A Flexible and Scalable 5G System Architecture

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Technology and Innovation

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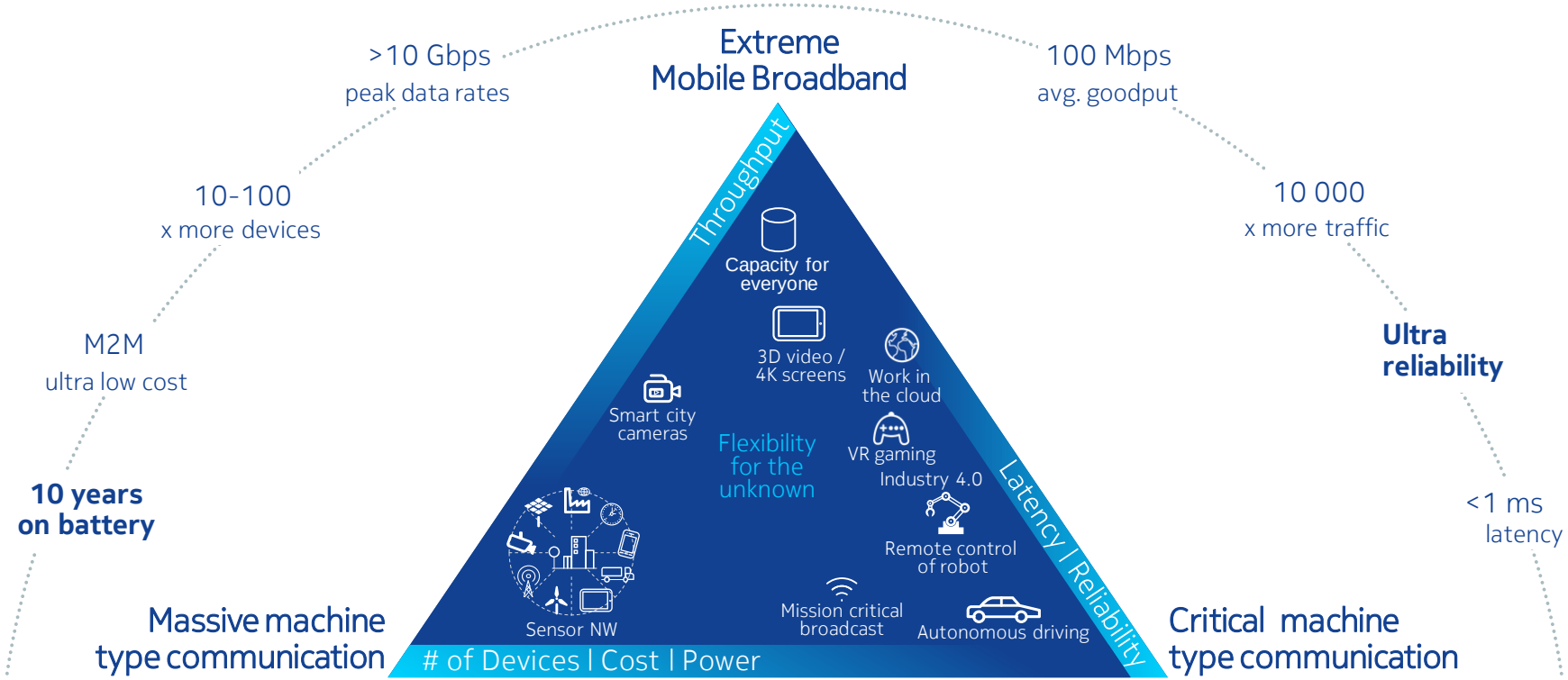
5G for people and things – diversity of use cases and requirements



