Nokia 5G Core

Explore how to open your network to the full potential of 5G and make it real.

NOKIA

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Your 5G opportunity

5G is your opportunity to become the company you were meant to be. But how do you serve everyone and everything, while maximizing returns? The answer lies in rethinking the core.

Our 5G Core frees the innovation within your network, so you can automate, customize and monetize your core with total confidence.

The architectural design is inherently cloud-native, secure and resilient. Network functions are deployed and scaled, rapidly and wherever required. The software is continuously optimized for performance, efficiency and sustainability.

We proudly celebrate that CSPs and Enterprises all over the world are working with us and our partners to transform business, industry and society.

5G Core: make it real

5G's marketplace needs a core that is cloud-native and uses a service-based architecture (SBA). The new technology drives a remarkable shift in the core's networking and operations. This is necessary to deliver high-performance, low-latency, ultra-reliable service, which are critical to winning in new markets including Industry 4.0, scaling Internet of Things (IoT), and blending physical and virtual experiences.

CSPs & Enterprises use our 5G Core to:

Profit with services such as network slicing, which enables efficient sharing of network resources while ensuring custom service level agreements for various applications and services.

Simplify with a core geared for extreme automation, efficient operations and sustainability. Prevent errors from affecting productivity. Quickly scale larger and smaller by matching resources and demand.

Open the core, so that it works across multi-cloud, serves any access, and is deployable on the edge cloud. CSPs and Enterprises can securely guide the creation of their own new services using the core's open APIs.

Be confident that the core delivers financial, operational and strategic results, while ensuring the evolution from 4G to 5G is efficient, effective and secure.

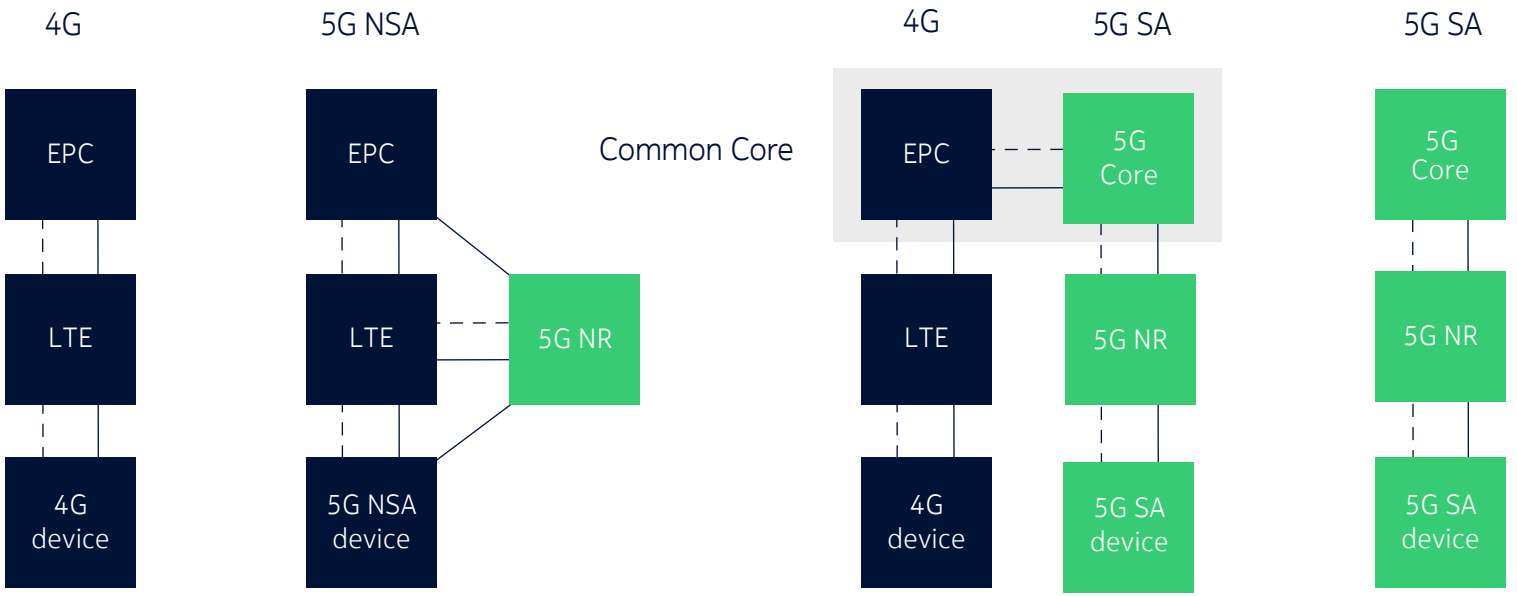
Evolve from 4G to 5G

5G NSA relies on dual connectivity of 4G and 5G radios, served by a 4G EPC. 5G NSA enables existing 4G CSPs to increase subscriber bandwidth and cell density.

