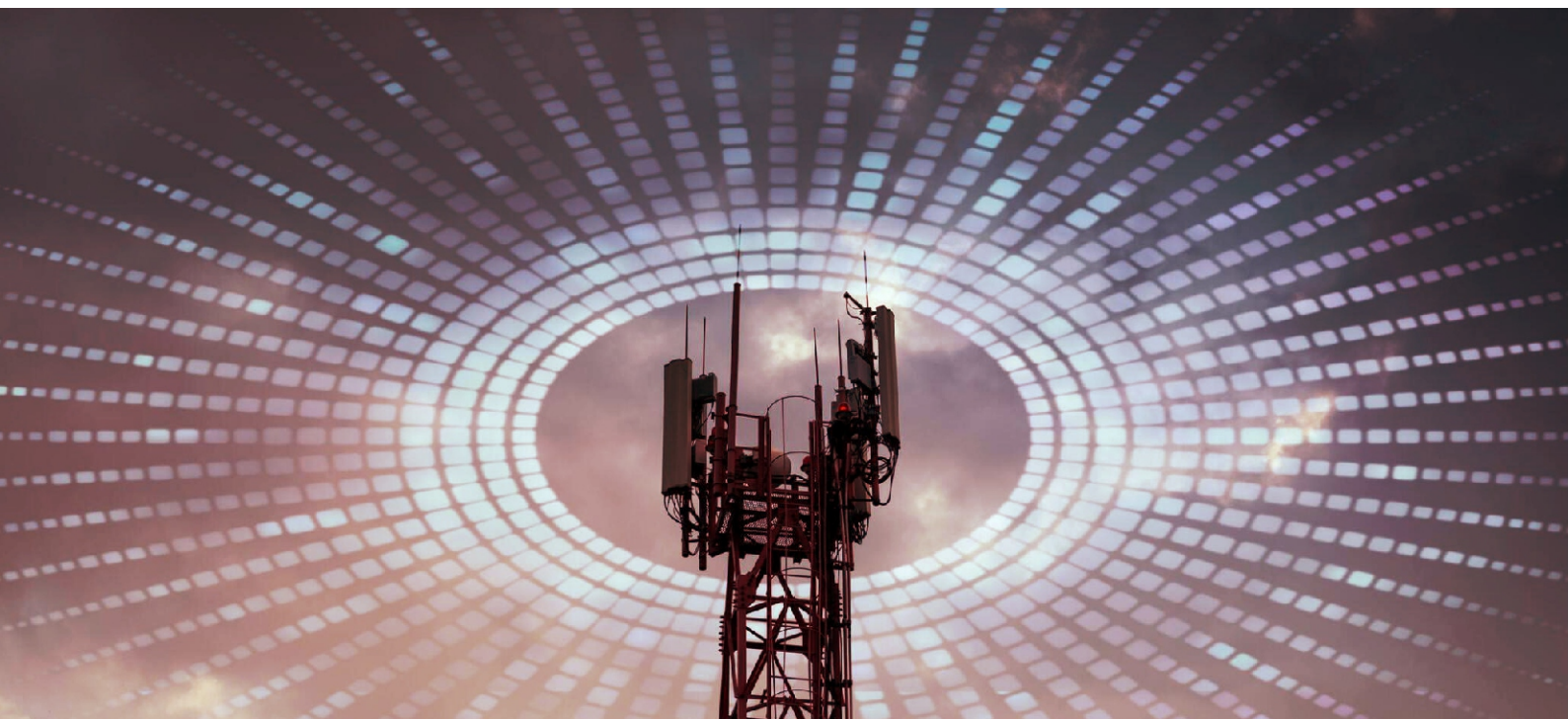


Comviva is revolutionizing the high-speed technology landscape with our groundbreaking platform Ngage CNPaaS. Designed to address the monetization needs of telcos, personalized intent-driven customer experience needs of enterprises, application modernization needs of devices, abstracting network needs of hyperscalers and application developers, Ngage CNPaaS offers a comprehensive solution comprising of an API-powered horizontal platform and developer-friendly marketplace to facilitate exchange of value among all the ecosystem stakeholders collaborate to deliver business-to-business (B2B) and business-to-business-to anything (B2B2X) use cases across industries and verticals, where X could be a device, user or an application.

With Ngage CNPaaS, application developers can utilize the network currencies in their software applications to enhance them using network intelligence like never before. Ngage CNPaaS offers developer-friendly tools and a low-code-no-code interface to considerably reduce the time to launch new applications & services.