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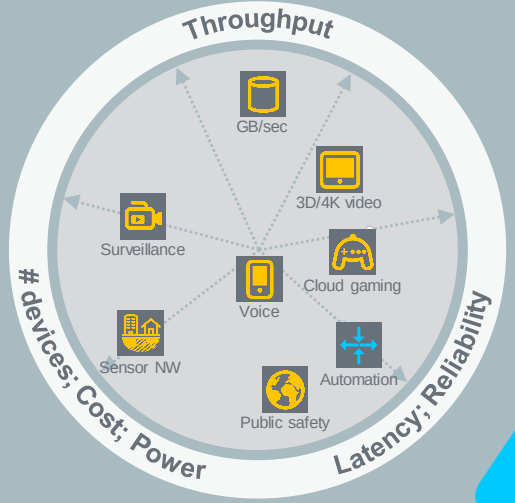
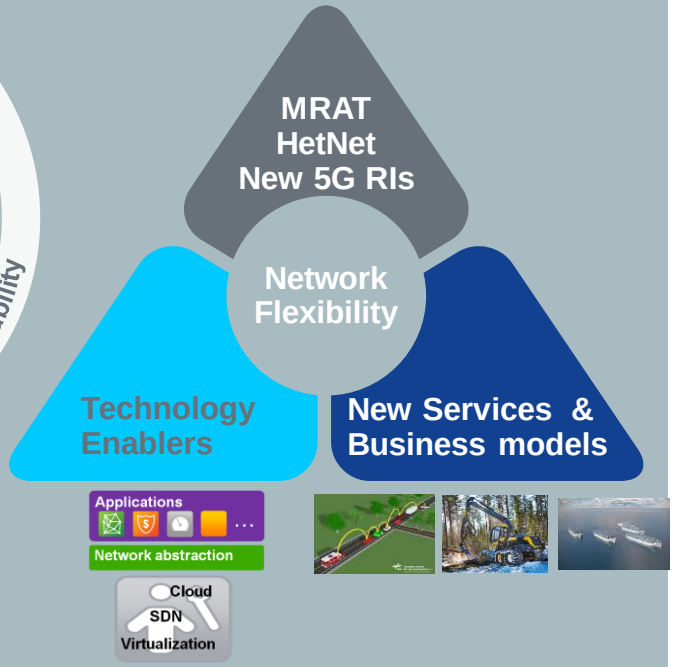
Driving Forces for the 5G Network Architecture

Diverse requirements – exponential volume growth





from ‘one size fits all’

to

‘flexible per service ’ network

Main Requirements impacting the Network Architecture

Grouping (at high level) NGMN and 4G America Requirements

1. **Native NFV and SDN based Network Architecture**
   - decomposition and optimized-reassembly of current functions

2. **Common (Access agnostic) Core Network (NGMN)**
   - Definition of access specific and access independent functions

3. **Network Flexibility, New Requirements for Verticals**
   - Network Slicing, Flexible RAN-any xhaul
   - Mobility on demand, session on demand, enhanced connectivity management (for e.g. PtM, local switching, connectionless, etc.), QoE, resilience against outages of or disconnect from core (e.g. for public safety)

4G americas

ngmn
the engine of broadband wireless innovation

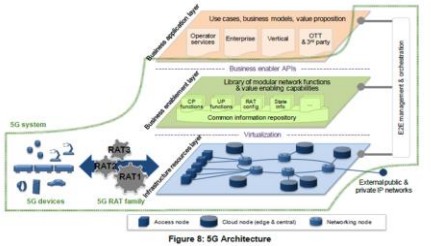


Figure 8: 5G Architecture

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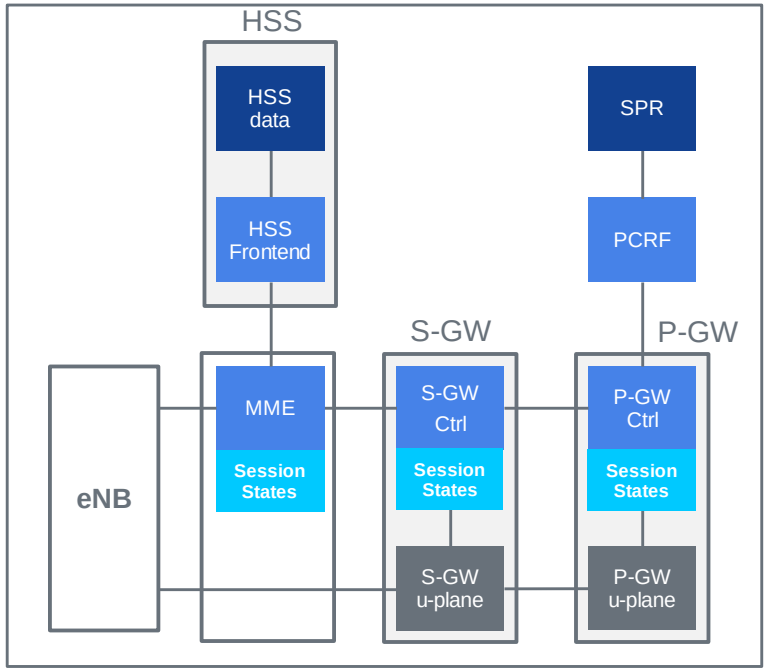
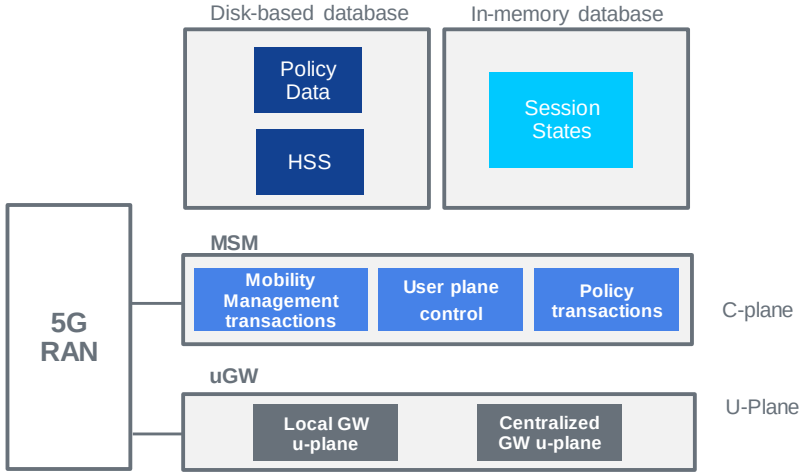
Towards a layered architecture for the 5G evolved core cloud
For better exploiting NFV and SDN technologies