However, 5G NSA reduces battery life (because of two simultaneous radios) and it is unable to deliver new services that rely on 5G's low-latency and ultra-reliability. In addition, the 4G EPC might still be physical or cloud, thus lacking cloud-native's scaling, efficiency and automation.

Interworking and mobility across 4G, 5G NSA and 5G SA requires specific functions to be deployed together: UDM & HSS, PGW & UPF, and SGW & SMF. Explore our NSA-to-SA collection for the details.

Nokia provides a common core (4G EPC and 5G Core). We've helped CSPs evolve from 4G to 5G NSA to 5G SA, including the CSP's evolution of technology and skills from physical to cloud to cloud-native.



Explore more, click here.

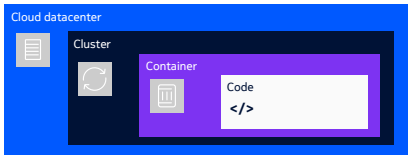
Enhance security

Trust is essential for commercial success. Increasing attacks, new mission-critical services, and 5G's complexity require stronger security and privacy. Evolving from 4G to 5G improves security thanks to 5G's specified improvements. However, new security vulnerabilities are introduced by 5G's more extensive use of cloud-native software, geographically distributed cores, other providers' infrastructure, and open-source technology.

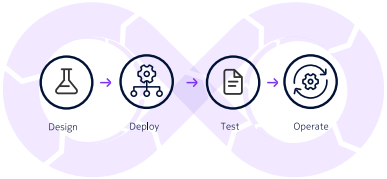
Evolving from 4G to 5G improves security

- AUTHENTICATION: Device authentication method is determined by the home network.
- FRAUD: When a visited network authenticates a roaming device, the home network gets proof the device is present in the roaming network
- PRIVACY: The device subscription identifier is not sent in the clear over the radio
- PRIVACY: Integrity protection of user-plane traffic.
- SIGNALING: Core signaling is secured with Transport Layer Security (TLS).
- INTERCONECTION: Security Edge Protection Proxy (SEPP) standardizes interconnection security.

Nothing less than a transformation of telco security is needed by adopting modern practices.



Zero trust's principles include abstraction, data hiding, encryption, and defense in depth.



DevSecOps integrates & automates preventative, detective, and responsive security controls into CI / CD.

Design for Security (DFSEC) defines activities for each phase of the product lifecycle.

Explore more, click here.

Open programmability

Nokia Network Exposure Function (NEF) provides secure, unified access as a 4G SCEF and 5G NEF. CSPs & Enterprises can create their own applications and services. Enterprises can perform self-care. Our NEF is a Linux CAMARA reference platform for testing API definitions and applications built using those APIs.

Network as Code (NaC) securely abstracts the whole of network & operations APIs (3GPP, TMForum). It extends API exposure to a wider developer ecosystem, because it removes the need for them to fully understand telecom's intricacies.

3rd party application servers

Consumes standard APIs

Wider developer ecosystem

Simplified, developer friendly APIs

Network As Code

Nokia Services

Low code environment

API and Intents Exposure

- 3GPP compliant NEF
- 5G Core
- IMS / Voice
- O-RAN RIC
- Provisioning

- Health status
- Network function insights
- Subscriber specific data

- Configurations
- Test automation
- Log collection
- Metrics
- Alarm notifications

- Lifecycle management operations
- Resource orchestration
- Network slice orchestration

Network API

Insights API

Operations API

Orchestration API

Explore more, click here.

5G Voice

Voice is essential to CSPs and Enterprises, as a fundamental service and for roles in new 5G services.

Nokia IP Multimedia Subsystem (IMS) enables Voice over LTE (VoLTE), Voice over New Radio (VoNR), Voice over WiFi (VoWiFi), and fixed voice (VoIP) for consumer & business.

