NOKIA

Enabling reliable Tele-driving with Network as Code

Network as Code platform powers Elmo tele-driving service

Powering safer drives with Network APIs

Autonomous and remote driving services are being trialed in cities around the world. One such service is being offered by Elmo in Estonia. Elmo's tele-driving service utilizes state-of-the-art technology, including advanced sensors, cameras, RADAR, and LiDAR systems to ensure precise navigation and situational awareness for the remote driver. The key to the safety of this service is assured mobile connectivity from the network. Any degradation to the network connection would introduce latency that instantly reduces the remote driver's reaction time. To achieve reliable connectivity, Elmo partnered with Nokia to integrate Nokia's Network as Code that uses Quality on Demand (QoD) to direct the 5G network to prioritize ultra-reliability and low latency for the Elmo service. This ensures that Elmo is able to operate safely and smoothly throughout complex urban environments.

Nokia-Elmo partnership uses Network APIs to deliver safe and reliable tele-driving services

Remote driving

Elmo Remote technology allows a remote tele-driver to fully control a car from virtually anywhere. These drivers operate from at a custom station that includes steering wheel, brake, and accelerator pedals, as well as dashboard controls and screen views taken by cameras in the car. From this station, remote operators are able to safely drive any electric vehicles that have been retrofitted with remote controls.

Renting in a snap!

Customers of the Elmo Remote service, such as rental companies, could deliver cars directly to their customers' homes. The customers would then drive them like normal cars throughout the rental period. Elmo saves them having to take public transit or a taxi to pick up and drop off their car. Elmo is also developing applications such as car sharing, robo-taxis, and autonomous vehicle fleet management.

Meeting safety concerns

One of the key safety challenges of remotely driven vehicles is network reliability. Even the smallest lag or latency in the communications channel could impair the remote tele-driver's reactions to events being shown on camera. Delays could put the vehicle, other vehicles, pedestrians, roadwork crews, and other road users at risk. 5G networks normally have plenty of bandwidth and lower latency, but if there are too many users in one cell, network traffic congestion can slow down the service.

Traffic congestion? No problem.

Unlike road congestion, network congestion can be managed. Through a button on the Elmo remote console which activates Quality on Demand (QoD) API, Nokia Network as Code enables the driver to immediately request more bandwidth and improved latency. On demand, the network connection is prioritized to ensure that communication delays regarding either brake or steering action as well as streaming video are assured at the highest level.

Elmo Remote partnered with Nokia to ensure a safe and reliable service

Elmo connectivity challenges

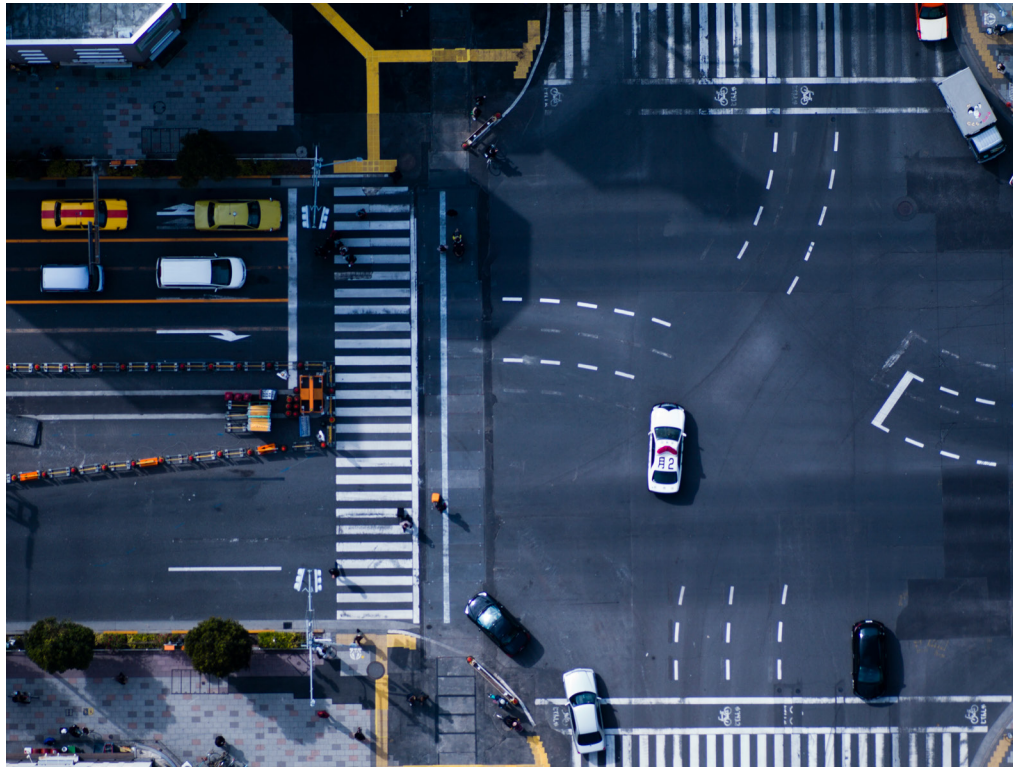
- Required consistent throughput for high video quality and assure low latency for precise feedback and control
- Complexity in managing connections across multiple network providers to maintain car connection anywhere

