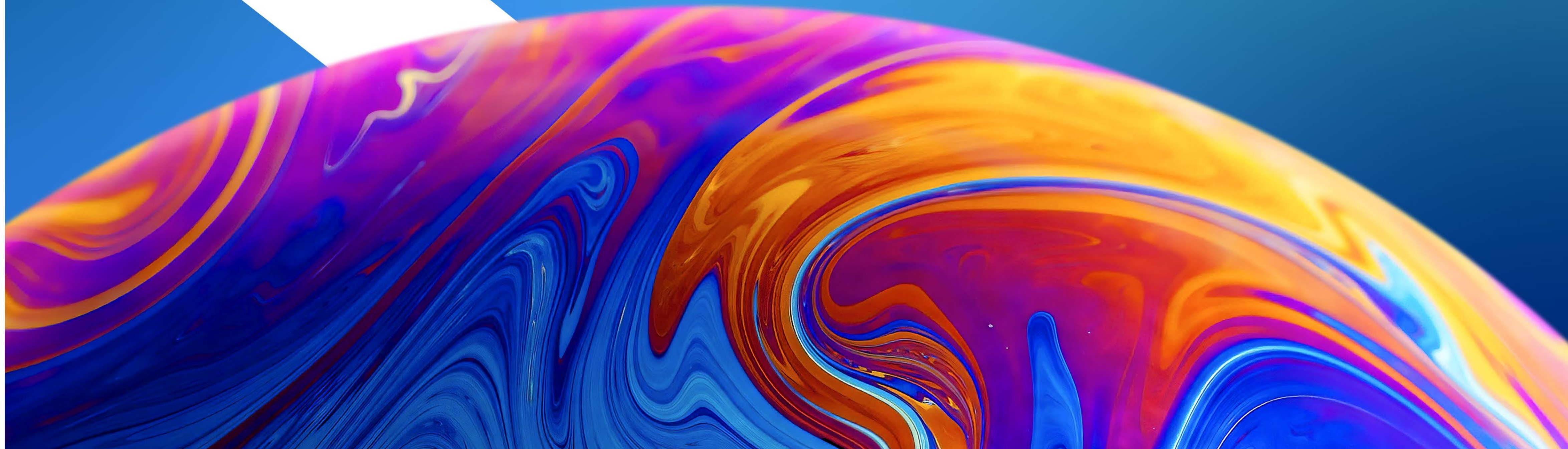


NOKIA

Nokia Cloud Packet Core

Deploy without limitations, profit from opportunities, evolve with confidence



5G opportunities

As the benefits of a 5G standalone core architecture become clearer, more service providers are investing to pursue opportunities that will be afforded by it. New business models are now emerging that can leverage the unique performance capabilities that 5G standalone can offer.

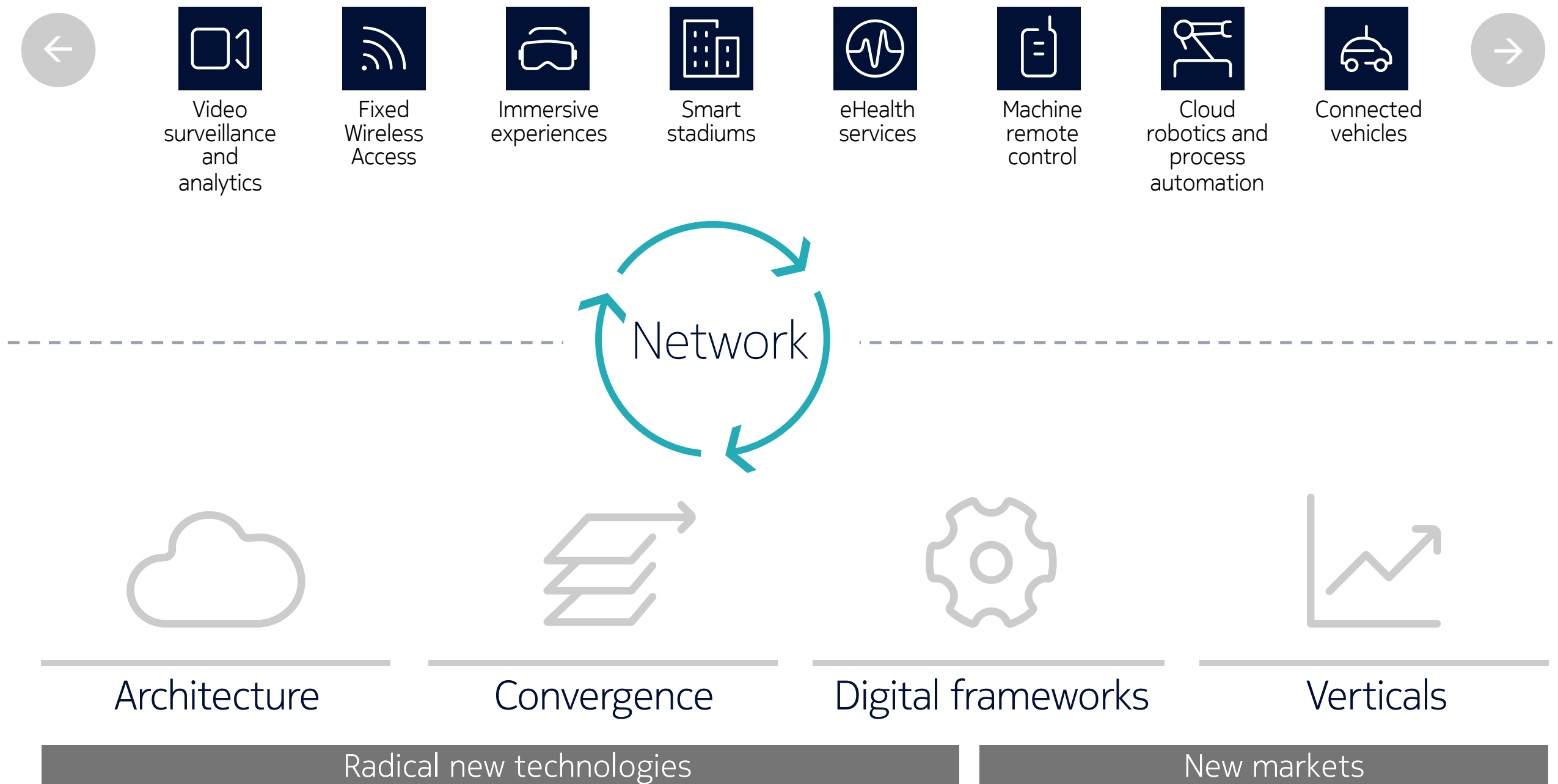
5G's new capabilities include faster speeds, greater immediacy through lower latency and more content value. These capabilities will give service providers new market opportunities with enterprises and select industry verticals.

