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# Democratizing Network **Access** in the 5G Era to Accelerate Telcos' Beyond Connectivity Ambitions

# Executive Summary

The increasing interest in 5G from Telcos, Hyperscalers, Industries, Governments, and Enterprises signals a collective belief in the potential value it brings to the community. Unlike previous generations, 5G is interpreted, defined, and executed by a diverse ecosystem rather than just influential bodies. With the rising prominence of Application Programming Interfaces (APIs), the landscape of telecommunications is undergoing a transformative shift. Historically, telecom APIs faced challenges due to technological complexities and a lack of global standardization. However, recent initiatives are concentrating on simplifying and standardizing APIs, making them uniform across service providers to appeal to a broader market.

The consumption of 5G beyond data pipe is now possible with significant efforts underway in standard bodies like 3GPP, CAMARA, etc. and technology forums such as GSMA, 5G FF, and ETSI. The beauty lies in the collaboration across these fronts to make 5G a platform for innovation, helping all the ecosystem players to flourish and take the whole industry forward.

The introduction of Network APIs presents a challenge but also an opportunity for telcos. The demand for advanced applications such as AR/VR, AGV/AMRs, AI, and the Metaverse, along with enterprise applications like Industrial IoT, necessitates a more active role for telcos in offering differentiated network control and access to previously unavailable services. The emergence of programmable networks has paved the way for API-driven networks and the 5G economy beyond connectivity.

In summary, 2024 is sure to be an inflection point in determining the direction of Network APIs enablement and their broader community adoption. The industry is at a crossroads where collaboration, standardization, and strategic decisions will shape the future of telecom operators in the evolving landscape of connectivity and application development.

# Network APIs: Opening the Doors to Innovation

It is clear to the telcos by now that if they must move into the tech-co image in their attempt towards digitization, network APIs are the wave they should ride on to make the most of it while it rides high. With the network APIs exposure, every telco is realizing the potential and taking steps towards announcing partnerships, PoCs with their enterprise customers to prove the possibilities and a better network experience.

**How are these network capabilities accelerating innovation and why the buzz around possibilities?**

Network being an underlying necessity every device and application connected to the network potentially has access to them. Movement of telcos towards digitizing their network and converting them to software components that understand APIs, has opened a massive opportunity to any application/ device/platform that can talk the API language

**Device and User Details**: Network APIs provide real-time data, including user identity, device status, and precise location, facilitating seamless integration across industries.

**Fraud Prevention and Security**: APIs offer advanced tools like SIM verification and network-based identity verification to combat fraud and ensure secure transactions without traditional methods like OTP.

**The API Advantage**: By granting external systems access to network capabilities, telcos are becoming innovation enablers, providing businesses with programmable network features that fuel growth and new applications.

**On-Demand Network Control**: APIs enable businesses to dynamically adjust bandwidth, reduce latency, and optimize network performance for mission-critical applications (e.g., online gaming, telehealth, smart manufacturing).

**Innovation Use Cases**:

- **Autonomous Factory Robots**: Real-time video streaming and bandwidth control for AI-based surveillance.
- **Seamless Financial Transactions**: Intelligent network verification bypassing OTP for faster, secure payments.

Such possibilities could open the doors to better solutions solving small but critical industry problems that drive increased adoption and hence consumption of such network APIs.