Comviva Ngage CNPaaS is a one-stop shop for developing and launching new customer experience-impacting services. Leveraging the benefits of being an application enabler, it delivers intelligent insights and advanced analytics, empowering enterprises, and telcos to make intent-driven decisions for effective Monetization. Ngage CNPaaS implements modern Security postures like encryption on wire, OAuth2.0 Authentication, and Zero Trust Security, ensuring the utmost protection of sensitive data complying with standard bodies.

One of the key differentiators of Ngage CNPaaS is its simplicity and scalability by being network, industry, hyperscaler, infrastructure, device, and application agnostic. In summary, Ngage CNPaaS is a game-changing platform that empowers our key beneficiaries, namely enterprises, telcos, hyperscalers, and app developers, to harness network currencies and deliver enhanced applications at scale with an intent-driven focus.



Is Ngage CNPaaS alternate to 5G Network Slicing?

No. Ngage CNPaaS is complementing Network Slice.

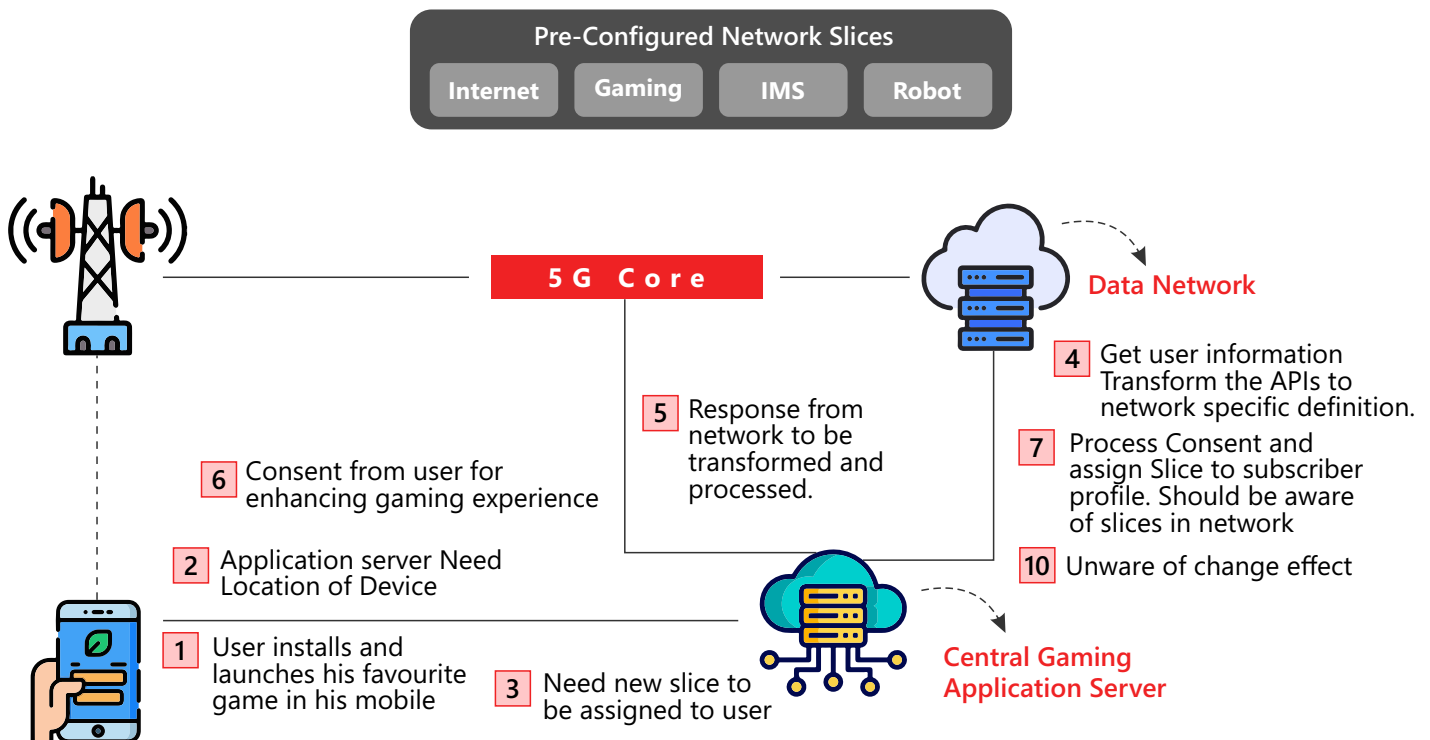
For telcos to extend their revenue streams i.e., monetizing network apart from the retail stream of Voice, Video, Data, and SMS is a need of the time. Especially, to achieve early ROI on 5G network infra-CAPEX. In the current market scenario, there is a missing or a half-baked functional block, which will enable the Application Providers/Developers to use network APIs (network currencies) easily with respect to the "Intent" required. That is where Telcos need "Ngage CNPaaS" to complete this ecosystem.