Greater co-operation is needed to lower barriers to 5G adoption and ensure that 5G networks can be optimized for the specific needs of different industries. For example, high bandwidth and lower latency will enable new and immersive experiences for entertainment and gaming, whereas a strong partner ecosystem will be needed for private wireless and industrial IoT.

As a service provider, you will need to select the correct 5G use cases to address your business and commercial objectives. Leveraging existing technologies will be key in mitigating risk and gradually introducing new 5G services and applications. Your chosen use cases should fit your existing customer base as much as possible so as to enrich and scale what is currently provided rather than fully customize.

Extreme
disruption
of the way
business
is done...

...related
to dynamic
technology
and market
trends



Transforming the core network

In order to enable new and compelling services, service providers need to transform their core networks. The re-architecture of the core will be essential for 5G stand-alone but it will also be important for delivering services faster and more efficiently.

Virtualization and cloud-based environments have been commercially proven to offer several benefits, but with migration efforts spanning a number of years, this comes at significant expense. Due to the fast-paced nature of technological change, you need to ensure that your initial investments in the cloud are the right ones and are made with the right vendors.

Utilizing emerging technological advancements in webscale approaches, artificial intelligence, machine learning and automation will vastly improve your operational processes. It will also enable you to be more competitive versus new entrants that are unencumbered by legacy technologies.

Ultimately, core network transformation should allow you to become more innovative and agile in the way you do business. A core network that is built for a webscale cloud environment will ensure that you can create value propositions that are competitive, while retaining your long-standing reputation for reliability and trust.

Change the
game and
beat both
traditional
and new
competition

Embrace
radical new
technology



Nokia Cloud Packet Core features

The Nokia Cloud Packet Core (CPC) provides key components needed for a webscale-class core network. Leveraging its inherent cloud-native attributes, you can deploy diverse services and applications without limits, either on a private or public cloud and using either a distributed or centralized architecture.

The Nokia CPC is disaggregated with a state-efficient design that enables separation of state from processing, which is fundamental to webscale and cloud environments that utilize virtualized network functions (VNFs) and cloud-native network function (CNFs).

Common application software is used in the Nokia CPC making it infrastructure agnostic, irrespective of deployment choices. The Nokia CPC is also independent of the underlying cloud infrastructure used for orchestration, lifecycle management (LCM) and infrastructure resource management.

As of 3GPP release 16, service providers with existing wireline assets will have the ability to seamlessly integrate them into the core network, utilizing a common CPC control plane that can interface to both wireless and wireline user planes.

The Nokia CPC consists of the Cloud Mobile Gateway (CMG), Cloud Network Resource Director (CNRD) and Cloud Mobility Manager (CMM). These products provide key components of the 5G core, evolved packet core (EPC) and 2G/3G packet switched domains, allowing you to build a single core network.



