5G-MONARCH

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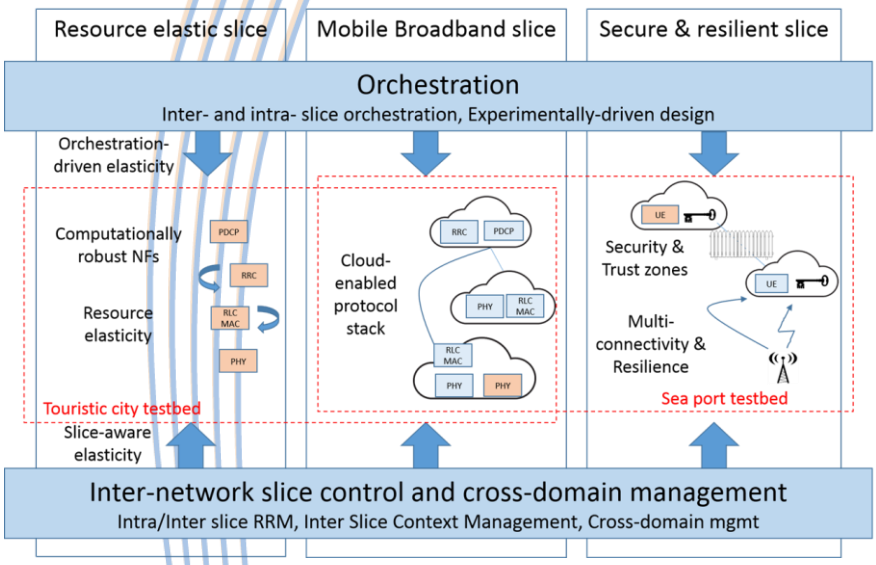
Turning 5G mobile network architecture concepts into practice



Project Goals

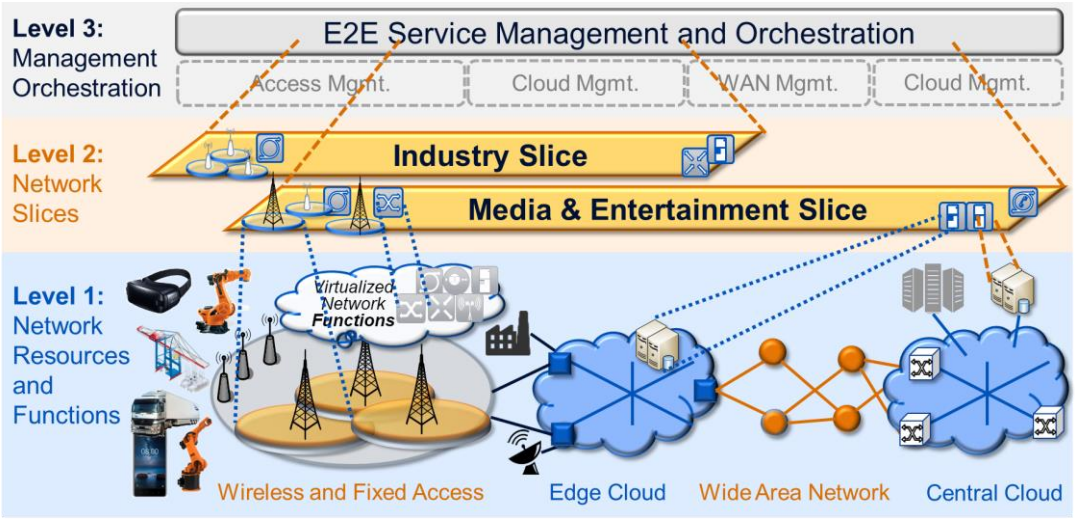
- ❑ Enhance and complete **5G network architecture** concepts and standards: make 5G network slicing actually usable
- ❑ Develop and implement dedicated **vertical use cases** with specific functionality requirements: Industry and Media & Entertainment
- ❑ Proof-of-concept and validation through simulation and **real-world testbeds** – smart sea port and touristic city

Network slicing

A core 5G technology that

- ❑ Provides **isolated logical networks**
- ❑ Builds on a **common network infrastructure**
- ❑ Uses software-defined networks, virtualisation, orchestration, analytics

Each slice is **tailored** to the requirements of a particular user, application, use case



