

5G CLOUD-NATIVE MOBILE PRIVATE NETWORK

RIGHT WAY TO GO FOR INDUSTRIES AND SOCIETY DIGITALIZATION



OVERVIEW

The next generation 5G network architecture opens up opportunities for service providers and enterprises to leave behind outdated architectures and redesign the services they have been providing for many years, but also to enable industry to drive digitalization. A 5G network brings benefits for digital transformation, it is an enabler for delivering more innovative, secure, and cost-effective services.

5G technology offers opportunities for realizing features such as ultra-reliable low-latency communications (URLLC), enhanced mobile broadband (eMBB) and massive machine-based communications (mMTC). Latency is a key factor in industrial applications that require real-time communications. Tasks in manufacturing and industrial automation require latency of less than 1ms.

The 5G technology ensures communication with millions of devices in a limited space, which was not possible with the old networks. Therefore, 5G meets the service requirements of a smart city or a smart factory, which require communication with many devices and sensors simultaneously.

Finally, 5G technology with the eMBB use case reaches residential customers through the fixed wireless access solution and provides the ability to transmit massive data. Other 5G eMBB services include augmented reality/virtual reality glasses (AR /VR), which require massive data, and remote monitoring through a surveillance camera with enhanced image quality.

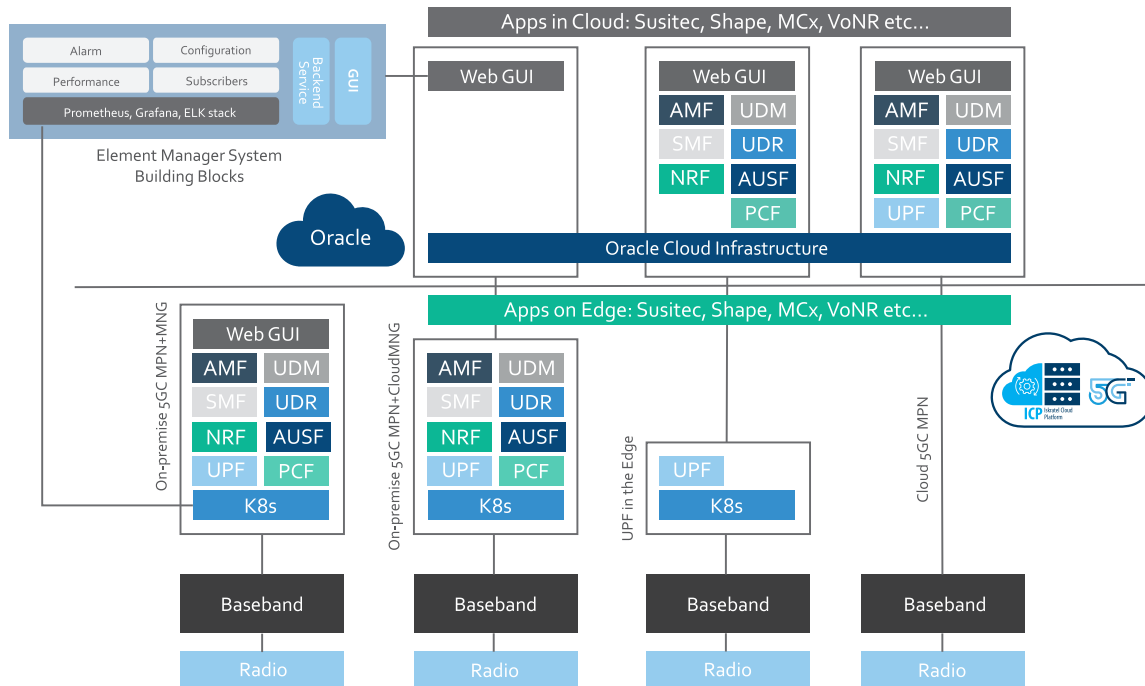
KONTRON CLOUD BASED 5G CORE SOLUTION

Kontron's in-house developed 5G is a 3GPP Release 16 compliant solution that includes all fundamental network functions from a Control Plane and User Plane perspective.

The solution is a cloud-native mobile 5G core that is hardware independent, meaning it can be deployed in any cloud - private, public or hybrid, centralized or at the edge of the network, with an optimized performance footprint for any deployment model.

5G Standalone (5G SA) ensures an unprecedented level of automation in an end-to-end network to meet the needs of new services and applications. The 5G Core solution is flexible, programmable, and decentralized, providing the flexibility needed to reduce time-to-market and achieve the highest levels of performance and efficiency.

DISTRIBUTED 5GC DEPLOYMENTS



The 5G core runs on a security-optimised Ubuntu OS, where all network functions are virtualized with containers and orchestrated by Kubernetes. Optimal performance can be achieved by using Kontron's Intelligent Cloud Platform (ICP), but other platforms such as OpenStack, VMware and Oracle Cloud Infrastructure are also supported. The system is hardware and platform independent, enabling seamless integration into various cloud environments.

We support 5G RAN solutions from our partners as well as equipment from Kontron Group, including field-proven 5G SA RAN solutions that include traditional and ORAN-based solutions. Our offering also includes 5G-enabled devices such as routers, gateways, cameras, and sensors.

Kontron's web-based management system provides a simple and powerful portal for managing 5G network functions and subscriber provisioning for the entire 5G system. Our solution provides a user-friendly, web-based Graphical User Interface (GUI) and a comprehensive configuration and status overview dashboard that provides a clear view of the devices, operational status, type and functionality of the network. The dashboard allows you to easily select and configure the network features you need, giving you complete visibility and control over your 5G network.