Deploy without limitations

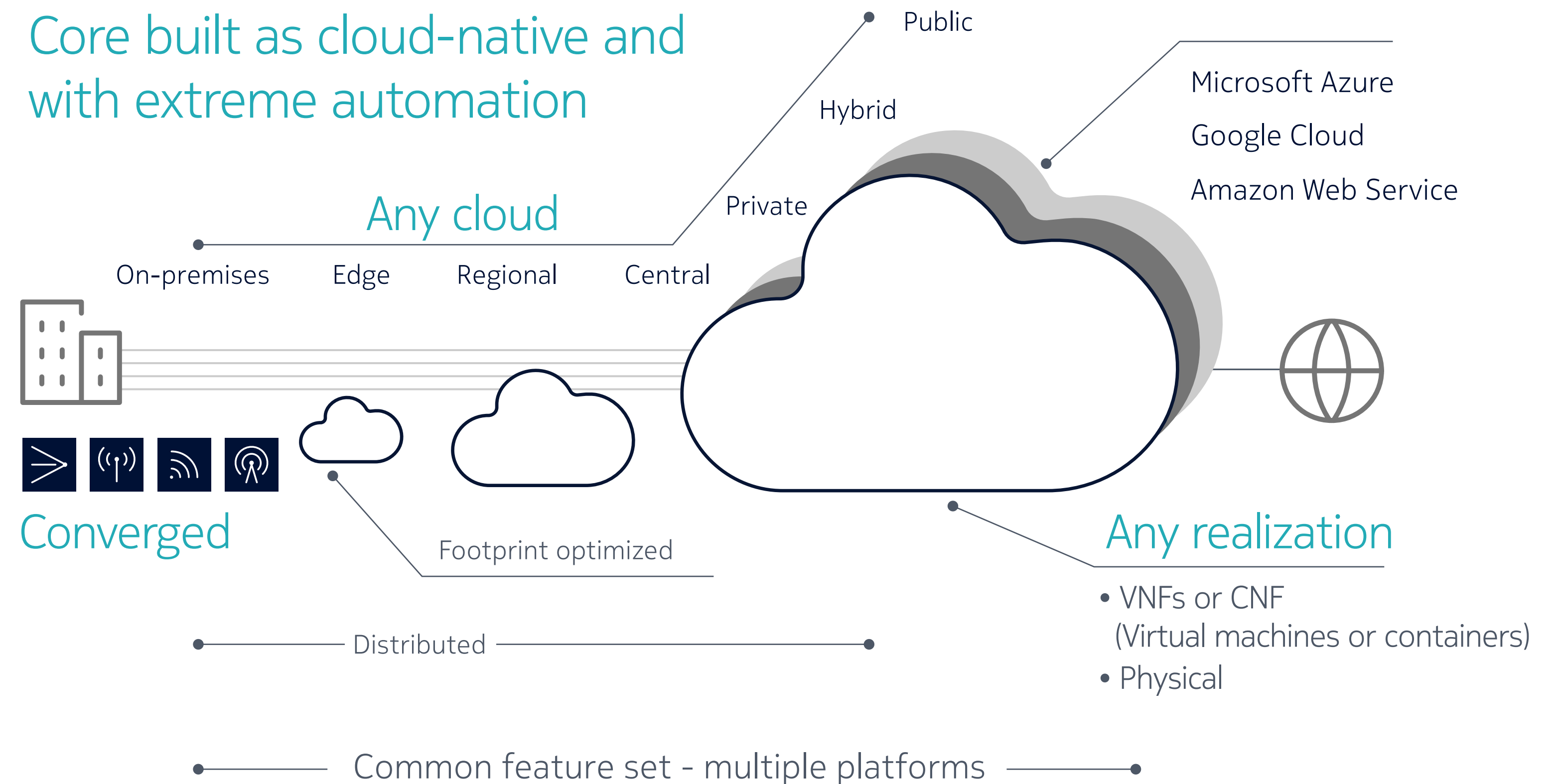
You want the flexibility to deploy your core network using your preferred solution, environment and vendor choice.

The Nokia CPC removes deployment model restrictions and lock-in. It offers the freedom of choice to deploy the CPC core network functions as software on any cloud whether private, public or on-premises. You can use virtual machines, containers-within virtual machines, bare-metal containers, or physical function-specific silicon. With its any-realization capability, the Nokia CPC enables you to deploy your core network as befits your cloud maturity.

Using the latest webscale technologies, the Nokia CPC allows you to build your core network in a centralized or distributed manner to suit your varying business and operational objectives.

The Nokia CPC provides a common feature set across diverse environments and platforms to ensure feature parity and no loss of application functionality.

