Nokia Policy Controller

A flexible and powerful way to deliver
4G and 5G services

Policy control for all use cases

The policy control function in mobile networks determines the resources and services that can be used to support connected devices. It is a vital part of ensuring the customer experience for modern voice and data services. It determines, for example, whether customers are subscribed to 4G or 5G services, their data allocations, whether they are fixed or mobile subscribers, and even what entertainment services they may have subscribed to through their operator.

5G notably expands the services that the network supports compared to 4G/LTE. There is no use case that works without policy control — both traditional and cutting-edge use cases for consumers and enterprises require a flexible policy control function (PCF). As we enter the 5G era, many of the new use cases will be in Industry 4.0 and include critical machine-type communications (cMTC) for industrial automation, as well as massive IoT networks. This means that with 5G, there is a much wider range of devices and use cases and greater complexity in terms of policy rules. This calls for flexibility and agility in 5G policy control systems to manage the complexity and scale rapidly.

CSPs' commercial strategies are heavily dependent on these new 5G use cases and immersive services. Monetization opportunities, however, absolutely rely on the necessary policy rules being managed in this diverse environment.

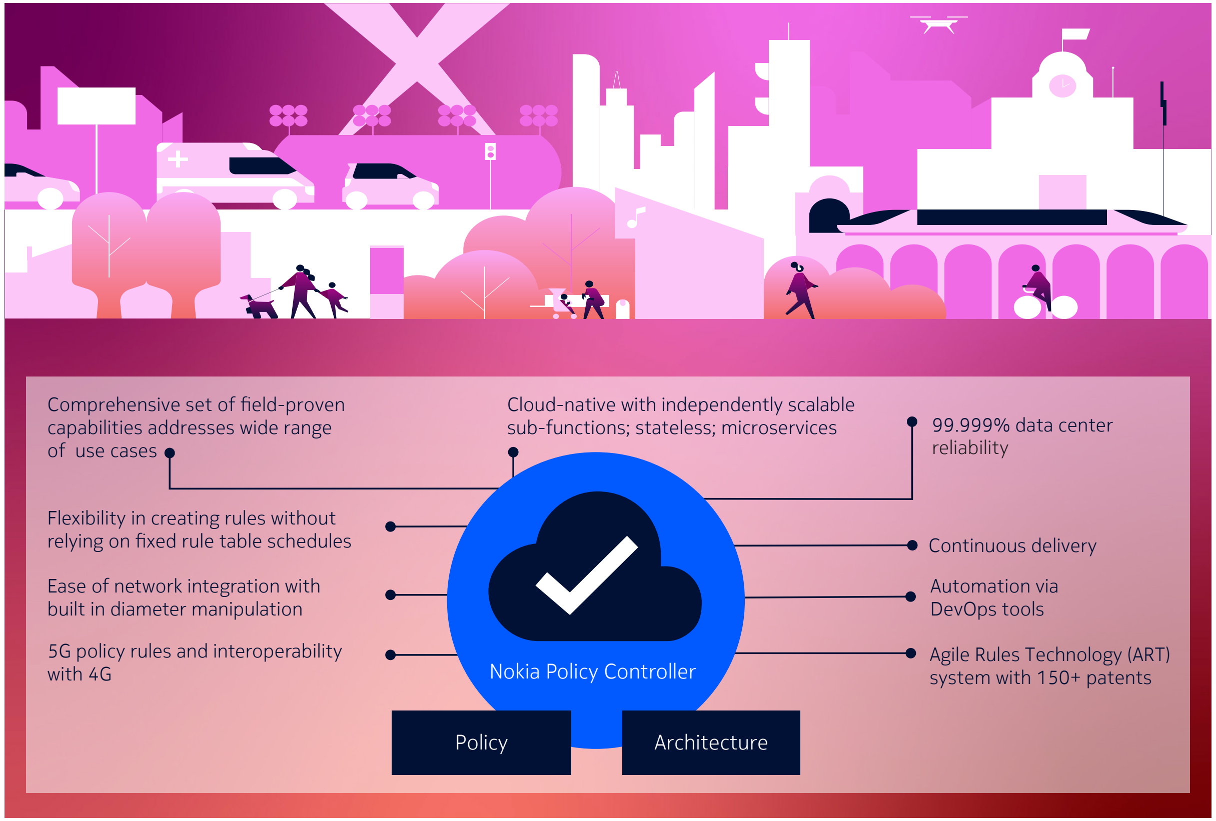
The Nokia Policy Controller is a flexible and powerful way to deliver both 4G and 5G services. It is focused on the scalability needs of large enterprises and supports the rapidly expanding number of industrial devices with out-of-the-box policies for many, and the ability to create custom policies for new devices and services as they develop.