Let us take a common use case from the gaming industry, the gaming provider wants their application server instances hosted on several MEC sites to get lower latency and higher bandwidth for a seamless experience for its user.

Without Ngage CNPaaS

In the below-depicted scenario, the application server is required to host various functions not relevant to actual applications to consume network currencies. The majority of application

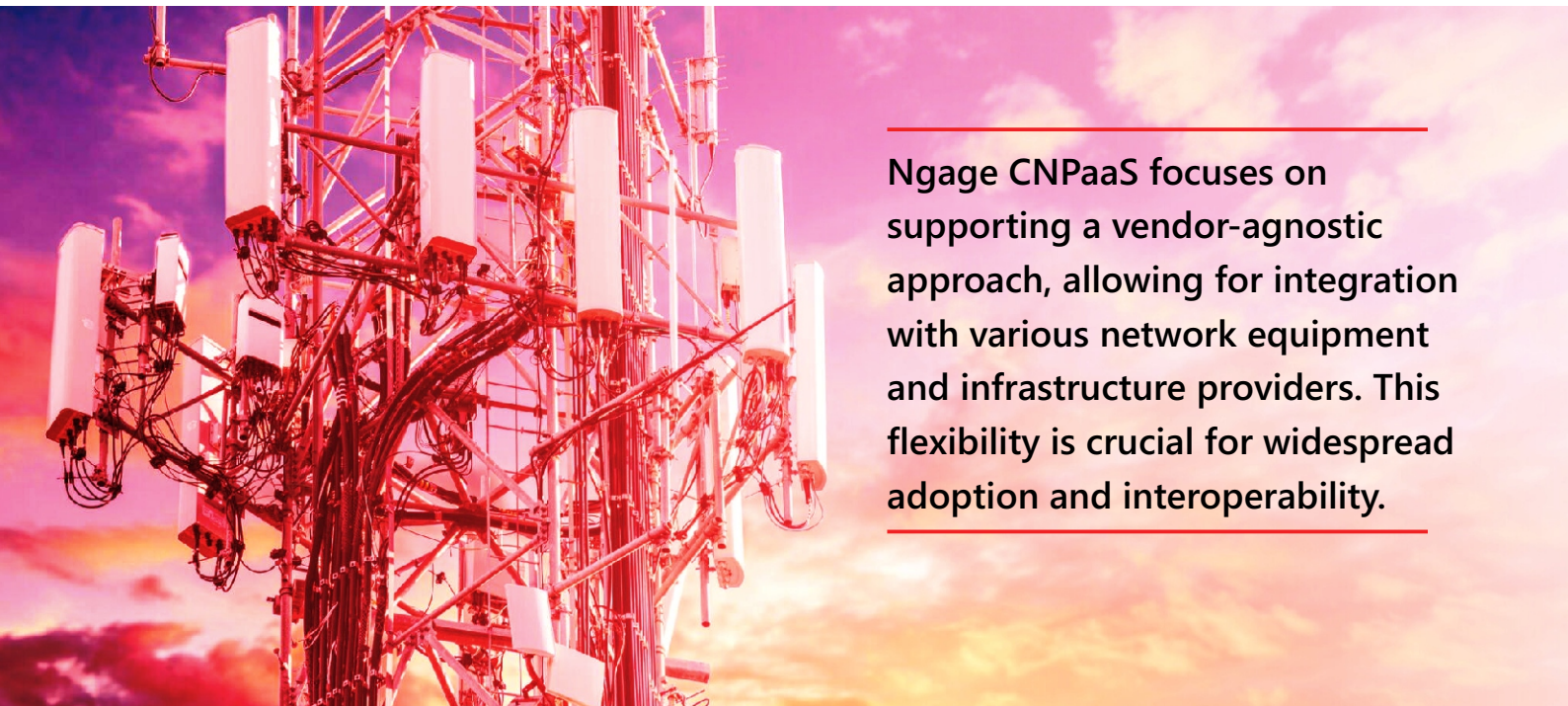
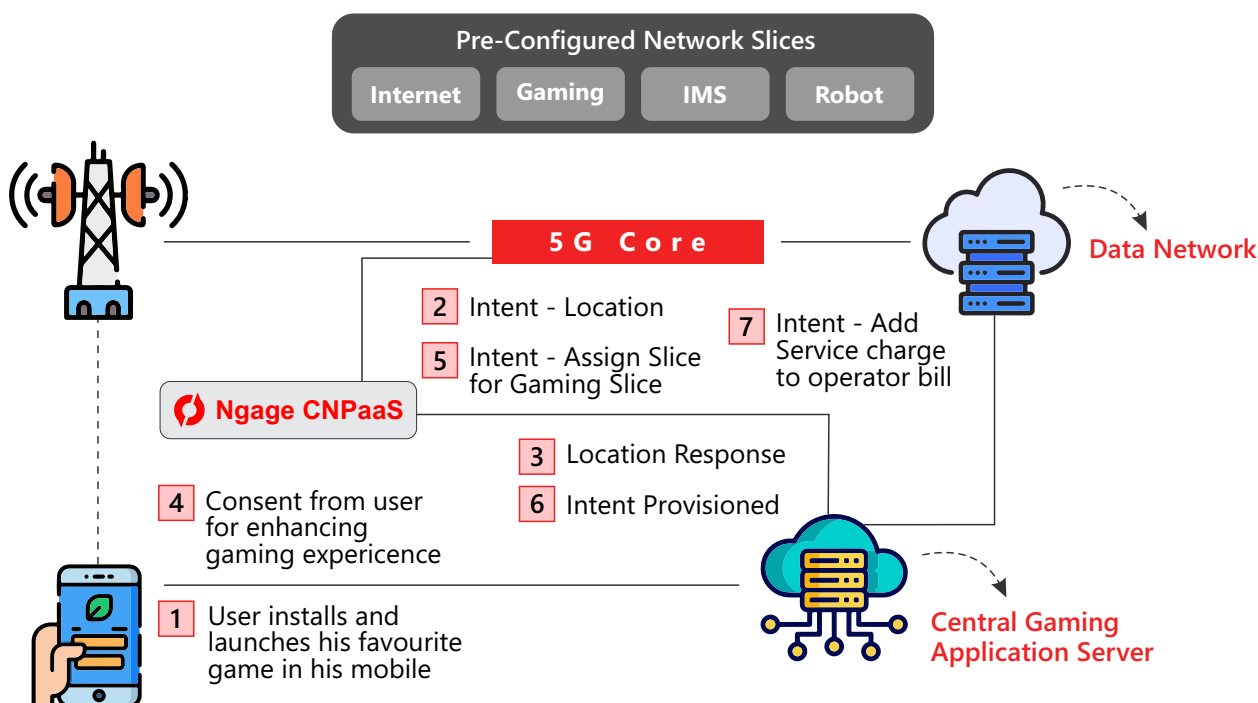
developers are not aware of network APIs and hence, they require a learning curve to utilize the network currencies.