Nokia Network as Code solution

- Provides higher network quality on demand for video stream and low-latency control via API
- Aggregates access to multiple networks through a single interface for seamless management of cars across multiple countries and providers

Benefits to elmosolution

- Network cost efficiency—APIs enable on-demand access with regular service during non-peak times, and pay only for premium services as needed
- Meet regulatory concerns—able to demonstrate the complete safety of the solution



The Nokia Network as Code platform is the industry's leading API platform for programmable connectivity

Keeping it simple

Network as Code makes it easy for developers to embed APIs that control network quality, provide network data and insights, and insert other specialized network capabilities into applications like the Elmo tele-driving solution. Developers only need a few lines of code. Network as Code is designed with a 'developer-first' mindset, and comes with a comprehensive developer portal, sandbox environment, and GenAI-based code assistant.

Flexibility to meet varying business needs

With Network as Code, easily scale API usage with our transparent pricing regardless of whether you're a startup or an international enterprise. Pay-as-you-go pricing means paying only for the API calls you actually make. This keeps costs low for small-scale deployments or during early-stage application development. As your needs grow, our flexible system provides customizable packages to suit your specific case.

The industry-leading API platform

Nokia Network as Code is the industry's leading API platform that enables you to easily integrate specialized capabilities and rich insights from the network into your latency and bandwidth sensitive applications.

Designed 'developer-first' with a comprehensive developer portal and GenAI based code generation assistant, Network as Code offers an expanded set of Network APIs with single API access across all global networks (public and private), greatly simplifying development complexity.

Powered by best-in-class API hub technology from Rapid (now acquired by Nokia), Nokia Network as Code offers guaranteed API performance and the highest API availability offered across the industry.

Since the platform's launch in 2023, Nokia's ecosystem has grown to over 60 partners, including leading global network providers BT, Orange, Telefonica, Vodafone, and the US majors.

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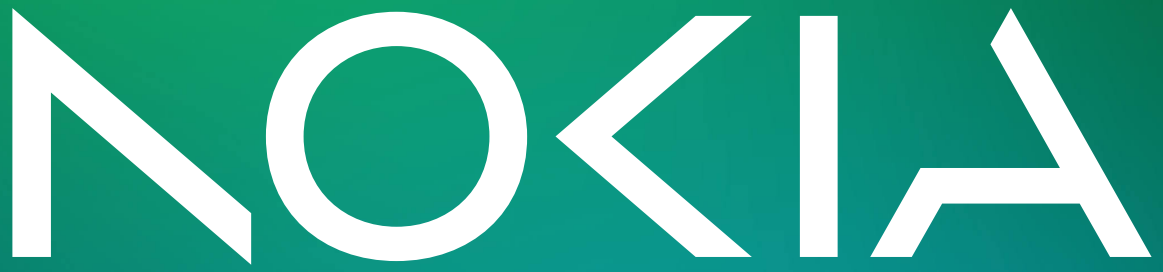

About Nokia

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, which is celebrating 100 years of innovation.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. 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.