Resilient and secure network functions

to support **industrial applications** and services

- ❑ **RAN reliability**: multi-connectivity, network coding in uplink and downlink, to enable uninterruptible connectivity for highly critical services
- ❑ **Resilience in telco clouds**: enhanced fault management with fault isolation and prioritisation, to prevent fault impact on service quality
- ❑ **Security**: slice-aware security trust zones, to enable highly secure areas for critical services

Resource elastic network functions

to support high flexibility, e.g., for **media mass events**

- ❑ **Efficient resource scaling** by using multiplexing gains of several elastic slices, to enable efficient use of networking resources for highly flexible services
- ❑ **Graceful downscaling** in case of outage of resources, to prevent from service failure
- ❑ **Orchestrate**: re-allocate network functions within and across the edge cloud for optimised support of the requested service quality

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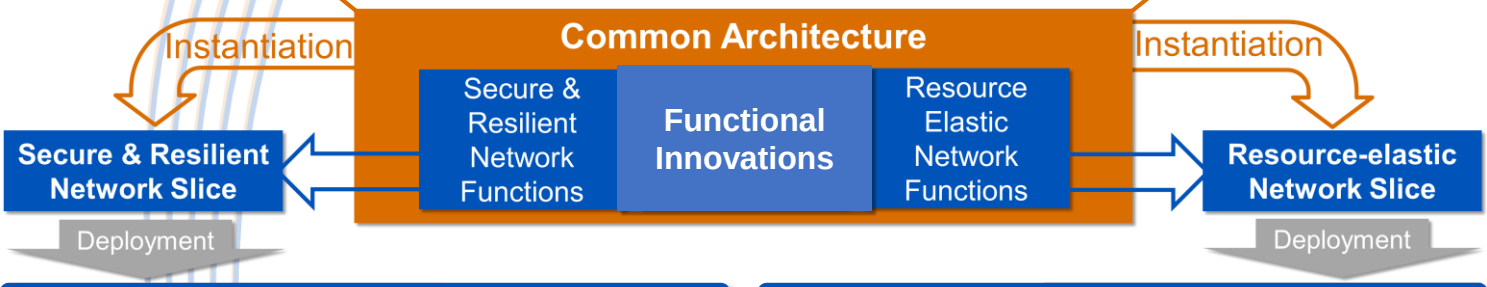
Physical and virtualised network functions integrated into **common framework**
Slicing support across network layer, control layer, management layer
Multi-tenancy capable network management & orchestration
Dynamic **resource sharing** between slices



Hamburg Smart Sea Port testbed

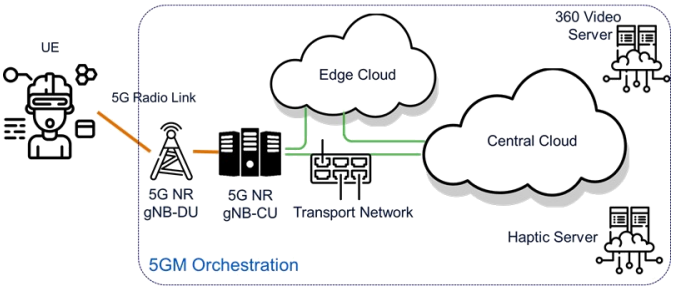
Three customised network slices fulfilling **industrial requirements** on **reliability, resilience, and security**: failsafe operation of applications in the port

- ***Better Traffic Flow (URLLC):*** Transportation traffic steering within port area through connecting traffic lights to control centre
- ***Improved Pollution Control (mMTC):*** Air quality monitoring in the port area through connected sensors on moving barges
- ***Improved Port Operations (eMBB):*** AR/VR and video streaming for remote expert assistance of port engineering teams

Turin Touristic City testbed

Two customised network slices fulfilling requirements from **media & entertainment**: flexibly handle temporary mass events with **high load / throughput** per user and challenging **latency** requirements

- ***AR/VR for live event experience (eMBB):*** 360° museum view full of real and imaginary people, enabling remote visits
- ***Cooperative media production (URLLC + eMBB):*** user interaction with virtual environment and other users, to offer remote guided tours in the museum



Technical Benefits and Commercial Impact

- Closing conceptual gaps in 5G network slicing and architecture concepts, service-specific functions
- Improve and proof usability of network slicing
- Development, evaluation, validation, and implementation of real-life 5G use cases
- Enhanced products (e.g., orchestrators, edge-cloud RAN, management solutions)
- Enabling novel services (by network slicing)
- Opportunities for new market players – mobile service providers, tenants