Today: 3GPP box-driven function split



5G: Layered architecture for the core cloud

1. Logical and physical separation of user plane
2. Session states separated from control plane
3. State-less and consolidated control plane



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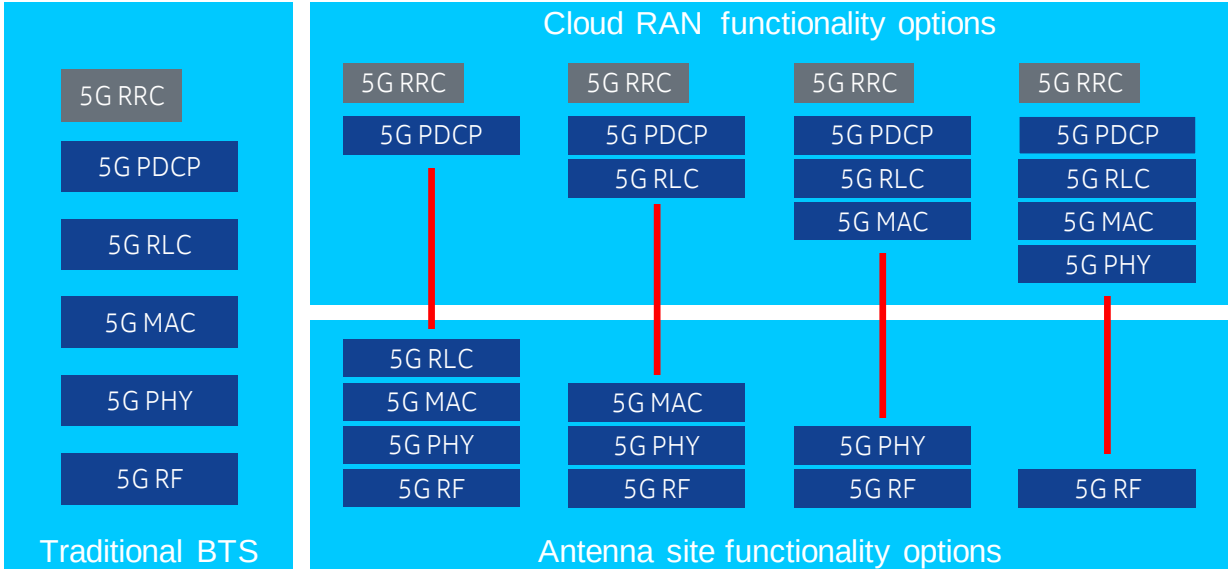
Fronthaul in 3GPP 5G Workshop – Nokia

RWS-150010

Many functional split possibilities – different fronthaul requirements



5G should be deployable regardless of the fronthaul technology, latency or capacity