Many 4G CSPs deliver voice using 3G Circuit Switched Fallback (CSFB), but CSFB is not available with 5G. Instead, voice in 5G networks is delivered using the methods shown in the table below:

VoNR provides the best service:

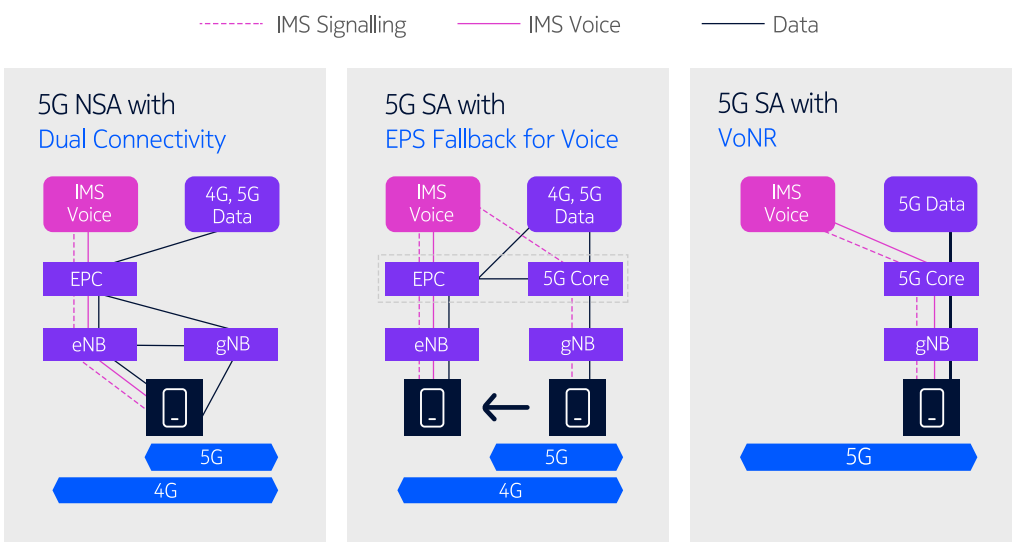
a. Best user-experience because of simultaneous 5G data with voice.

b. 5G coverage is more widespread, because the mobile device no longer relies on 4G.

c. VoNR call setup time is faster than VoLTE.

d. VoNR's battery lifetime is longer than Dual Connectivity or EPS Fallback, because one radio is used instead of two.

Access	Voice	Data
5G NSA	VoLTE	Data reverts to 4G
5G SA (islands of 5G in a sea of 4G)	Evolved Packet Switch Fallback (EPS Fallback)	Data reverts to 4G
5G SA (widespread 5G)	VoNR	Data remains 5G



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Automation

The game has changed. 5G requires CSPs to adopt cloud technology with automation frameworks. Automation was used for decades in telecom networks, mostly for isolated operational cost reductions. Because of 5G, automation changes.

5G's market includes services & advancements that must rely on network automation. For example, scaling up to massive machine-to-machine communication, rapidly managing many network slices, and operating distributed multi-cloud deployments.

Automation across all layers:

Monitoring

Delivery

Configuration

Upgrades

Operations

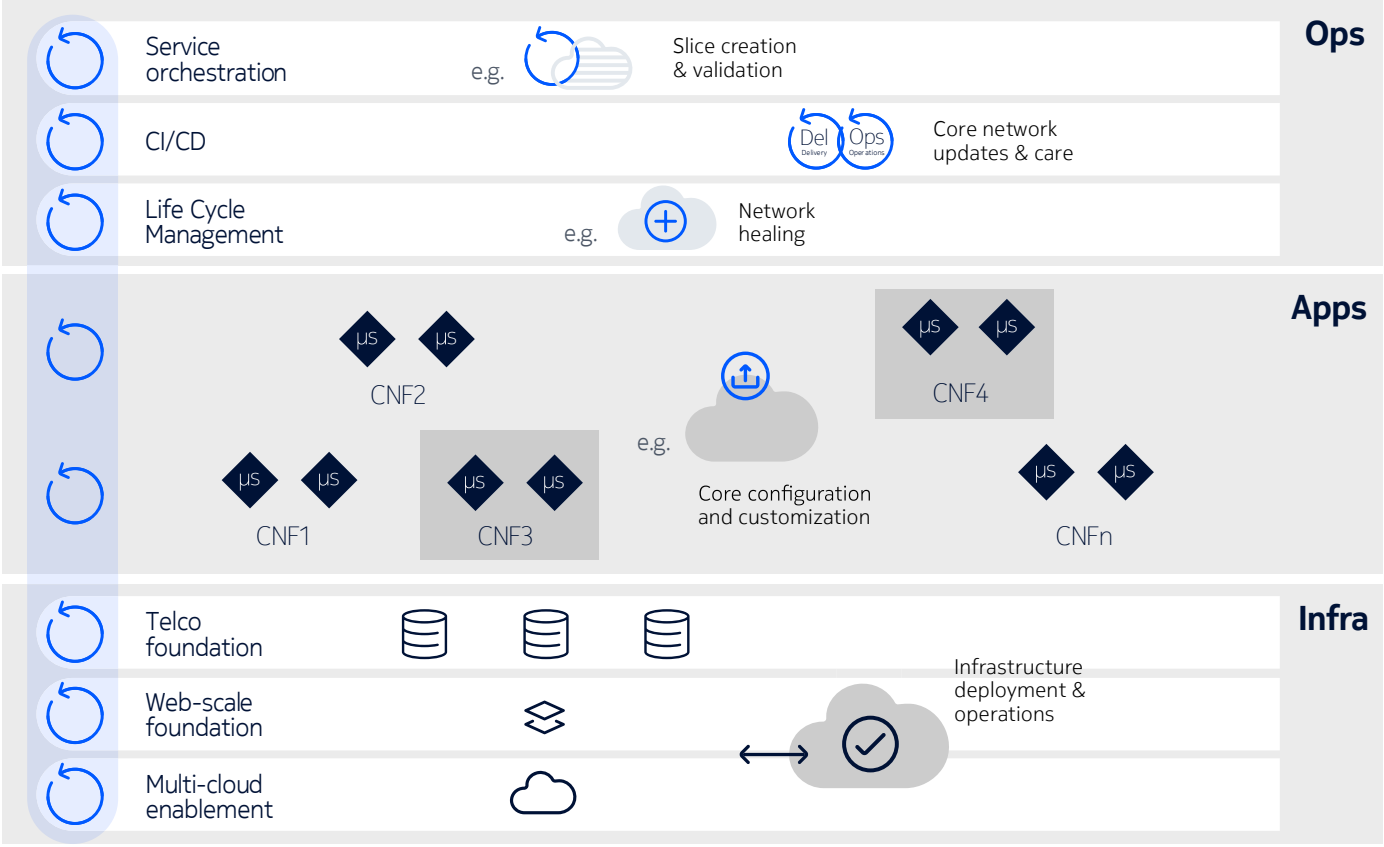
etc.

Key benefits:

Operate efficiently

Diversify effectively

Deliver quality



Explore more, click here.