# Matching Device/Application Needs with API Solutions

| APPLICATION/ DEVICE NEEDS | NETWORK API | USE CASES |
|---|---|---|
| Provide hyper-precise device location without GPS and verify geo-fencing. | Location on-demand | Fleet Management, Connected Cars, Fraud Detection |
| Determine if a device is roaming or out of its connectivity zone, track availability. | Device Status | Roaming Status check, Asset Tracking |
| Verify if a SIM associated with a device has been swapped. | SIM Swap | Fraud prevention and detection |
| Validate device ownership for login, bypassing OTP authentication | Number Verification | Mute authentication, Fraud detection |
| Get the unique identification of user device such as IMEI or IMEI SV, IMEI TAC, manufacturer details. | Device Identifier | Verify legitimate device user, Detect stolen devices, Enhanced security |
| Boost bandwidth, improve latency, or stabilize throughput for applications that are uplink and downlink intensive. | Quality of Service on-demand (QoD) | Online Gaming, OTT video streaming, Virtual training, Tele-health, Remote assistance |
| Verify possession of a device by sending an OTP through SMS and validating it afterward. | OTP Validation | Carrier billing verification, Secure application login |
| Capture the privacy consent of personal information (PI). | Identify and consent management | End User Privacy Compliance and Management, KYC Validation |
| Influence the traffic routing from the user device toward the Edge instance of the Application | Edge Cloud | Optimizing traffic for latency-sensitive applications like connected cars or healthcare networks |
| To enable network carrier to take care of billing payments or follow-up payments for subscriptions on the go. | Carrier Billing | Subscribing to OTT platforms, in-app purchases, Mobile payments |
| Improve performance for latency and bandwidth-sensitive applications by influencing traffic routing. | Traffic Influence | Connected cars, Route traffic for bandwidth sensitive application demand in hospitals or OPDs |

## Understanding the Current Landscape

In today's rapidly evolving telecommunications landscape, the introduction of network APIs is reshaping the ecosystem, bringing together multiple players such as telcos, aggregators, and enterprises. However, the industry still faces challenges due to fragmentation, where each entity operates in its own silo. Partnerships, therefore, are essential to overcome these barriers and enable seamless innovation.

### Ecosystem Breakdown:

**Telecom Operators:**
Telcos are at the heart of the network API revolution, as they hold the core network infrastructure. By exposing network APIs, telcos can offer external integration to various industries. However, telcos must work closely with other ecosystem players to make these APIs widely available and usable.

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**Developers**
Developers play a critical role in making network APIs accessible to enterprises. They act as the bridge between telecom operators and the enterprises that use these APIs. Developers are pivotal to the adoption of APIs, as they drive the explore, test and deploy iterations for successful app integrations and hence usage for enterprises.

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**Enterprises:**
Enterprises are the consumers of the services enabled by network APIs. They leverage APIs to enhance their business operations, innovate new services, and improve customer experiences. For enterprises, network APIs unlock value in the form of increased efficiency, automation, and innovation.

This lack of cohesion hinders the seamless integration of network capabilities into innovative services and applications, thereby impeding the realization of the full potential of democratized networking in the 5G era.

More importantly, partnerships play a pivotal role in overcoming the challenges inherent in the fragmented network ecosystem. By addressing issues related to network discovery, integration, and monetization, partnerships streamline access for application developers and pave the way for seamless innovation. Traditionally, telcos have focused primarily on providing connectivity. However, with the advent of APIs, they are now uniquely positioned to harness their network assets to offer a diverse array of services beyond mere connectivity.

Through strategic partnerships, telcos can combine their deep understanding of networks with their partners' expertise in crucial areas such as network abstraction, intent fulfilment, and security. This collaboration empowers them to co-create innovative solutions tailored to the specific needs of enterprises across various industries. By leveraging these partnerships, telcos can unlock previously untapped revenue streams from their network services.

Nevertheless, realizing the full potential of these partnerships necessitates collaboration across industry boundaries. By capitalizing on synergies between telcos, their partners, and other stakeholders, the industry can foster an environment conducive to innovation and growth, ultimately driving the democratization of networking in the 5G era.

# Democratizing the Network Access Beyond Connectivity

Imagine a world where intelligent infrastructure seamlessly integrates with connected devices, where businesses can tailor network configurations on-demand, and where developers unlock revolutionary applications without navigating complex telecom APIs. This is the vision of a democratized network, and it's a vision fuelled by the transformative power of platforms that empower applications and devices to dynamically control and tailor the network experience in real time.

However, the journey to maximize network potential is paved with challenges. Traditional network management remains siloed, rigid, and often inaccessible to external parties. Telecom APIs have not been successful yet due to network complexities, creating a significant barrier to entry for businesses and developers seeking to innovate. As a result, the true potential of telco network infrastructure – its ability to unlock new services, streamline industries, and empower individuals – remains I like this.

Having said that, we cannot ignore some network relevant challenges that businesses face that are yet to be resolved. Technical challenges to implement APIs include consent management, GDPR guidelines across the globe and net neutrality as per country regulations and law.