The Nokia Policy Controller

The Nokia Policy Controller is designed for a broad range of 5G use cases and is backward compatible with legacy 4G use cases with a comprehensive set of field-proven capabilities. For operators focused on delivering services quickly to market and rapidly meeting the needs of enterprise customers, the Policy Controller's patented agile rules technology (ART) provides a flexible and simple way to create policies quickly. It has built-in capabilities for manipulating protocols to ease network integration. For even more rapid deployment, it is pre-integrated with other Nokia solutions such as the Cloud Packet Core, Monetization, VoX Core and Subscriber Data Management.

The Nokia Policy Controller is fully cloud-native and based on a containerized, microservices architecture. Its distributable sub-functions are independent and stateless, so they can be scaled without limit. It fits well into any DevOps environment and features its own automation tools for continuous integration and continuous delivery (CI/CD). For operator's deploying the Policy Controller, it provides centralized management of services with a unified interface for managing alarms, logs and metrics. It supports 5G usage monitoring control and alarm brevity control. It offers centralized management for all UIs and APIs and extensible fault and performance management.

The Policy Controller employs cloud-native network functions (CNF) that are fully containerized but can also run on VMs in Nokia's Cloudband Infrastructure Software (CBIS) or VMware. The Policy Controller is pre-integrated with the Nokia Monetization solution.



Agile rules technology (ART) provides flexibility and scale

When an event occurs, the Nokia Policy Controller uses rules to determine how the network's resources should be assigned. A wide range of behaviors are recognized by these default policies. When a custom policy is needed, however, the Policy Controller employs Nokia's patented Agile Rules Technology (ART).

ART combines the benefits of general-purpose and hard-coded rules engines, without their drawbacks. It models the call flow and data requirements of a fundamental set of telecom use cases representing key business models to reduce the complexity of use cases before they reach the rules engine.

Some of the benefits of ART:

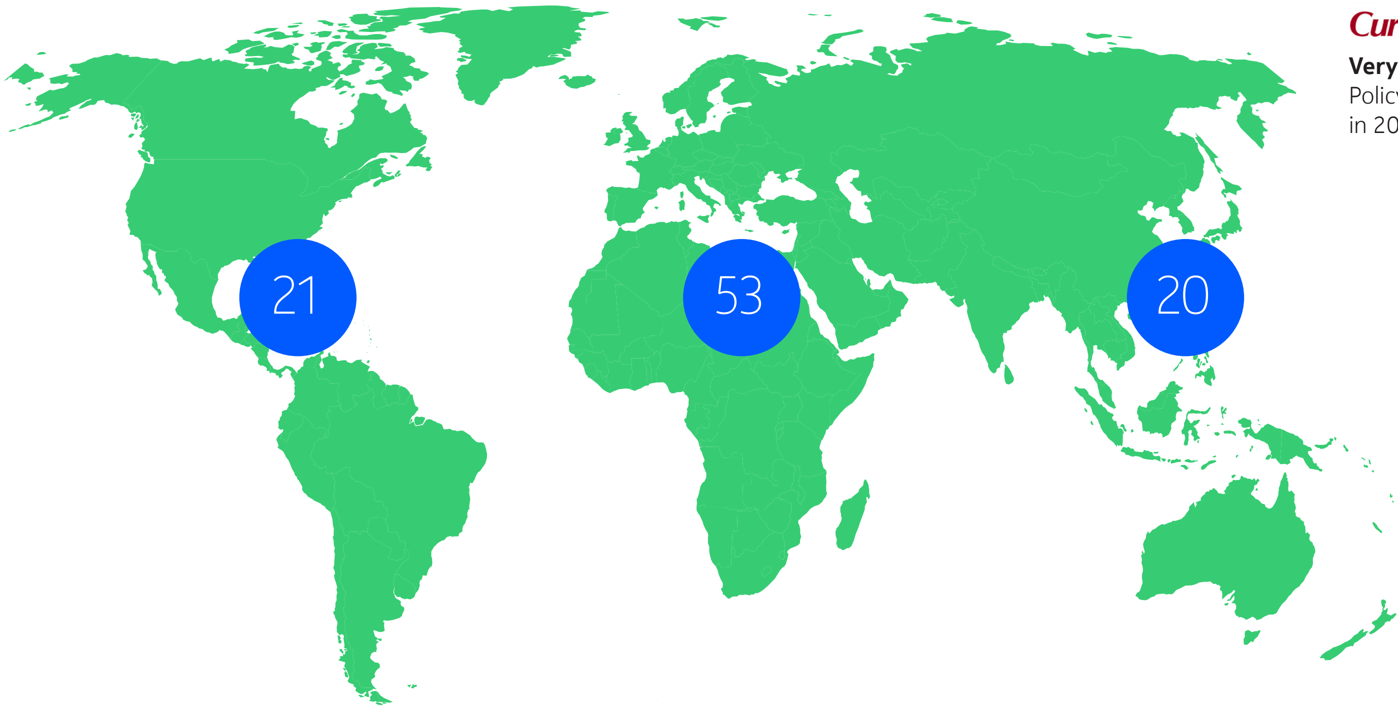
- **Intuitive rules visualization GUI:** quickly and easily create and modify rules in-house, without the need to understand detailed programming. This eliminates dependency on vendors or system integrators, reducing cost and time.
- **Excellent flexibility:** leverage the wide range of service provider specific use cases to configure, test and deploy a new set of rules in minutes.
- **High performance:** manage anew breed of complex use cases even across massive subscriber and session scale.
- **Powerful operation and maintainability:** reduce time and operational costs with rapid installation, upgrading, troubleshooting and debugging of new rules.