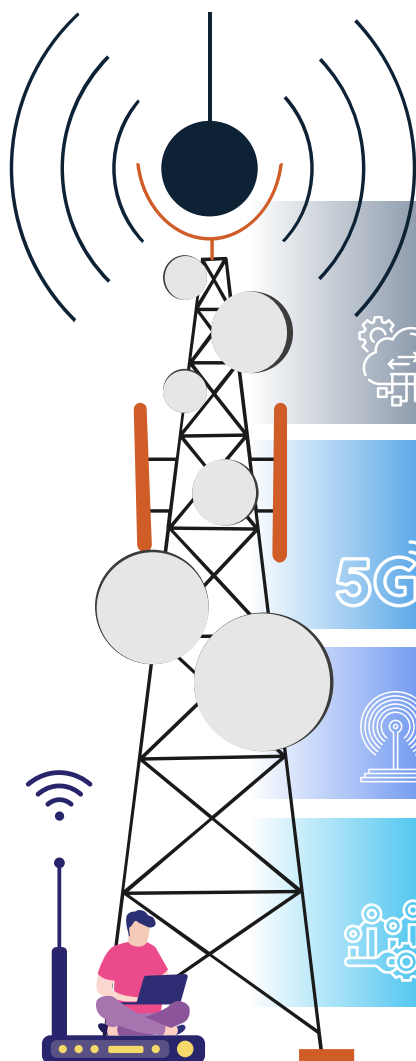
With Ngage CNPaaS

Once Ngage CNPaaS is deployed in the network, the Telcos allow any gaming vendor to integrate with Ngage CNPaaS for consuming the network currencies such as Device Location, Device Status, Assigning Network Slice, Carrier Billing, etc. Ngage CNPaaS simple intent APIs will allow the application developers to consume these

network currencies without any learning curve of network APIs. Ngage CNPaaS flexibility could also allow the application developers to bring in their own API definition to minimize changes at the application end, Ngage CNPaaS will transform the API to the required intent and integrate with the network.