Business challenges include siloed organisation (CIO led organizations being B2C focused, CBO looking at B2B, whereas CTO led organizations are technology focused. Democratisation must cut through all these layers to enable and capitalize on the programmable network.

## Making it accessible to all

There is a need to capitalize on the power of advanced networks like 5G and redefine how future applications can access and consume network currencies.

When we talk of Democratized Network, the dictionary meaning of the word 'Democratize' refers to 'making something accessible to everyone'. In the context of this whitepaper, when we say we want to democratize the network, does it mean the network has never been available to its end customers until now? If yes, what was the missing part of the puzzle?

Network currencies even if telco assets, have not been leveraged to capitalize on them. A very good example is the data monetization that was lost to other players in the market. Telcos typically are a closed community with the network access and knowledge residing within them for all these years. This worked in their favour to be the connectivity masters of the world and experts on networks then. But with the network APIs being exposed in the 5G today, the market is slowly moving towards making networks more programmable, query-able, and controllable.

With this, the dynamic on how to capitalize this capability has become a stumper. Now more than ever telecom operators are realizing the value of these network assets that could bring efficiency, productivity, security and safety for its enterprises and new revenue streams for themselves.

**Democratizing the network with 3 perspectives viz:**

- Democratize to be a solution to enterprise problems (Enterprise POV)
- Democratize to simplify network APIs (Developer POV)
- Democratize to productize network assets (Telcos POV)

# 1 Democratize to be a solution to Enterprise Problems – Enterprise POV

When we speak of Enterprise problems, it is a broad spectrum of the many difficulties that enterprises face spanning industry verticals like Media and Entertainment, Manufacturing, Mining, Supply chain and Logistics, Banking, Healthcare, Education and E-Commerce.

Broadly the top challenges almost every industry has been facing are - shortage of skilled labour for the job, pressure to reduce overall OPEX, competitive pricing in the market, Supply chain blind spots in order management, shipment/ material tracking and operational efficiencies.

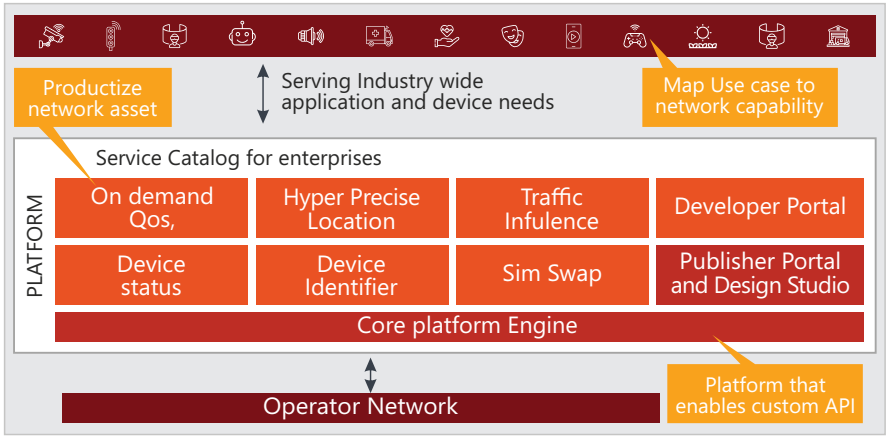
**Finding solutions:**

New processes, new set of intelligent devices and applications have come up to attack some of these industry problems viz. technologies like AR/VR, cameras with better resolutions, robots, drones, AGVs that understand commands, AI/ML technologies that enable operations in absence of humans. So, network performance has become critical to make or break the application experience for the end users, rather than being just infrastructure that provides connectivity. Until programmable network came into being there was no thought around changing, manipulating the network to suit user needs on an on-demand basis.

The very notion of advanced networks being a programmable, makes several network assets to be available at the user's fingertips, democratized for enterprise benefit, which was not a possibility before.

What will help democratize network for Enterprises?

EXHIBIT 1




**Productize network asset**

Making a Network Asset – an API available to be sold as a unit, that makes business sense for the consumer with a clear implementation and benefit matrix. Marketplace like platforms with detailed and categorized API catalog would drive subscriptions and usage for such APIs.