Core built as cloud-native and with extreme automation



5G core network functions

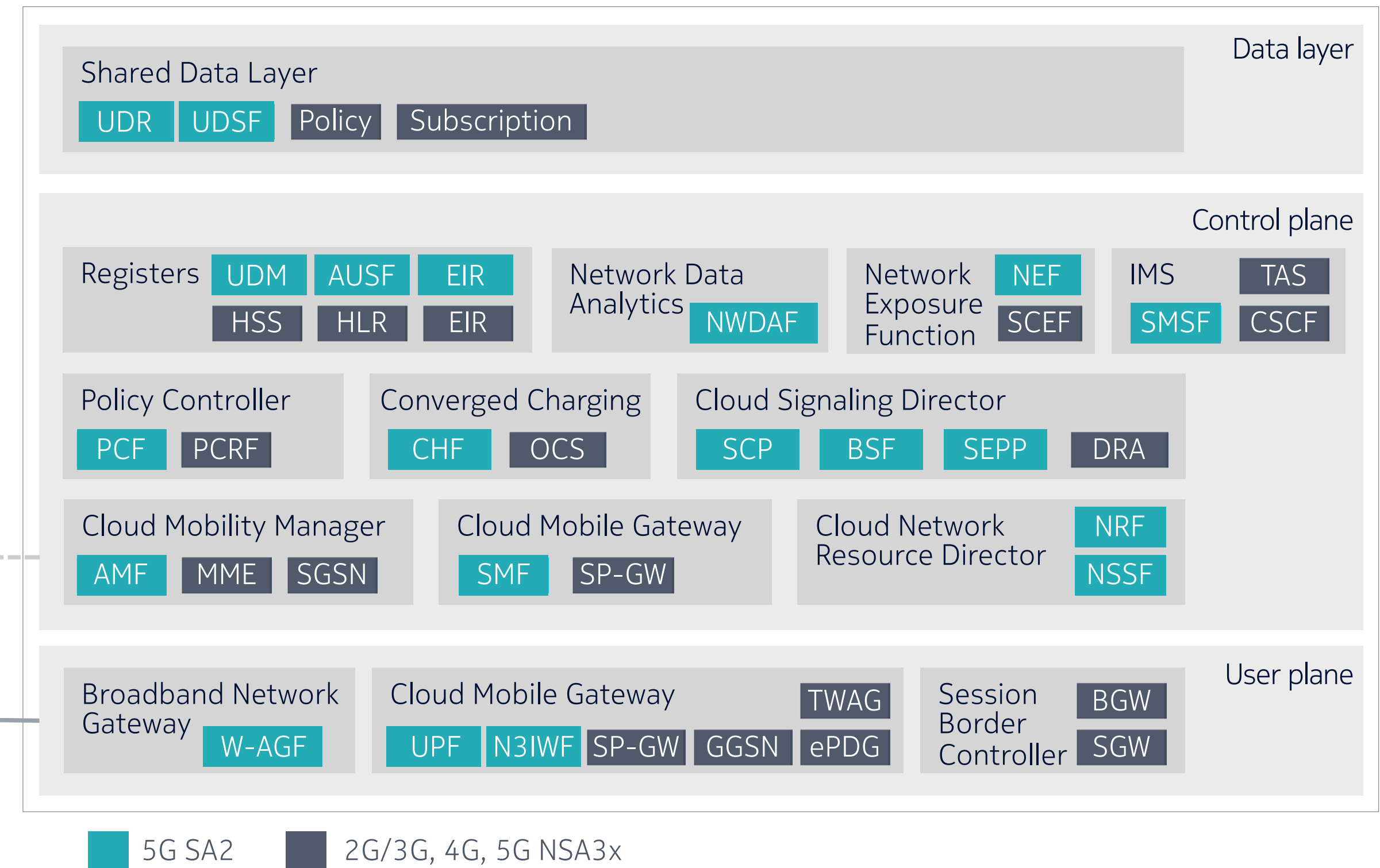
The Nokia CPC provides key core network components for the control and user planes and has the ability to anchor both wireless (2/3/4/5G NSA and SA) and wireline access technologies, forming a universal adaptive core.

The Nokia Cloud Packet Core (CPC) consists of numerous network functions:

- Network Slice Selection Function (NSSF): Assigns network slice instances to devices
- User Plane Function (UPF): Equivalent to the user plane of the Evolved Packet Core's Serving Gateway (SGW) and Packet Data Network Gateway (PGW)
- Network function Repository Function (NRF): Provides registration and discovery functionality; maintains the network function profile and supported services
- Non-3GPP Interworking Function (N3IWF): Handles the integration of untrusted non-3GPP access
- Access and Mobility Management Function (AMF): Terminates the interface from the various access networks
- Session Management Function (SMF): Establishes and manages sessions for all access types.

Mix and match support of any evolution across

- NSA/SA
- Fixed
- Unlicensed
- 2/3G, 4G, 5G



Wireless and wireline convergence

Control and user plane separation (CUPS) is mandated by 3GPP for 5G core network functions and is an approach that can be adopted within the wireline domain.

A key network element within the wireline domain, the Broadband Network Gateway (BNG), will benefit from CUPS, which will allow it to integrate into a universal adaptive core.