Optimal functional split may depend on the available fronthaul

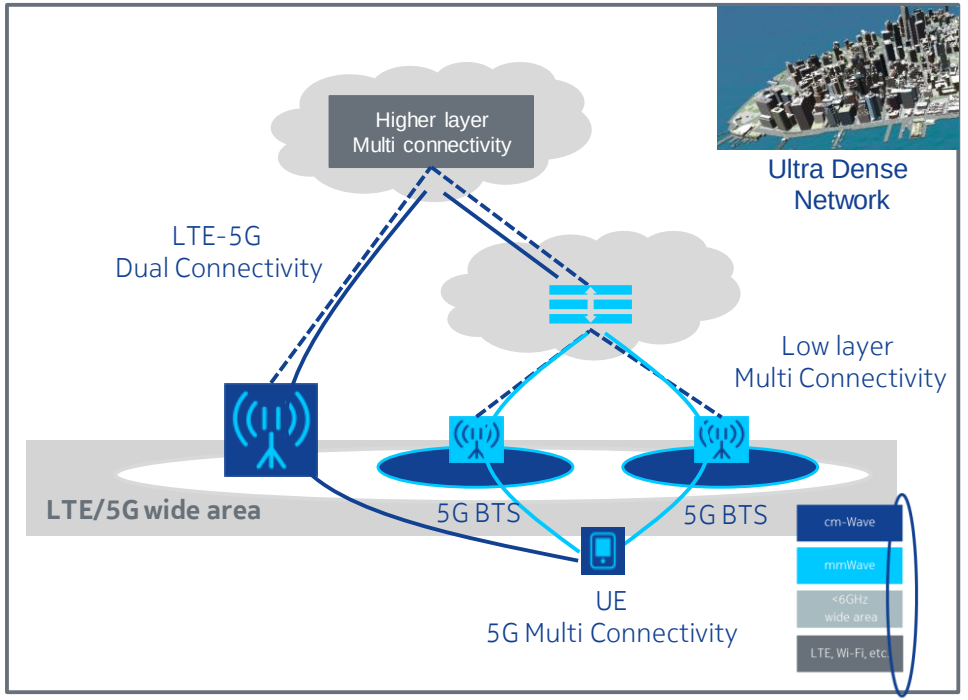
5G radio specification should consider functional split and not limit

Simultaneous and native Het Net & multi-connectivity
Reliability

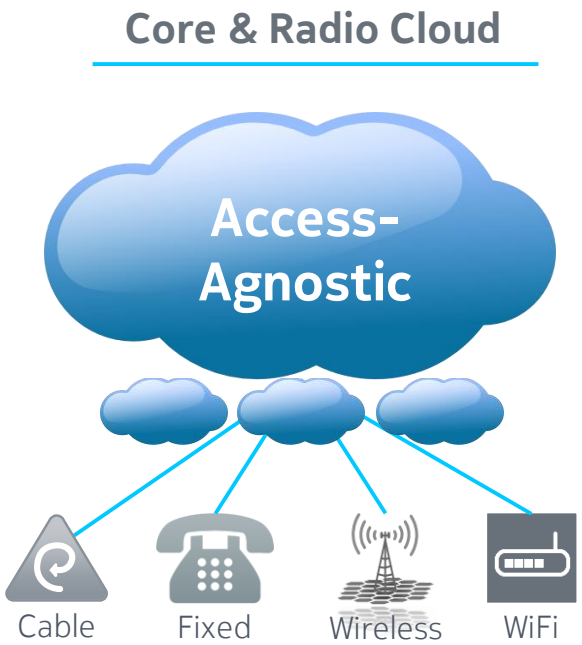
3

- LTE⇔5G dual connectivity ensures smooth introduction of 5G
- 5G multi-connectivity improves robustness and data throughput
- Multi or Single connectivity selected depending on the type of service

Benefits:
- Highest data throughput and consistent end user experience
- Enabler for the growing market of mission-critical services, e.g. health and safety, industry automation