**Map use case to network capability**

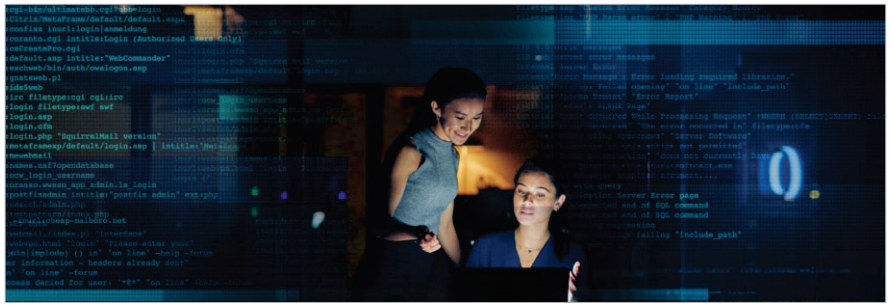
A problem + solution story will help make consumption a reality, rather than elaborating a network capability which may not be relatable in the face of enterprise challenges. Selling use cases and not just APIs is the way forward as API adoption is use case centric.

**Platform that enables tailored API and workflow creation**

Every enterprise/ business has unique problems and unique solutions that could be cost, time and effort sensitive for them. A platform that allows the enterprise to develop their API tailored to suit their use case need is essential, to truly reap the benefit of programmable networks.

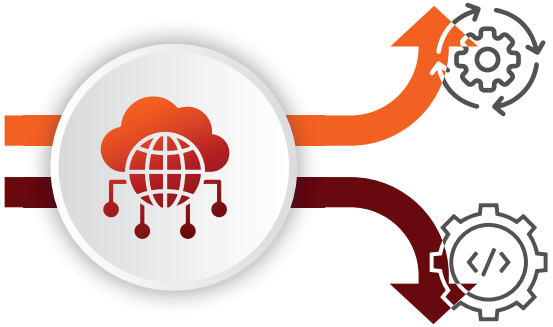
## 2 Democratize to Simplify Network APIs – Developer POV

Non-telco or say non-network experts have always shied away from learning and getting their hands dirty in such a complex domain. It is the network complexity that both scared developers away from touching and secured a niche for the telco experts. With the changing scenario there is a need to invite attention and interest in the same complex network as programming the network for business specific use cases is a possibility. The new telco ecosystem will soon thrive not just on the infrastructure business but also on how the programmable network is adopted and integrated with enterprise applications, exploiting the network currencies as rightly called for their monetization potential. It is observed that developers tend to trust Hyperscaler as an exemplar of simplified tools to build their applications. Tapping into the large developer community of these Hyperscaler would make network API platforms accessible and adoptable to large extent. The standardization initiatives like GSMA Open Gateway have made it even more lucrative to turn developers towards these networks' APIs highlighting the potential of a better application experience for the end users.



### Intent API for application driven request fulfilment

If developers from different industry domains want to use network APIs to control network behavior for optimum application experience, they have no clue as to what network parameters should be used to get the expected application behavior. To bridge this knowledge gap, if the network API parameters are reduced and simplified for any developer to understand and integrate them, the API will be democratized, with more developers integrating with their applications, hence increasing consumption.



### Providing SDKs

In developers preferred programming languages, along with detailed documentation, sandbox environments for building, testing, and deploying solutions, and a community portal for knowledge sharing and collaboration, can significantly streamline the adoption of network APIs. These resources empower developers to quickly leverage network capabilities for diverse use cases while fostering innovation through shared learning.

## 3 Democratize to productize network assets – Telco POV

If we look beyond the underlying connectivity characteristic of the network, and now reflect on the telecom APIs, there can be a couple important opportunities that telcos lost of other competitors which were never anticipated to take away the network market. Telcos lost the GPS market valued at $ 22 BN until 2022, to the global Location services platforms even when network can provide a precise user/ device location when needed. The communication channels of calling and SMS were lost to chat messenger that emerged in 2009 and has an active 2BN user base to date, which could have been the calling and SMS revenue that telcos may have banked on.  A classic was the OTT platform revenue loss again that banked on increasing user base, using the very underlying data network, leaving no revenue share for telcos. Conversely as a learning from these examples, there are 2 things these players did right:

### Use the RIGHT channel

For any product introduced in the market, after a deep understanding on the target segment that is addressable and serviceable, a very big onus of the product success lies in the channel through which the product is made accessible to the users/ consumers/ enterprises. Choosing a channel that makes it cumbersome or difficult for consumers to reach makes the product less attractive, irrespective of what ground-breaking features the product brings to the table.