CUPS allows for the BNG subscriber management control plane functions to be separated from its user plane function. Our approach is not just to separate the BNG control plane but to add the functionality to the CPC's session management function (SMF). This creates a fully converged control plane for both wireless and wireline access that is unique within the industry.

The Nokia CPC also supports the decoupling and distribution of user plane functions, which optimizes capacity, performance and cost. This is beneficial when offering multiple services. It provides flexible traffic distribution, breakout and offload options for wholesale, voice and internet traffic that was not previously possible in core networks.

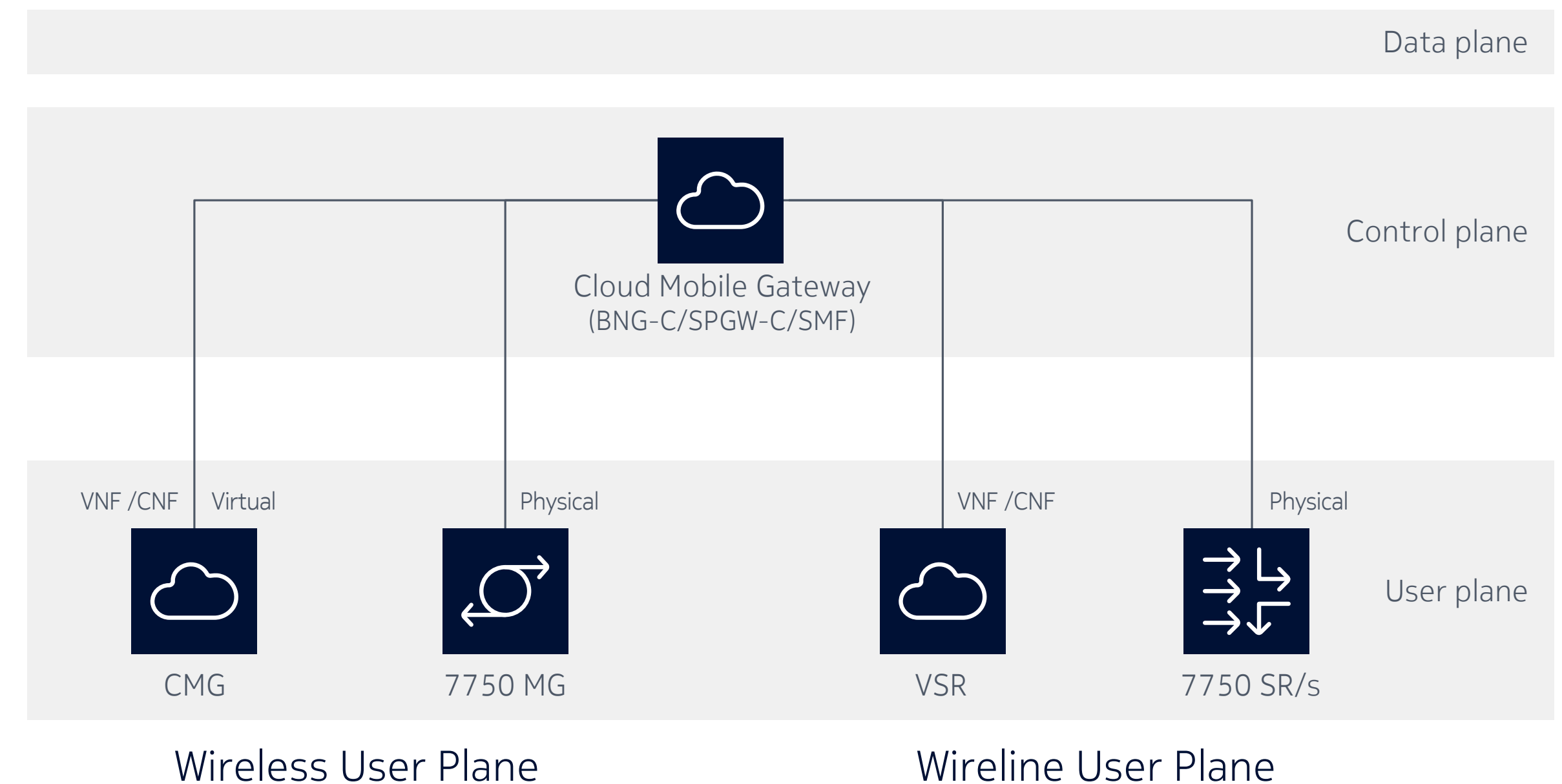
When operating wireline networks, you will value the enhanced flexibility that the CPC offers to scale and optimize your service delivery. Consolidating and converging wireless and wireline access technologies allows you to offer ubiquitous and seamless services. It also reduces the operational complexities and inefficiencies of managing multiple networks.

