GSMA
Foundry

OCTOBER 2023
CASE STUDY

Making
Networks Easy to Programme

Nokia's Network as Code platform promises developers easy access to network capabilities

Executive Summary

Nokia is working with mobile operators and developers to explore how best to tap the versatility and advanced capabilities of 5G technologies. At the Nokia Arena in Tampere, Finland, for example, Elisa and Nokia have deployed a programmable 5G mmWave network to showcase advanced solutions, technologies and services for sports, entertainment and other events.

"There are different parties that can innovate and utilise the network and use it for the purposes that are important for them," explains Tiina Höckert, Head of Mobile Access at Elisa. "This network is so open and we can use it in different ways. It brings a lot of possibilities."

Nokia is looking to make it straightforward to programme a cloud-native 5G network to meet the connectivity needs of demanding applications. For example, a live high definition video stream might need enhanced throughput for a specific period of time or a remote control system might require low-latency connectivity. This kind of programmability would make it easier for mobile operators to monetise new software-based networks and open up new revenue streams.

To that end, Nokia has developed its Network as Code platform, which is intended to be a trusted two-sided ecosystem paradigm that abstracts network complexities and exposes developer-friendly interfaces that can be used to deploy apps across multiple public and private networks. Nokia is providing software development kits (SDKs) that remove the need for the app provider to know the details of how a network works or which provider is offering the service.

The Network as Code platform draws on the work of various industry consortia, such as the **CAMARA open source project** and the **GSMA Open Gateway** - a framework of common application programmable interfaces (APIs) for access to operator networks. The platform aggregates the CAMARA APIs employed by the GSMA Open Gateway initiative, so that apps can gain access to capabilities from multiple operators, without the developer having to set up a contractual relationship with each of them.

"Network as Code is our mission to simplify networks to provide a persona of a programmable nature to these developer communities and technology application partners, and let the 5G network participate and distribute its service chains," explains Jitin Bhandari, CTO and Vice President of the Cloud and Network Services business group at Nokia. He says the programmable persona is aimed at ecosystem developers and technology application partners working in the enterprise, Web 2.0, Web 3.0, Industry 4.0 and operational technology domains.

Nokia is working with several network operators, such as Elisa, and application developers to establish working prototypes. "Each one of these are tied to industry or consumer-related use cases with real world relevance," adds Shkumbin Hamiti, Head of Nokia's Network Monetisation Platform Business Unit. "True to the spirit of a marketplace ecosystem vision, it is an iterative process of collaboration to get the first few use-cases to take shape with each member making technical and business contributions."

At the **Nokia Arena** in Tampere, Finland, Elisa and its partners - Futurice, Valve, Tampere Technology Centre and Akun Tehda – have used the Network as Code platform to help build an augmented reality app that enables spectators to see in real-time how fast the ice hockey puck is travelling and the speed that the players are skating, and a virtual reality app that enables the user to experience the live action from different viewpoints. "Using this Network as Code type of platform has been very beneficial," says Risto Karhu of Valve. "It's the future of things."

New disaggregated networks are more accessible

The Network as Code platform is designed to take advantage of a shift in the way networks are designed. To drive reductions in capital spending and operating costs, operators are increasingly deploying disaggregated networks. That makes them addressable at more discrete, atomic levels. By exposing these disaggregated network capabilities in an accessible way, the Network as Code platform seeks to enable the development of applications that can fully exploit the potential of advanced networks.

Nokia says developers will be able to write applications that can leverage a wide range of functionality from many different networks across the world without needing to understand how they differ 'under the hood'. In turn, telecoms operators will be able to expose their networks, via the ecosystem, to app developers across all the markets where they operate. In short, Nokia intends Network as Code to offer a global two-sided value proposition when it is launched commercially before the end of 2023.

"For telecoms operators that are looking to move themselves to a higher position in distributed service chains, this enables them to do that by further opening up access to their networks for third party application development," explains Bill Stanley, Portfolio Manager at Nokia. "In turn, for application developers, this provides them unprecedented access to discrete network functionalities that they can incorporate into the applications that they bring to their enterprise and consumer markets."

> For telecoms operators that are looking to move themselves to a higher position in distributed service chains, this enables them to do that by further opening up access to their networks for third party application development

Bill Stanley - Portfolio Manager at Nokia

Hiding the underlying plumbing

Nokia stresses that the Network as Code platform is intended to be much more than an API (application programming interface) gateway. The goal is to deliver an easy-to-use interface for developers with little or no experience of harnessing networking capabilities. In many cases, the platform will bring together specific functions and capabilities from different parts of the network, abstracting the underlying "plumbing" for the developer.
For example, an SDK could combine functions and data from an operator's core network and an application server with quality of service information from the operations support systems (OSS). "This is not a simple task, but done correctly it will provide security, reliability, flexibility and convenience," notes Mikko Jarva, Head of Portfolio & Architecture for the Network as Code platform.