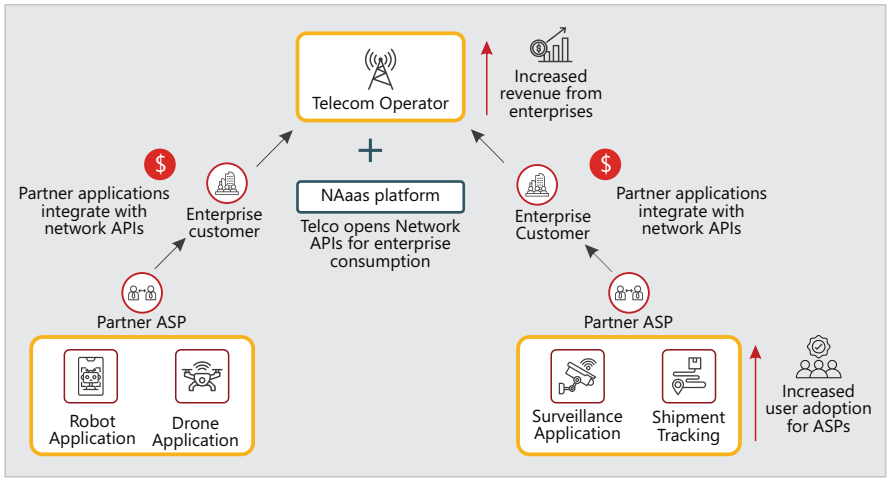
Considering the complex ecosystem of telco services consumption and introduction of the network APIs with 5G, the role of Hyperscaler and communication channel partners has become crucial. A marketplace where multiple vendors and operators can publish their APIs and make them available for developer and enterprise consumption is how truly the consumerization of such APIs will happen.

The huge enterprise customer base with these players makes it an important enabler for Telcos to enter the market, build their own user base and eventually make business out of it.

### Use the RIGHT business model

Compelling products and services often lose to each other not because one product is better than other, but only because the business model, initial commitment or value for money is better than the other. Business models and commercials usually left at the end of most customer conversations, make it the most important influencer when deciding which product, the customer would choose.

EXHIBIT 2




Considering the niche market and an early adopter of network APIs, if customers are offered with least initial investment until they attain a certain number of user base or revenue benchmark, more enterprises would sign up and will be open to experiment for vertical specific use cases.

For partners, a value proposition that helps them earn more users thus opening a new revenue stream would excite them to work together with telcos in making the enterprise success story a reality.

## The Role of Aggregator for Accessibility & Value Creation

As the industry increasingly focuses on addressing end-customer needs, the value creation across the ecosystem becomes paramount. Service providers must adopt a multi-faceted approach to market their offerings effectively, ensuring widespread adoption of modern network APIs.

Amid ongoing standardization efforts and integration challenges, the role of the aggregator emerges as crucial. Aggregators serve as facilitators, supporting continuous innovation and delivering substantial value to all stakeholders within the ecosystem.

An aggregator is a standardization layer or a unified platform sitting on the network across multiple telco operators to enable API adoption services by enterprises leveraging network APIs. Telcos attempting to take the aggregator route is counter-intuitive to bringing other telcos players to collaborate on the same, killing the competition. Hence, third-party aggregators are ready to exploit such an opportunity to bring enterprise customers for API adoption across multiple operator networks.

Democratizing the network entails unlocking significant value for key players:

**Enterprises**
benefit from accessing network capabilities to craft unique solutions, expand their reach to new customer segments, and enhance operational efficiency.

**Telcos**
stand to monetize their network assets beyond traditional connectivity, gain access to innovative solutions, and nurture a thriving developer ecosystem.