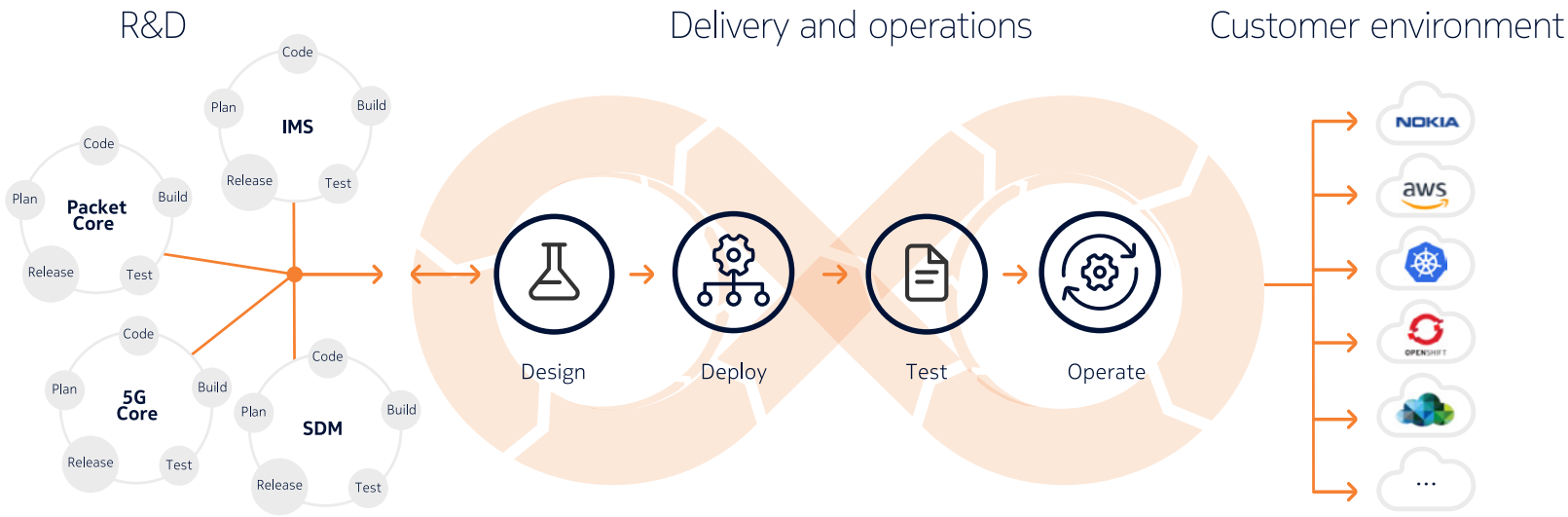
Delivery Operations

5G's marketplace demands the adoption of DelOps (delivery and operations) and CI/CD (continuous integration, continuous delivery). Together, they speed up the rollout of new services while reducing the risk to highly complex telecom operational networks.

DelOps is our unique approach to IT DevOps, specifically suited for telecom's complexity.

CI/CD and continuous testing ensure software updates are quick, safe & automated.

Nokia Continuous Delivery is a pre-integrated solution delivering CI/CD. Nokia Services can adapt it to a customer's environment.



Realized by Nokia Continuous Delivery Solution + services

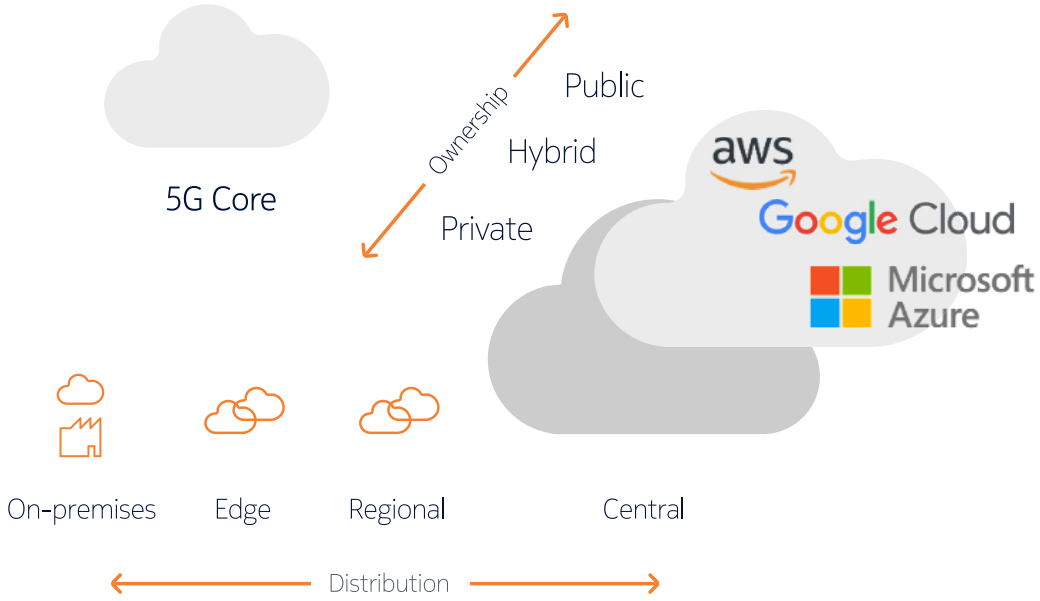
Global telco experience | Scale | Openness & flexibility | Freedom of choice | Seamless merger | Early access Time-to-market

Explore more, click here.

Public and hybrid clouds

Deploying the 5G Standalone Core on multi-cloud opens broader ecosystem innovation, enables continuous software updates, and allows rapid scaling for on-demand responsiveness – all supported by greater resiliency and security. CSPs can benefit by deploying their core onto a hyperscaler's cloud, taking advantage of its infrastructure, ecosystem and partnerships.

Nokia 5G Core's cloud-native architecture can be deployed on public & hybrid clouds, **giving you all the freedom and flexibility** your business demands. Source the vendors you choose for the services you need and create an ideal environment for new and profitable service development, including edge cloud for enterprise partnerships.