ART provides excellent run-time efficiency by anticipating and caching key data requirements of each call flow, triggering the rules engine only under specific conditions and filtering out extraneous event data. This reduces the complexity of use cases before they reach the rules engine, ensuring that it can scale.

While not required for every signaling routing use case, ART proves especially beneficial in the context of a Diameter Routing Agent (DRA), 5G Service Communication Proxy (SCP) or 5G Security Edge Protection Proxy (SEPP) for use cases such as message mediation, server off-load, roaming steering, session binding and load balancing. ART also uses rules profiles to streamline its interactions with other sub-systems such as charging.

Why Nokia?

94 Policy (PCRF/PCF) customers



Current Analysis

Very strong rating:
Policy control solution
in 2017-2020

Nokia provides end-to-end network solutions to a wide range of customers and deploys complex and complete networks. The Nokia Policy Controller meets the requirements of both complex multi-vendor environments and networks where most elements or, even, the whole core network is supplied by Nokia. We have extensive experience integrating the Nokia Policy Controller smoothly and effectively into many customers' core networks. The Nokia Policy Controller builds upon a strong legacy of policy control in 94 service provider networks worldwide.

Today, the Nokia Policy Controller is used by telecom operators such as Vodafone Idea (India), T-Mobile (US) and Rakuten (Japan).

Vodafone Idea India

Vodafone operates the second largest telecoms network in the world with over 440 million subscribers. To support the rapid expansion and deployment of their packet core, Nokia replaced the legacy PCRF to prepare them for the migration to 5G and its cloud-native architecture. The rapid rollout of the new service to 80 million initial subscribers was completed in less than 4 weeks.

The project represented potential footprint savings of 70% compared to the legacy PCRF system and supported both PCRF and 5G PCF functionality.

T-Mobile US

T-Mobile needed to evolve its existing bare-metal, single cluster PCRF deployment. It was having difficulty managing its 140+ use cases (and growing) text-based table, including outages caused by cumbersome manual changes in the live table. With aggressive 5G rollouts planned in late 2019, Nokia engaged to evolve their operations using the Nokia Policy Controller. They upgraded 160 million devices covering six geo-redundant zone in T-Mobile's full multi-vendor environment. It now provides comprehensive rules management for seamless transition from lab to production using DevOps delivery that ensure regress load in two days.

Rakuten Japan

Rakuten is a new entrant in the Japanese telecoms market creating innovative digital experiences in areas such as FinTech, digital content, food, travel and e-commerce. It is Japan's fourth largest mobile provider. As part of its mobile service, it launched a rewards program using advanced monetization capabilities to six million subscribers on LTE with an evolution path to 5G. The Nokia Policy Controller played a pivotal role in supporting the monetization business case.
Integrated with the Nokia FlowOne and Cloud Signaling Director, the Policy Controller provided an all-IP, cloud-native solution, which not only provides cost savings of 40%, but accelerated time to market for the service, which is quickly gaining market share and delighting Rakuten's customers.

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