Access-Agnostic Core



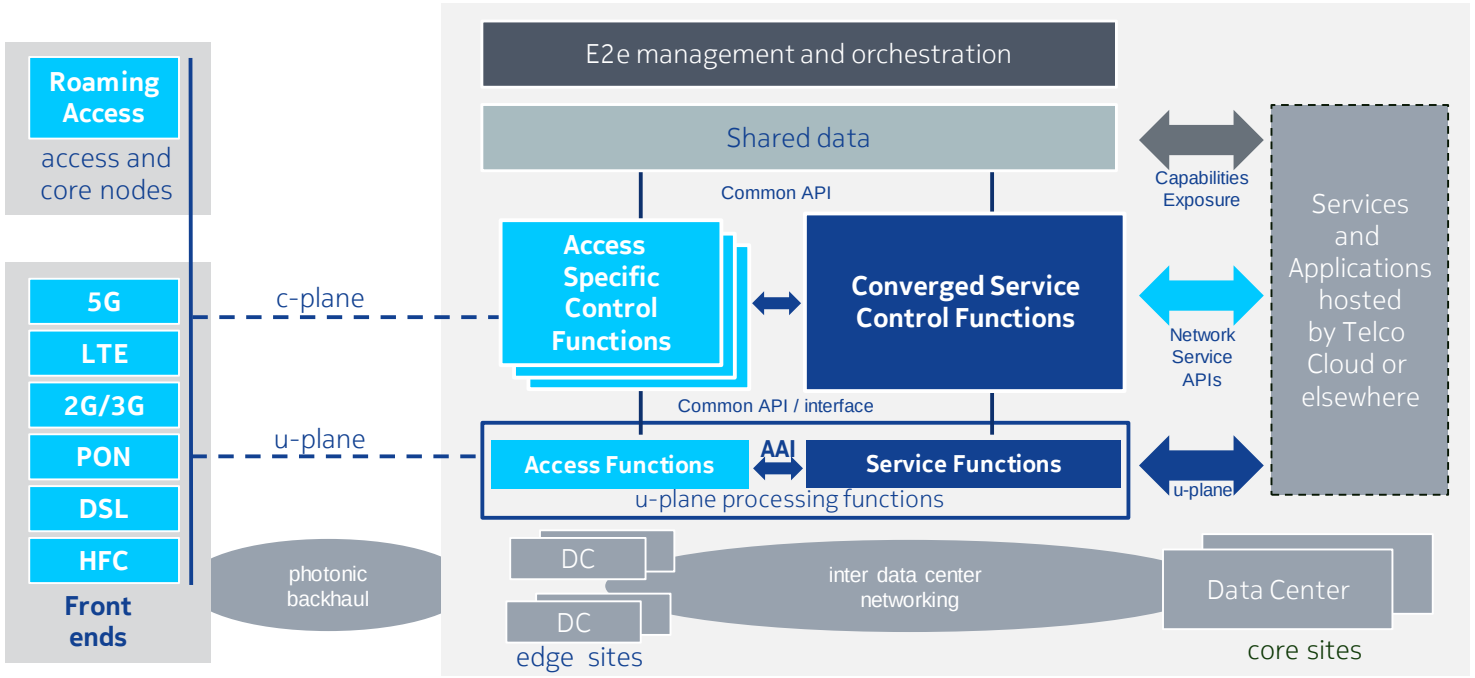
Characteristics

- Distributed cloud
- Multiple access network types
- Automation
  - Orchestration, SDN
- Flexibility
  - Network Slices, Chaining
- Cognition through analytics

Approach

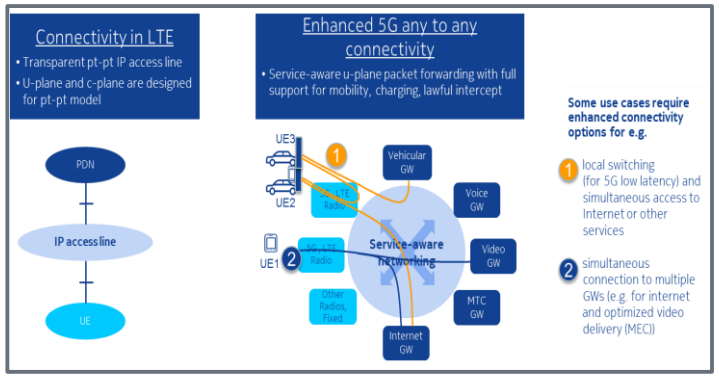
- Define administrative domains and required reference points
- Decompose legacy network elements into basic functions
- Assign functions strictly to their respective domain
- Derive models for the interfaces of the reference points

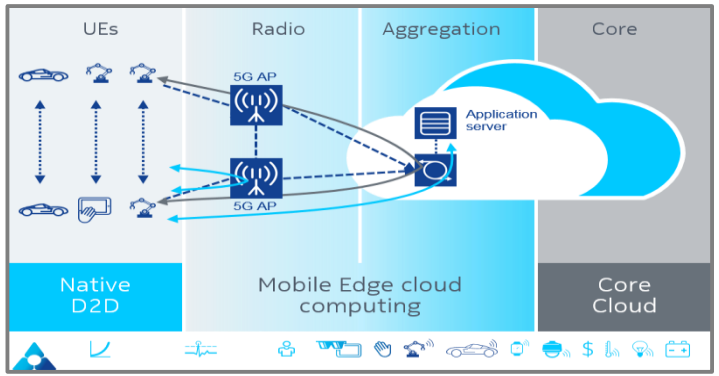
Converged Network Services Architecture
Common (Access agnostic) Core Network (NGMN)