Ngage CNPaaS focuses on supporting a vendor-agnostic approach, allowing for integration with various network equipment and infrastructure providers. This flexibility is crucial for widespread adoption and interoperability.



Understanding 3GPP API

Ngage CNPaaS offers Simple Intent APIs with easy definitions or can adapt to existing APIs provided by clients. Ngage CNPaaS handles the transformation seamlessly, eliminating the need for application developers to grasp telecom-specific intricacies.

Under Utilized Pre-Provisioned 5G Slices

Ngage CNPaaS integrates with application servers to reuse preconfigured slices efficiently. By subscribing to existing network slices, Ngage CNPaaS updates subscriber profiles to align with application requirements.

Network Slice Assurance

Ngage CNPaaS ensures network slice availability before provisioning, ensuring users receive the expected quality of service.

QoD (Quality on Demand) or SoD (Slice on Demand)

Ngage CNPaaS intelligently processes intents and dynamically invokes Quality on Demand or Slice on Demand based on application requirements, optimizing resource utilization and user experience.

To support end to end network slicing, Ngage CNPaaS could provision the following data sets to 5G subscriber profiles;

5G

NSSAI

Network Slice Selection Assistance Information The NSSAI is a concept that represents the set of parameters used to identify and describe a network slice. It includes two key elements:

Slice Differentiator (SD): It is a globally unique identifier that distinguishes between different network slices within a 5G network.

Slice Service Type (SST): It indicates the specific service or application type associated with a network slice. The SST provides high-level information about the characteristics and requirements of a slice, such as low latency, high bandwidth, or ultra-reliable communication.

4G 5G

URSP

User Equipment Route Selection Policy URSP is introduced as a way to manage network slice information for the UE. URSP is a network slice feature enabled by the PCF which informs the network slice status to the UE via the AMF. In 4G network systems, it was nearly impossible to install new services in the network for a UE. But through the URSP feature, 5G network operators can easily configure new services for a UE.

↑ ↓

TRAFFIC INFLUENCE

Application Function Influenced Traffic Routing The application server when invokes an intent towards Ngage CNPaaS, the Ngage CNPaaS could communicate with the PCF (Policy Control Function) either directly or via the NEF (Network Exposure Function), influence how traffic is routed through the network e.g. the Gaming application server can invoke intent for low latency and high bandwidth towards Ngage CNPaaS. Ngage CNPaaS communicates with the 5G network that the subscriber has just launched a gaming app, with instructions for the 5G network to send gaming traffic to local MEC resources.

In conclusion, the advent of 5G technology has ushered in a new era of connectivity and innovation, with network slicing standing as a cornerstone for realizing its full potential. While network slicing offers unparalleled customization and efficiency, its implementation poses significant challenges, from resource allocation complexities to monetization strategies. Comviva's Ngage CNPaaS emerges as a transformative solution, complementing network slicing by simplifying access to network APIs, streamlining intent-driven decision-making, and empowering stakeholders across industries.

With Ngage CNPaaS, telcos, enterprises, hyperscalers, and application developers can harness network currencies with unprecedented ease, driving innovation, and accelerating time-to-market for new services. Its vendor-agnostic approach and emphasis on simplicity and scalability make it a game-changing platform poised to unlock new realms of possibility in the 5G era and beyond.

Embrace the future of connectivity and innovation with Comviva Ngage CNPaaS. Contact us today to learn how Ngage CNPaaS can empower your organization, streamline network operations, and unlock new revenue streams in the dynamic landscape of 5G technology. Together, let's shape the future of networking and redefine possibilities.





Comviva simplifies business complexity. Our innovative portfolio of digital solutions and platforms brings greater choice, faster time to market and flexibility, to better meet the evolving needs of our customers as they drive growth, transform, and bring efficiency. From maximizing customer lifetime value to enabling large-scale digital transformation, we partner globally with organizations in the communications and financial industry to solve problems fast and transform for tomorrow. Comviva solutions have been deployed by over 130 Communication Services Providers and Financial Institutions in more than 90 countries and have delivered the benefits of digital and mobility to billions of people around the world. Comviva is a completely owned subsidiary of Tech Mahindra and a part of the Mahindra Group.

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