Converged

Session management for wireless and wireline

Limitless

Right platform for every deployment scenario



Nokia Cloud Mobile Gateway and Cloud Network Resource Director

The Nokia Cloud Mobile Gateway (CMG) and Cloud Network Resource Director (CNRD) are key elements in the Nokia CPC solution. They are optimized for the evolution to 5G and next-generation mobile voice, video and data services.

They deliver the high performance and subscriber scalability to address the growth in users, devices and applications, as well as demands for higher bandwidth and lower latency.

The Nokia CMG supports multi-access connectivity by converging multiple mobile gateway functions onto a single, general-purpose computing platform, while offering multiple configuration options that provide deployment flexibility.

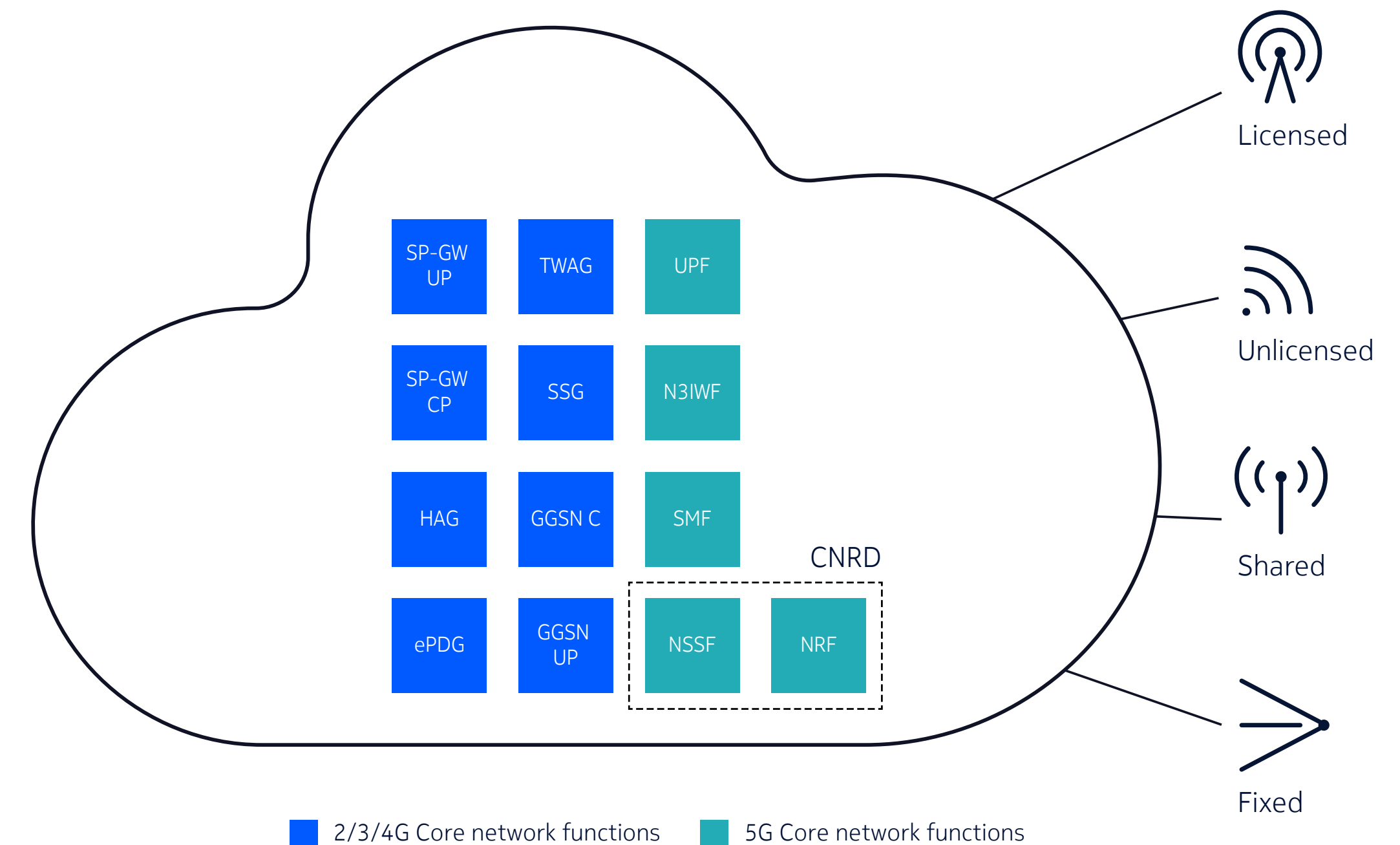
The CMG can be deployed as a standalone network function or in various combinations:

- Serving Gateway/Packet Data Network Gateway/ Gateway GPRS Support Node (SGW/PGW/GGSN)
- Policy Control Enforcement function (PCEF)
- Subscriber Services Gateway (SSG) providing carrier-grade network address translation (NAT), TCP optimization, firewall and service chain steering capabilities