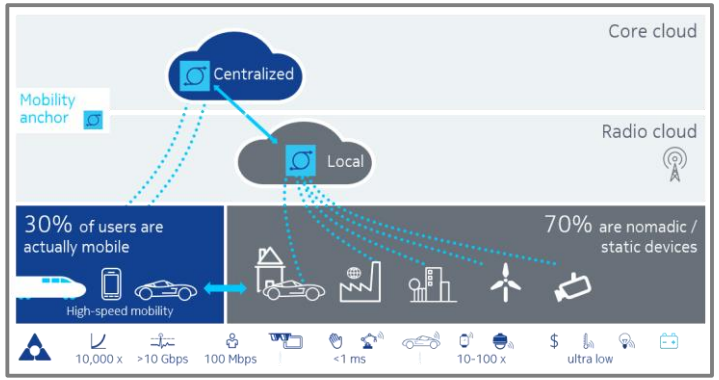


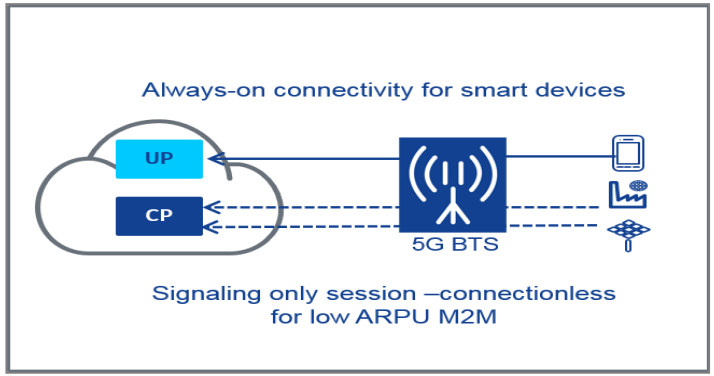
Feature ‘on demand’