MAIN BENEFITS OF 5G MOBILE PRIVATE NETWORKS

As technology changes, enterprises must also change. The 5G Mobile Private Network brings digital transformation benefits to accelerate and simplify the process of adaptation and transition to digitalization. The 5G Core SA network is the center of gravity in this complex system. Below is a list of the key benefits of the 5G-based MPN mapped to our Kontron 5G Core capabilities and how they enable more innovative, secure, and cost-effective services.

Coverage

is provided indoors and outdoors through dedicated spectrum, even in remote locations. Our Kontron 5G ecosystem, integrates many variants of the RAN solution macro and small cell factors from various vendors in the traditional and ORAN space.

Security

is a critical component in all private networks. Kontron MPN provides a high level of security and complies with all FIPS-140-2 and the latest 3GPP features with encrypted keys. The nature of this solution ensures that all data remains within the enterprise.

Capacity

is an essential feature because a private network excludes any competition with other network users so that network performance, e.g., uplink and downlink bit rates and latency, can be guaranteed.

Control

allows companies to determine and control how resources are used and how traffic is prioritized. The radio access network can be customized to optimize reliability and latency, and security can be controlled to ensure confidential information stays in place.

Reliability

is ensured through mechanisms for mission-critical communications services and ultra-high definition video surveillance. One of the key elements of the Kontron 5G Core solution is redundancy, which relies on all cloud-native Kubernetes functionalities.

Predictability

and **low latency** are important for many IoT applications that rely on time-bound communications, where delays can lead to catastrophic failure. We optimize them with a focus on Time Sensitive Networking to control and ensure critical data is delivered on time.

KEY FEATURES

- Fully virtualized, **cloud-native 5G SA Core** infrastructure-agnostic-by-design (**containers/microservices**),
- Highly available and scalable solution that can be deployed on **COTS HW** or cloud platforms such as **Oracle Cloud Infrastructure**,
- Enables granular **end-to-end management** and control - easy to use by IT personnel,
- Solution designed and **developed for mobile private networks** for optimized value,
- Easy integration with **third-party vendors**
- Rapid deployment with **pre-installed** setups.
- SBA architecture; Release 16
- Using NRF
 - * NF Service discovery and selection
 - * High Availability
- Specific use cases
 - * Subscribed UE data manipulation
 - * RAT restriction
 - * Reregistration required
 - * Subscription withdrawn
 - * Framed Routing Support
- Subscriber provisioning and configuration
- Network exporters and Monitoring
- Logging
- SSO

Control and User Plane 5G Network Functions

- 3GPP R15/R16 5G Standards compliant
- Full blown Service Based Architecture (SBA) consists of:
 - * AMF: Access and Mobility Management Function
 - * SMF: Session Management Function
 - * UDM: Unified Data Management
 - * UDR: Unified Data Repository
 - * AUSF: Authentication Server Function
 - * NRF: Network Repository Function
 - * PCF: Policy Control Function
- UPF – general purpose User Plane Function HW agnostic
- DPDK UPF – high performance UPF with acceleration
- Intuitive **web-based GUI** for FM, PM and subscriber management with MPN dashboards

Kontron 5G C Key Functionalities:

- Registration Management
 - * Registration, Deregistration (UE, Network)
- Connection Management
 - * UE triggered, Network triggered (Paging), AN Release
- Mobility Management
 - * Xn based HO
- Security

Technologies in use

- Kubernetes, Multus CNI, SR-IOV, Prometheus, Grafana, Fluentd, EFK, Helm, CI/CD etc

Focus Use cases

- **Fixed-Wireless Access (FWA)** – as an increasingly dominant access network technology that brings broadband services to residential and business locations
- **Industrial IoT** and **TSN** implementation
- **Future Railway Mobile Communications System (FRMCS)** closely following the standardization process in which 5G is a fundamental part, we offer a proven solution for the railways.
- In the field of **Public Protection and Disaster Relief (PPDR)**, we developed new architectures and key technologies as well as a business model for the implementation of an advanced dispatcher-as-a-service based on 5G.

WHAT DO YOU GET WITH OUR SOLUTION?

Kontron's 5G Core SA serves as a crucial building block for a pre-integrated IIoT solution, facilitating a seamless transition to Industry 4.0 for industrial facilities and campuses. Our standardized 5G Mobile Private Network is now available in a production version, and we offer telecom providers and enterprises with private networking needs a great solution. With easy installation on a single server, high availability variant, or in the cloud, it provides new features that ensure successful 5G network operations. This makes it the perfect choice for private network deployment and testing and validating new services and applications in a 5G environment. Additionally, it is easy to manage and interoperable with other network components, making it an efficient solution for building an E2E network.

Kontron offers a complete range of E2E solutions, including RAN, end devices such as scanners, cameras, sensors, and industrial applications such as Susietec, from our own portfolio and our partners' best-in-class portfolios. In addition to technological excellence, Kontron provides optimal solutions, from one-time investment to pay-as-you-grow business models. We support the entire connectivity journey for enterprises who choose our Mobile Private Networks solution, including future-proof technologies that enable new applications and use cases.

WHY CHOOSING KONTRON?

In addition to the added value of the Kontron solution, our highly specialised and innovative team offers a comprehensive range of professional services (project management, engineering, deployment, maintenance, and support) and complete turnkey project services to help our customers achieve their goals. Choosing Kontron means relying on a long-term, committed partner with the guarantee that the project will be delivered on time. Kontron has an unmatched track record of successfully delivering projects and always strives to provide the highest level of quality and support.