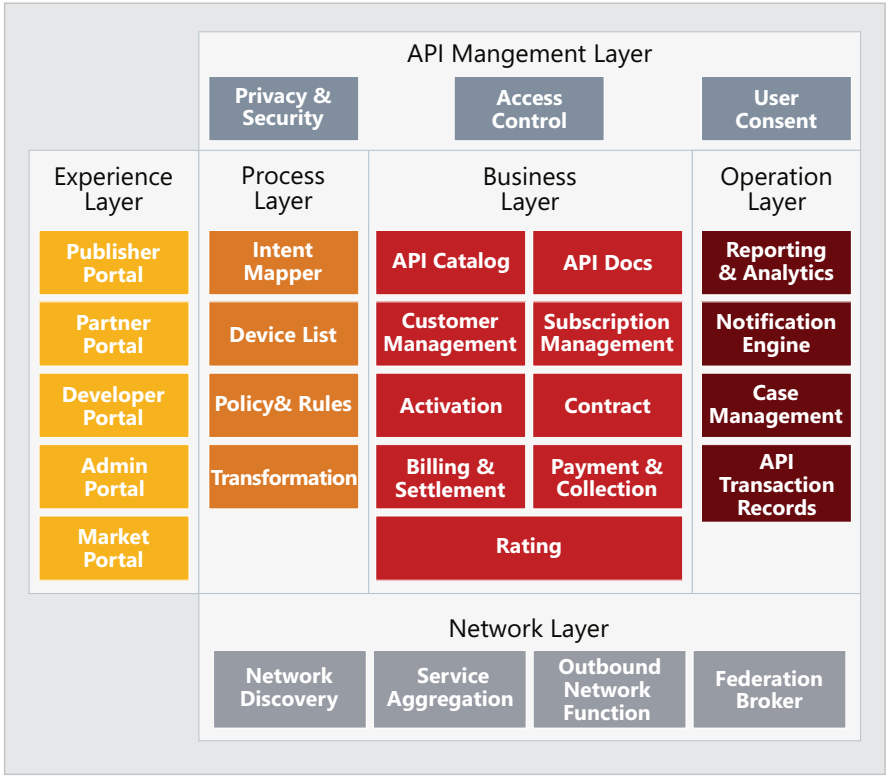
**Developers**
are empowered to leverage a diverse array of network APIs, enabling them to build innovative applications, introduce new services, and seize revenue opportunities.

Within this framework of high-value aggregation, sophisticated platforms like **Comviva NGAGE CNPaaS** emerge as game-changers. NGAGE CNPaaS is a Gen-AI-enabled Communication and Network Platform as a Service, designed to help telcos unlock the full potential of their programmable assets. This includes network capacity and capabilities, offered through universal, simplified, and standardized APIs that enable scalability and on-demand services.

With intent-driven, network-aware, developers-first approach: **NGAGE CNPaaS** is your all-in-one platform for Communication and Network as a Service (CNPaaS), designed to help telecom companies monetize their network assets and deliver superior customer experiences.

This democratization fosters an environment of innovation and collaboration, where businesses can leverage network resources to create value-added services, reach new markets, and drive operational efficiencies.

EXHIBIT 3



# The Road Ahead: Growth Drivers & Endless Possibilities

For network APIs to be utilized to their full potential and drive the growth in the market the way it promises, there are certain levers that would be responsible:

## API Standardization

The newer generation of networks which are now "API-fied" are still in their nascent stage both in terms of adoption and consumption. Every operator may or may not have the same API structure as per their proprietary preferences and business needs. Only if APIs are standardized, they can be leveraged across networks and geographies. Enterprises would find it tedious to integrate with different APIs across different operators if they are scattered and can become a blocker for their consumption.

### Why is it a growth driver?

- **Telcos are seeking unified approach**:

  This is the first-time operators are seeing value in collaboration, as everyone is trying to solve the same problem, and the ground on which one solution could be better than other is use case and business specific. To bring these APIs to a common ground GSMA Open Gateway It's a framework of common network APIs designed to provide universal access to operator networks for developers (source: GSMA). A sweeping consen sus has been reached within the industry, the number of signatories to the Open Gateway memorandum of understanding now has **53 operators** representing 245 networks and more than two-thirds of global mobile connections.

- **One API for many networks:**

  Every operator network has a specific proprietary API structure which could differ from other operator networks. If Developers are given simple APIs that follow network standards but can be tailored for their business problem, their adoption will be easier and faster.