3









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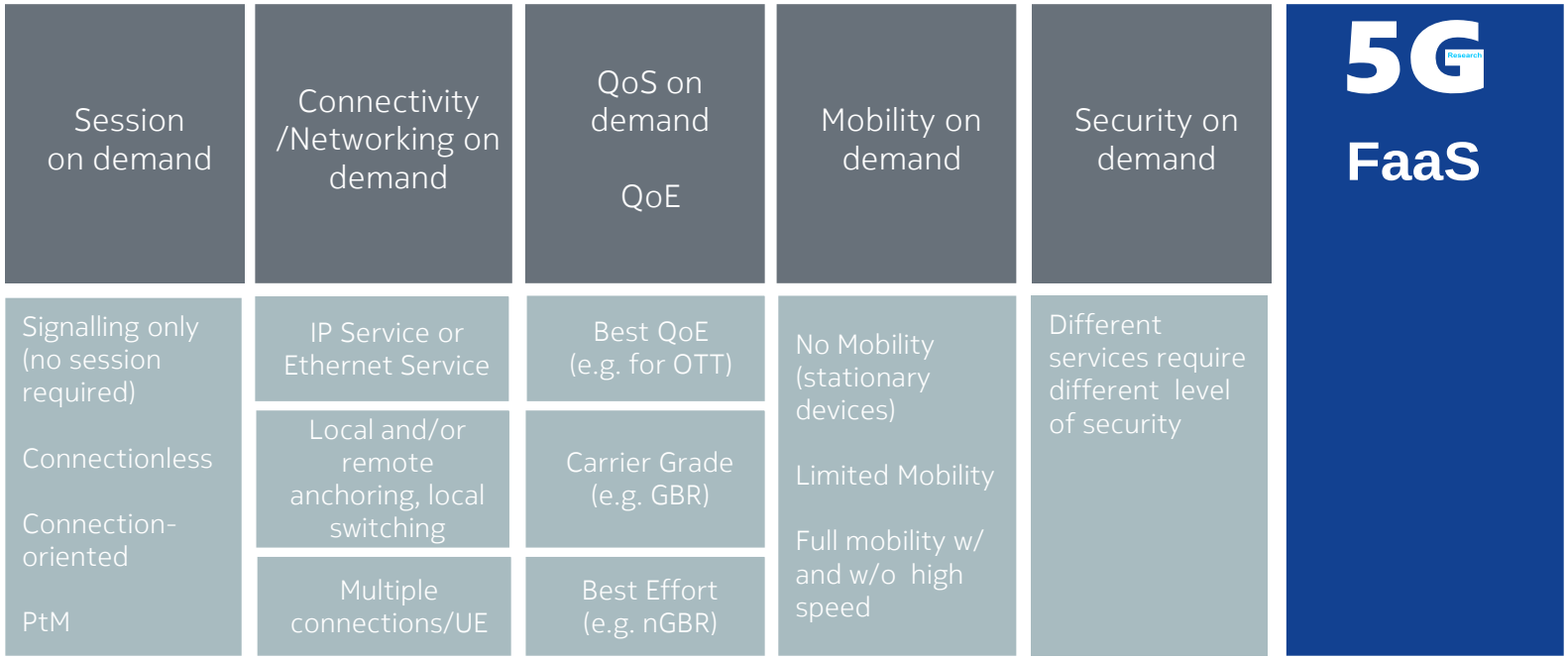
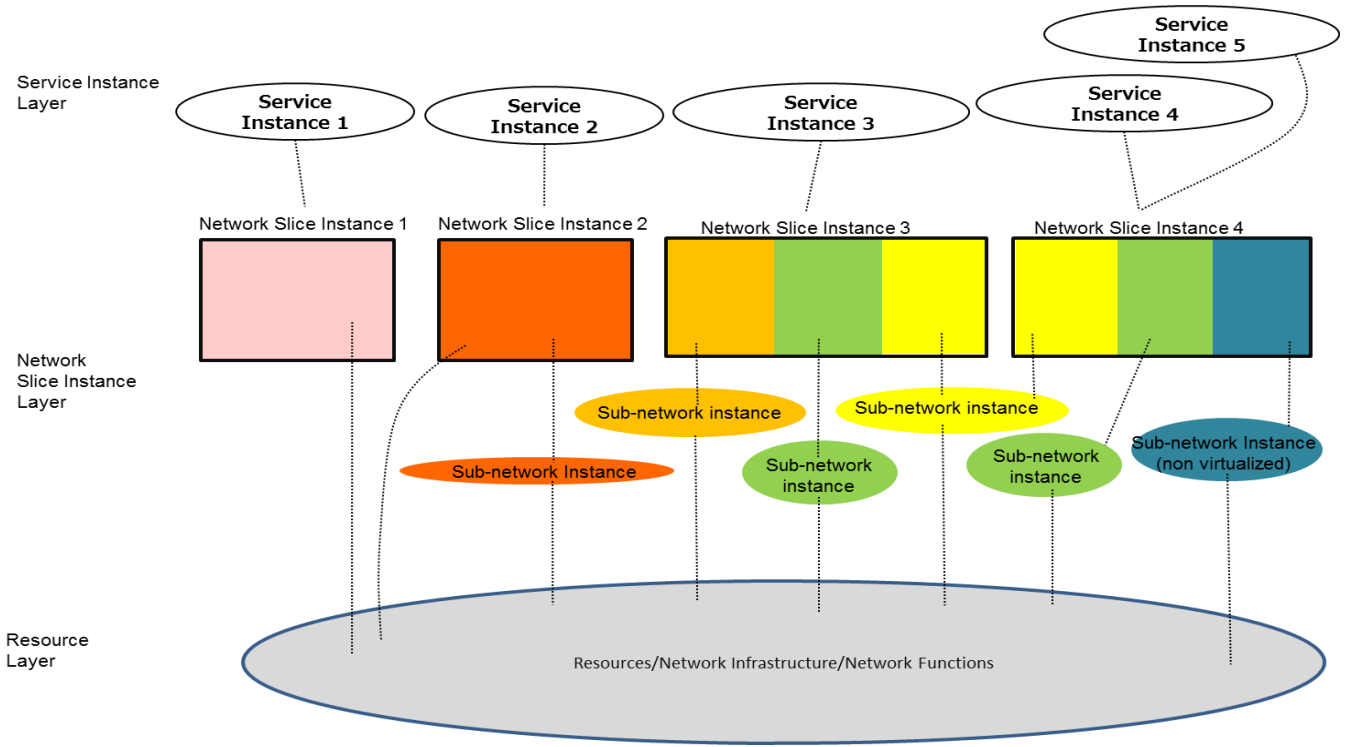
FaaS Toolbox
Feature-as-a-Service



Network Slicing according to NGMN
- New Service Introduction, Cloud Transformation, Overlay deployment