- Hybrid Access Gateway (HAG) for converged service delivery
- Home Agent Node (HA)
- Evolved Packet Data Gateway (ePDG)
- Trusted Wireless Access Gateway (TWAG)
- Session Management Function (SMF)
- User Plane Function (UPF)

The Nokia CNRD provides the following 5G core network functions:

- Network Repository Function (NRF)
- Network Slice Selection Function (NSSF)



Visit the [Cloud Mobile Gateway web page](#)

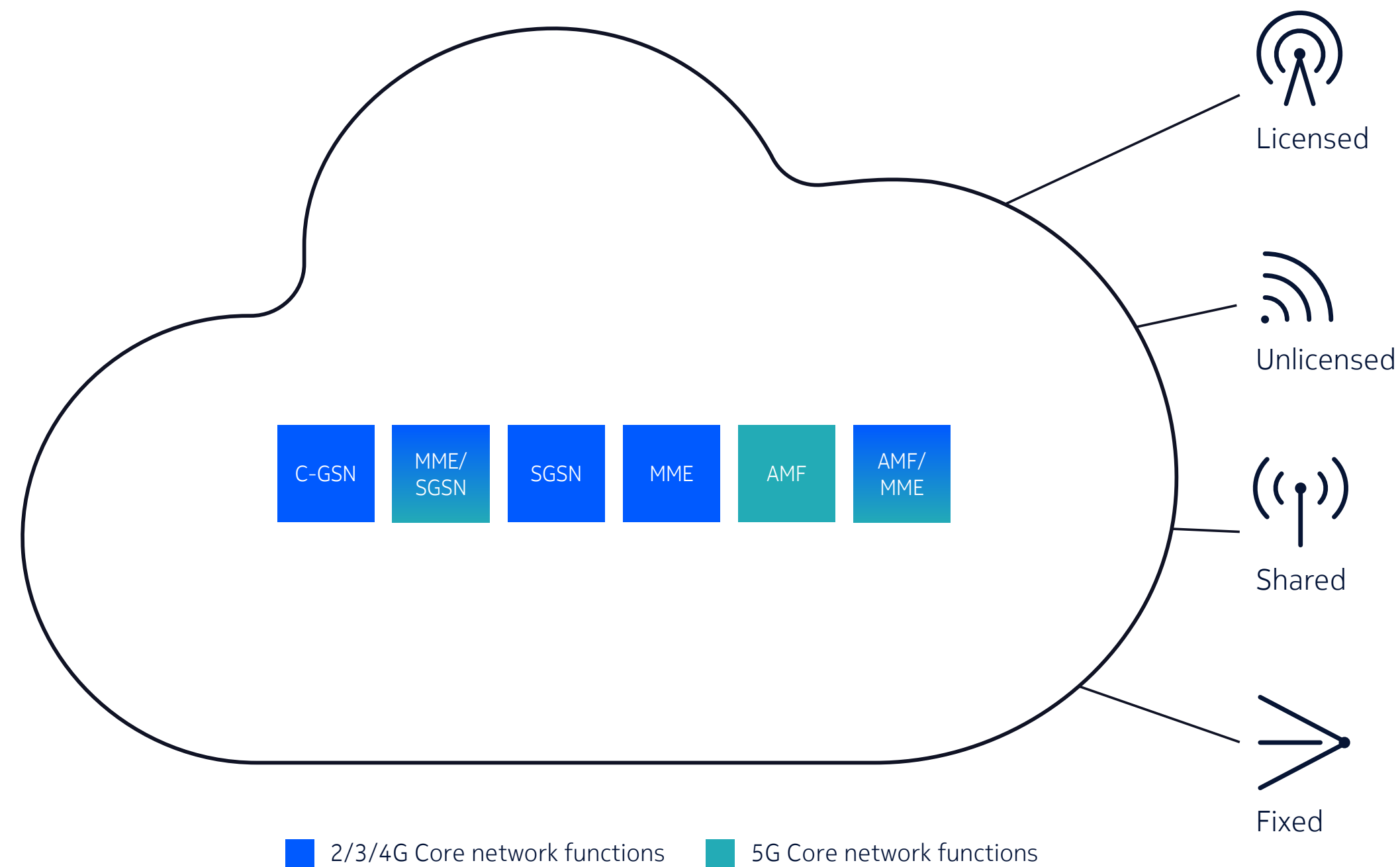
Nokia Cloud Mobility Manager

The Nokia Cloud Mobility Manager (CMM) is a key element of the Nokia CPC solution. It is optimized for the evolution to 5G and next-generation mobile voice, video and data services. It delivers the high performance and subscriber scalability to address the growth in users, devices and applications with their associated signaling and lower latency demands.

The Nokia CMM supports multi-access connectivity, converging the 5G, 4G and 2G/3G mobile core control planes onto a single, functional instance.