- **Value across borders:**

  As applications span geographies and connect people across the world, network capabilities must also reach them wherever they are connected via a network. Imagine the hassle a developer has to go through if every operator has a different API structure bringing about the same network capability that business expects.

# API as a solution bundle

It is debatable if an API is a product or a service, as the interpretation changes with its context. For the scope of this whitepaper, although network APIs are the focus, they are the channel or medium through which telcos can deliver value to the customer. Network APIs that solve a problem statement or use case becomes 'the solution' that brings value to the customer.

## Why is it a growth driver?

→ **Customers want solutions not APIs:**

Considering the POCs across the globe on network capabilities it is no surprise today that providing a QoS boost or location of the device on demand is possible if you have the API. But identifying that exact pain point for the customer and making network capability a compelling need for the application in demand only, will drive its consumption.

→ **Use Case will determine adoption:**

Irrespective of the maturity of standardized APIs, in absence of a compelling problem statement and clear solution, no enterprise will be able to solve any problems for themselves, nor would telcos capitalize on it.

# Developer Collaboration

With the explosion of applications, cloud native technologies, inclination towards AI/ML and automations, every enterprise across industries is looking out for technological competence along with increased revenues and reduced costs. Increase in the developer community is increasing the number of applications that solve day-to-day customer problems in both B2B and B2C sectors. Any API based product that has been able to harness the developer's strength has made it big in the market.

## Why is it a growth driver?

→ **APIs for everyone:**

Network complexity has hindered adoption by the majority of developer community. But if simplified APIs that require no telecom knowledge are provided with tools and levers to build, test and deploy those APIs, more and more developers will turn to network APIs to build better applications.

→ **Ease of availability:**

An API play on channels like marketplace, aggregators and in collaboration with Hyperscaler would make a lucrative option for businesses to adopt network APIs. This way they can pick and chose only the APIs and capabilities that matter to their business, instead of worrying about purchasing an entire platform which is yet to prove its potential to the enterprises. Hyperscaler will be a crucial channel to reach a huge developer community across the globe who will be the advocates of network APIs and will exactly know where in their business use cases can they be utilized.

→ **Unending possibilities:**

If an application developer is exposed to the possibilities of what network APIs could achieve, it would enable applications to make use of capabilities like precise location on demand, OTP-less authentication, device status and so many more into their applications across domains. Inclusion of such capabilities not only helps telcos to increase their outreach but makes the applications desirable by end consumers who look for better user experience.

# Conclusion

The democratization of network access beyond mere connectivity in the 5G era presents an unprecedented opportunity for stakeholders across industries. Telcos, developers, and enterprises are converging to unlock the transformative potential of network APIs, paving the way for innovative solutions that address real-world challenges and drive growth.

The evolution of telecom APIs signifies a paradigm shift in next-generation businesses, characterized by collaboration, standardization, and strategic partnerships. As telcos embrace the role of solution providers rather than just connectivity providers, they unlock new revenue streams and cater to diverse enterprise needs.

For developers, simplified network APIs offer a gateway to unleash creativity and build applications that leverage network capabilities to deliver enhanced user experiences. With the right tools and collaboration, developers can harness the full potential of network APIs to create value-added solutions across industries.

Enterprises stand to benefit from accessing network capabilities tailored to their specific needs, driving operational efficiency, and unlocking new revenue streams. By embracing network APIs, enterprises can innovate faster, expand their reach, and stay ahead in an increasingly competitive landscape.

As the industry moves towards standardization and collaboration, the future of network APIs holds immense promise, and platforms like **Comviva NGAGE CNPaaS** (Communication and Network Platform as a Service) are pivotal in this evolution - bridging the gap between network capabilities and application requirements, simplifying service delivery, and accelerating time-to-market for innovative solutions. With concerted efforts to address integration challenges and capitalize on growth drivers such as API standardization, solution bundling, and developer collaboration, the democratization of network access will continue to fuel innovation and drive value creation across the ecosystem.

In 2024, the democratization of network access beyond connectivity in the 5G era represents a pivotal moment in shaping the future of advanced networks. With the market potential estimated at 22 billion over the next 5 years from 5G APIs according to STL Partners, the momentum for network API adoption and innovation is set to accelerate, propelling the industry towards a new era of connectivity and collaboration.

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