Multi-service scenario
Example: LTE in Tier 1 MNO

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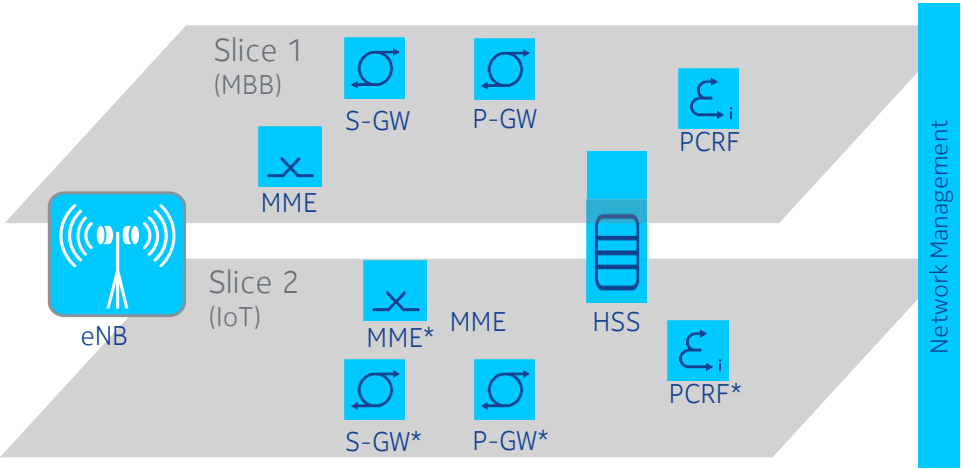
- Owner and operator of infrastructure
- Operator of NW management system (incl. NFV MANO)
- NW slices implement service-specific mobile network instances, e.g. with customized u-plane and PCRF functionality
- All instances are managed and controlled by the MNO
- Network functions are shared when operationally necessary or economically sensible
- Network management has full awareness of existence of multiple slices



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Connect to 5G NORMA

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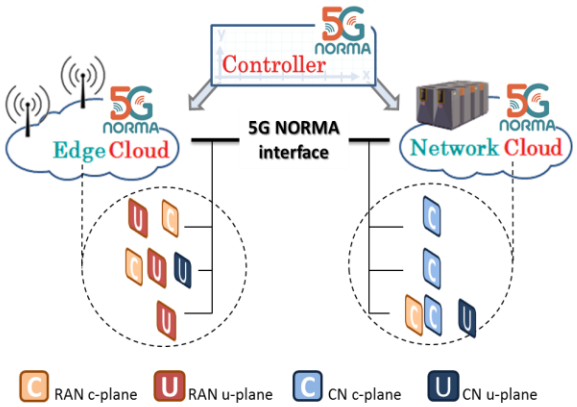
Visit 5G NORMA

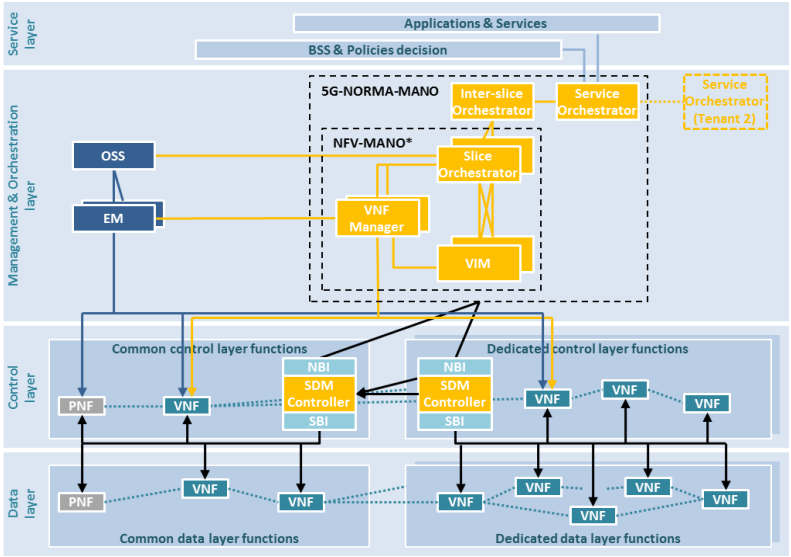
- ✓ 5G Architecture demo @ IEEE Globecom 2015 in San Diego
- ✓ 5G Architecture panel @ IEEE Globecom 2015 in San Diego
- ✓ Demo at EC booth @ MWC´16

Nokia Networks Project Coordinator

5 x 5G NORMA Innovations



1. *Software Defined Mobile network Control (SDMC) applies SDN principles to mobile network*
2. *Adaptive (de)composition and allocation of mobile network functions (c-plane and u-plane) between network and edge cloud that depends on the service and deployment*
3. *Joint optimization of mobile access/core network functions when located together in the network or edge cloud*



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VDE/ITG 5.2.4