It can support multiple core network functions and offers various configuration options for full deployment flexibility:

- Access and Mobility Management Function (AMF)
- Mobility Management Entity (MME)
- Combined AMF/MME
- Combined MME/Serving GPRS Support Node (SGSN)
- Cellular Serving Gateway Node (C-SGN).



Visit the [Cloud Mobility Manager web page](#)

Cloud Packet Core benefits

Core networks done right

You need the ability to deploy advanced core networks without being dependent on a particular solution, infrastructure or vendor. The Nokia CPC gives you the competitive advantage you need, without limiting your deployment choices.

Core networks done now

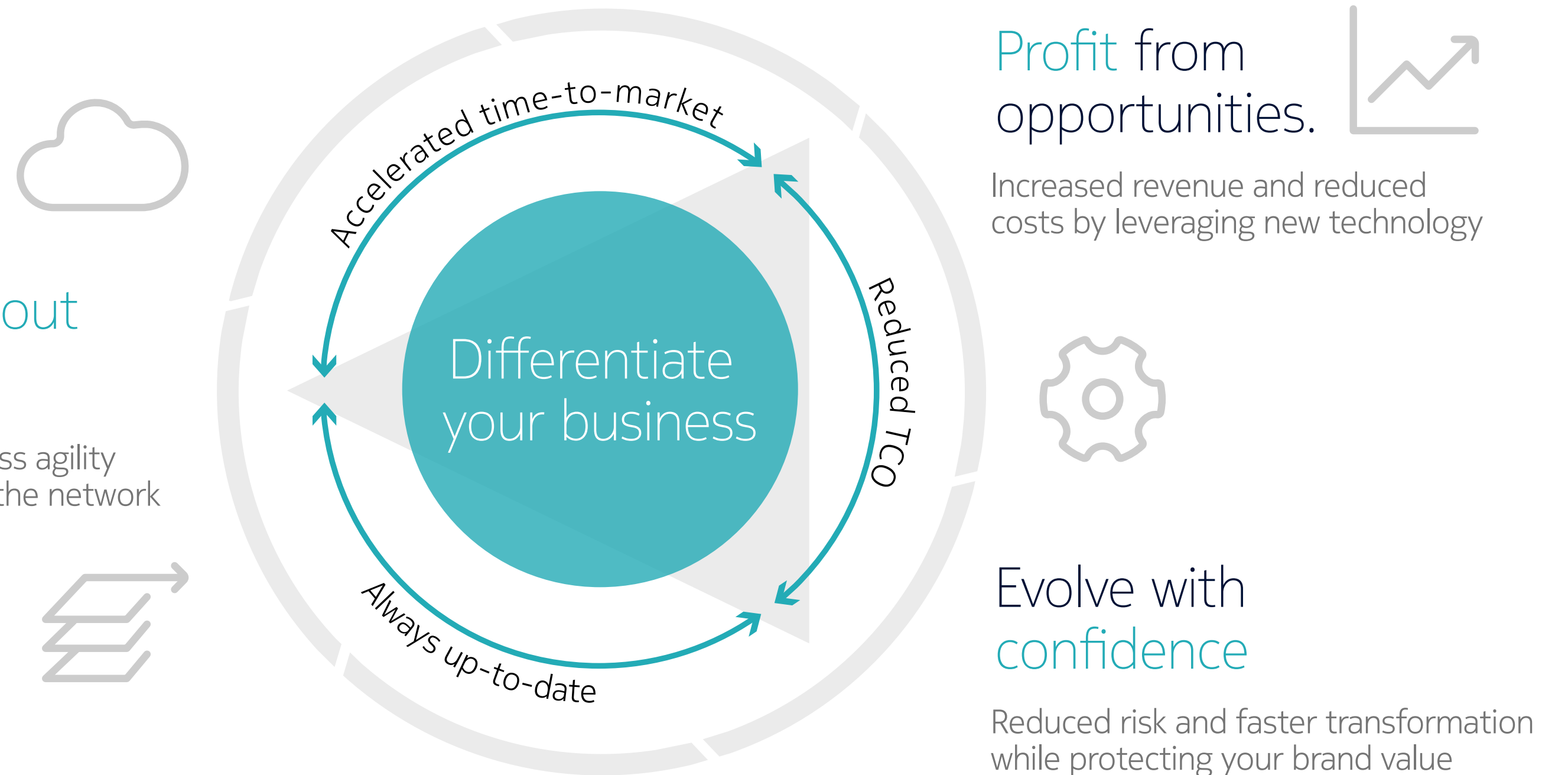
The Nokia CPC gives you a flexible and open core network and associated ecosystem that allows you to profit from opportunities today.

Core networks made real

To protect your investment and brand identity, you need assurance in selecting the correct vendor and technology choice. The Nokia CPC gives that assurance allowing you to evolve with confidence with a partner you can trust.

Deploy **without** **limitations.**

Unrestricted business agility while transforming the network



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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.

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.

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