Explore more, click here.

Core SaaS

CSPs & Enterprises can get a faster time to value, greater business agility, and better cost management.

We built our 5G Core SaaS per 3GPP architecture and slicing, so that you can choose to deploy an entire core, or just a portion, or extend your existing network capabilities.

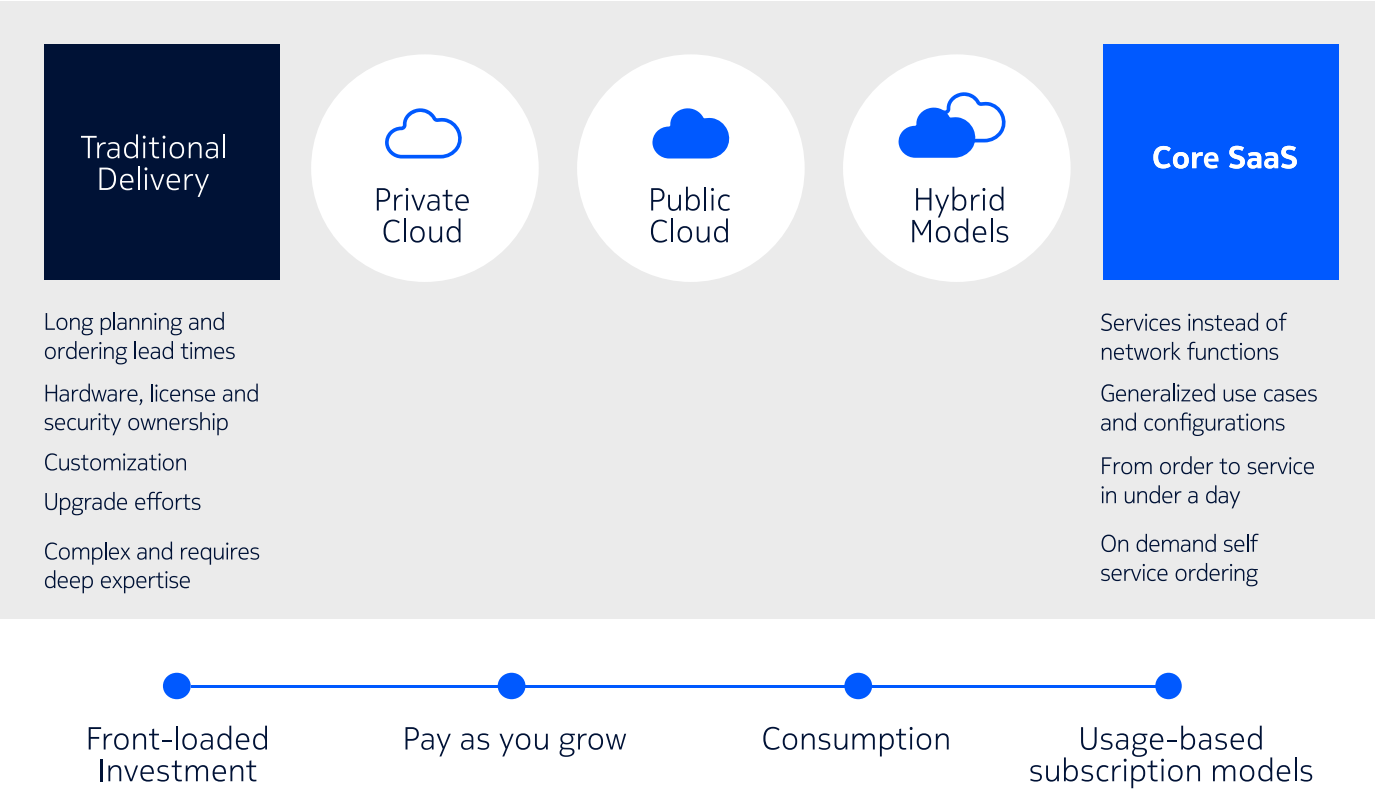
Why Core SaaS?

Enabler for new services

Better cost control & predictability

Simplicity & ease of management

Faster delivery & deployment



Explore more, click here.

Case Studies

Explore how CSPs are making 5G real.