Nokia believes it has the in-depth networking expertise required to build this kind of service for developers. "To make this work, you have got to speak network-ese," says Mikko Jarva. "That means all of the different languages, all the different domains. Developers don't know what they don't know. You have to take all that complicated network stuff and translate it into something that can be digested by developers so you have got to know networks."

> Money needs to be able to flow between the participants in whatever form they ultimately decide is best for their business, and our platform will enable that

Bill Stanley - Portfolio Manager at Nokia

Opening up new revenue streams is an objective for all the members of this ecosystem. To make the platform as versatile as possible, Nokia wants to accommodate a wide range of monetisation and revenue sharing models. "Money needs to be able to flow between the participants in whatever form they ultimately decide is best for their business," explains Bill Stanley, "and our platform will enable that." He envisions most developers paying either by subscription or by API call volume.

But there could also be cases where the charging model is tied to the actual use case. "If I'm putting drones up for doing remote inspection services of oil refineries and every route that the drone completes successfully is charged, that's event-based," adds Bill Stanley. "So it could take lots of forms. If we're going to be the middleman, we have to facilitate and enable that, so that the money can flow."

Bringing about business behavioural change

As the technical work on the platform has matured, Nokia is now focused on really demonstrating the business value. "We feel there is as much a business behavioural change required here, as there is a technical requirement," explains Bill Stanley.
To bring about that behavioural change, Nokia is identifying potential use cases in specific industries. Once it is able to showcase the potential in this way, Nokia believes adoption could rise rapidly.

"There is a force-multiplier effect," says Shkumbin Hamiti. "As more operators and more developers participate to develop a growing ecosystem, then more reach and access can be achieved by all."

Nokia anticipates the first adopters are likely to be "telecom insider types" with established business practices related to networking capabilities. These developers are already participating in the telecoms ecosystem with some even working inside telecoms operators with large IT organisations.

Others will be working for third party independent software companies that are adjacent to the telecom industry space, and already bring network-centric products to market. This group may bolt capabilities from the Network as Code platform on to their existing propositions.

Nokia is also targeting developer groups inside of large enterprises. Bill Stanley notes that a large airline may have hundreds of developers using bespoke third-party platforms every day, "whether it's something like a CRM platform or an ERP platform and Nokia's Network as Code could become another platform that their company uses on a subscription basis."

> Whether it's something like a CRM platform or an ERP platform and Nokia's Network as Code could become another platform that their company uses on a subscription basis.

Bill Stanley - Portfolio Manager at Nokia

How the platform could evolve

As defined by the **GSMA Open Gateway** Initiative, the Nokia Network as Code solution is an aggregator platform that will interoperate with other aggregator and hyperscaler platforms to make it easier for developers and mobile operators alike to get access to each other.

While the first use cases of the Network as Code platform are taking advantage of the cloud-native capabilities and Network Exposure Function (NEF) interface of standalone 5G networks, Nokia ultimately plans to enable developers to harness the capabilities of all kinds of networks. In terms of use-cases, Nokia anticipates the initial quality on demand and device location capabilities will be very relevant to mobility-intensive industries, such as transportation and logistics. But over time, Nokia also expects to also see big uptake in healthcare, gaming and entertainment and high tech manufacturing.

About the GSMA

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

GSMA is a membership-led organisation where members collaborate with industry peers and stakeholders, engage in influential discussions, and drive industry-wide initiatives that address the most pressing industry challenges and opportunities. As a GSMA Member, you'll have a seat at the table where decisions are made, specifications are developed, and the future of mobile telecommunications is shaped. Join a global community of like-minded professionals and organizations who share a common goal of advancing the mobile ecosystem for the benefit of billions of people worldwide.

Find out more: gsma.com/membership

For more information, please visit the GSMA corporate website at gsma.com

Follow the GSMA on Twitter: @GSMA.

About the GSMA Foundry

The GSMA Foundry is the go-to place for cross-industry collaboration and making positive change happen, supported by leading technology organisations and companies. By bringing together members and key industry players, engaging, and unifying the end-to-end connectivity ecosystem, the GSMA is solving real-world industry challenges.

Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. This enables the mobile industry's mission: to connect everyone and everything to a better future.

Find out more, or submit a new project idea, at gsma.com/Foundry

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

www.nokia.com

About this case study