CSP: **T-Mobile US**
Goal: Increase coverage and win market-share
Result: World's first launch of nationwide 5G SA
See: Announcement

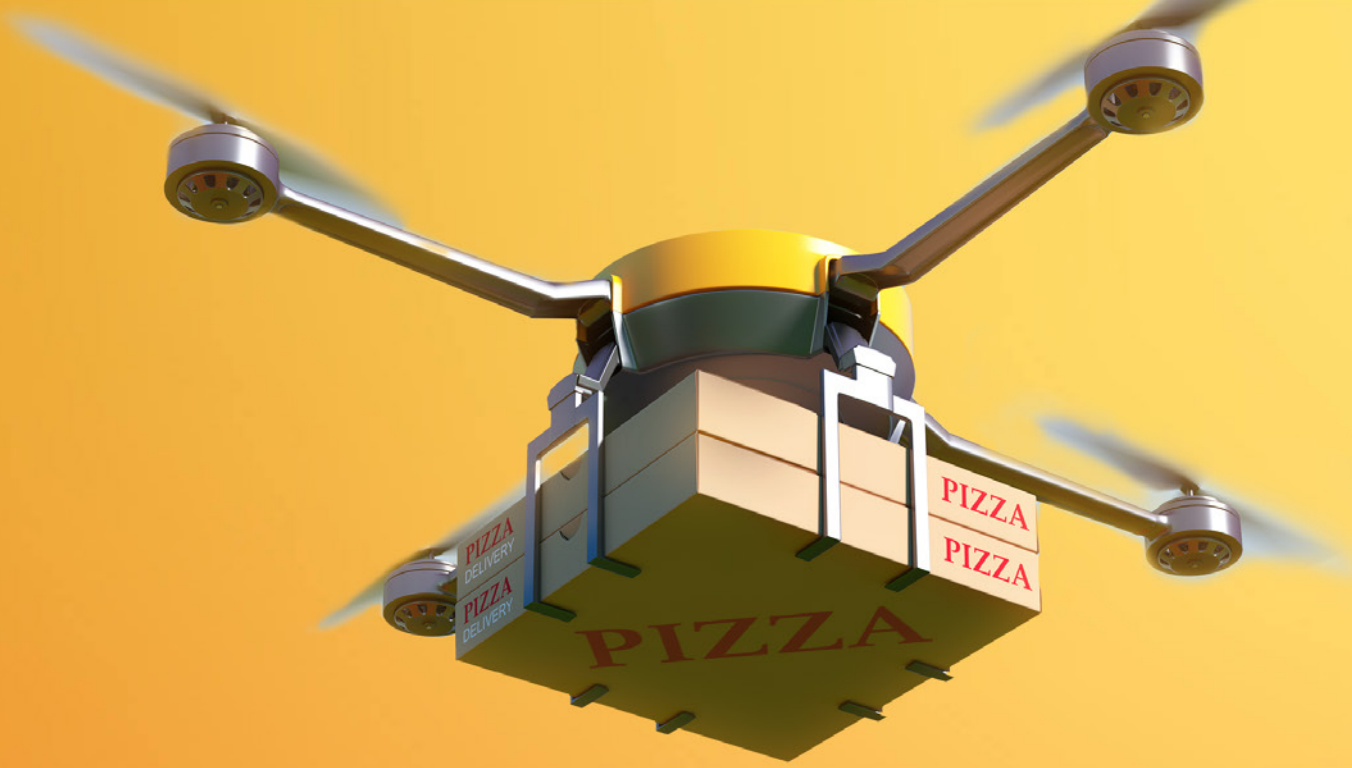
CSP: **Telia Finland**
Goal: Innovate new services
Result: World's first launch of commercial slicing in 5G SA
See: Announcement, Video interview

CSP: **British Telecom**
Goal: Drivers & challenges of a fully geo-redundant core
Result: Selected Nokia for 5G Standalone Core
See: Video testimonial

CSP: **DISH Wireless US**
Goal: Win market-share as a new type of 5G provider
Result: World's first launch of 5G SA Core on public cloud
See: Announcement, Video testimonial, Case study paper

CSP: **Telenet Belgium**
Goal: 5G as an innovation engine & other ways of working
Result: 5G Standalone Core on Google Anthos
See: Announcement, Video testimonial

CSP: **Our customers**
Goal: Explore how we & our customers are making 5G real
Result: Customer achievements and the outlook for 2023
See: Video



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

Through B2B networks that sense think and act, we enable our customers, partners and technology innovators to create the digital services and applications of the future.

By pioneering the future where networks meet cloud, we are helping to realize the full potential of digital in every industry.