Understanding the Potential of Open Campus Networks for driving an ”Open 6G for all” - *Lessons learned from the German Flagship Project CampusOS*

Fraunhofer FOKUS / TU Berlin

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https://www.6g-ready.net/

Mobile Network Evolution Towards 6G – Driven by Open Campus Networks

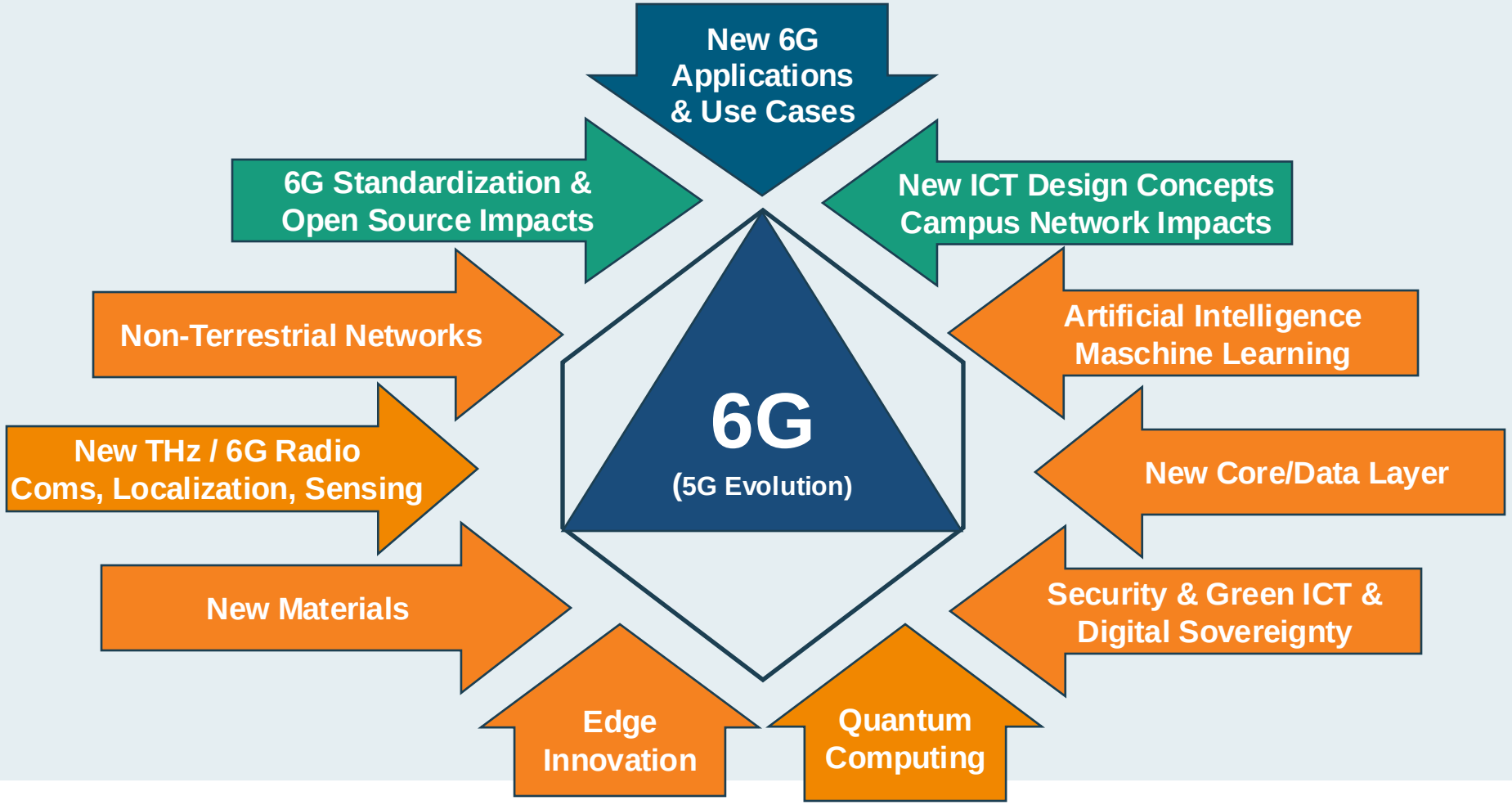
Classic next G network evolution – every ten years a new G is arising …

- Higher radio frequencies, more speed, more devices, new services, …
- 2G made 1G international and digital
- 4G made 3G a useful mobile internet (VoIP/VoLTE + M2M/IoT)
- 5G is extending / optimizing 4G to multiple vertical application domains (the big challenge – “how does one size fit all”?)
- 6G will likely extend 5G and make 5G “perfect” - expectations should meet reality

Lots of lessons are learned from 5G deployments and evolution research

- 5G vertical applications are diverse and need dedicated network features ➔ network customization
- End to end network modularity, interoperability, and openness will become key ➔ driven by Open RAN concepts
- Network softwarization, cloudnative and AI enables more agile network developments ➔ DevOps and CI/CD
- 6G research seems to extend 5G towards higher frequencies (JCS), better coverage (NTNs), robustness, and sustainability
- **We assume 6G will be (mainly) driven by 5G Campus Network evolution!**

Technology and societal Impacts for 5G Evolution towards 6G



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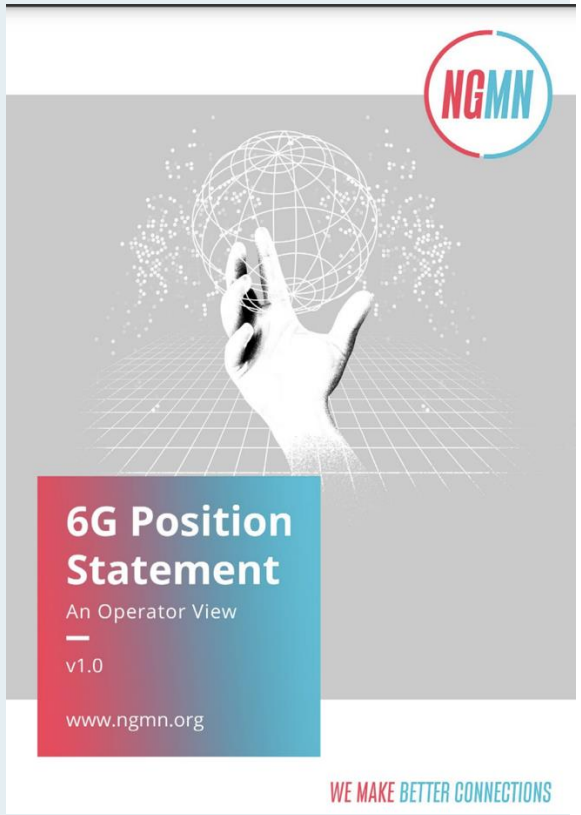
NGMN 6G Position Paper 09/2023 – Cooling down the 6G hype and expectations

- NGMN Alliance (NGMN) published end of September 2023 the **"6G Position Statement: An Operator View".** With this essential publication NGMN guides a course for the future of communication networks by taking a proactive stance and emphasising the needs for a new paradigm for graceful evolution and successful value creation and delivery.

- *"NGMN is committed to ensuring that 6G delivers tangible benefits to end-users, simplifying network operations and ensuring sustainability, while offering compelling new experiences", he added*

  "Whatever 6G might become, it will be built on the foundations of 5G"

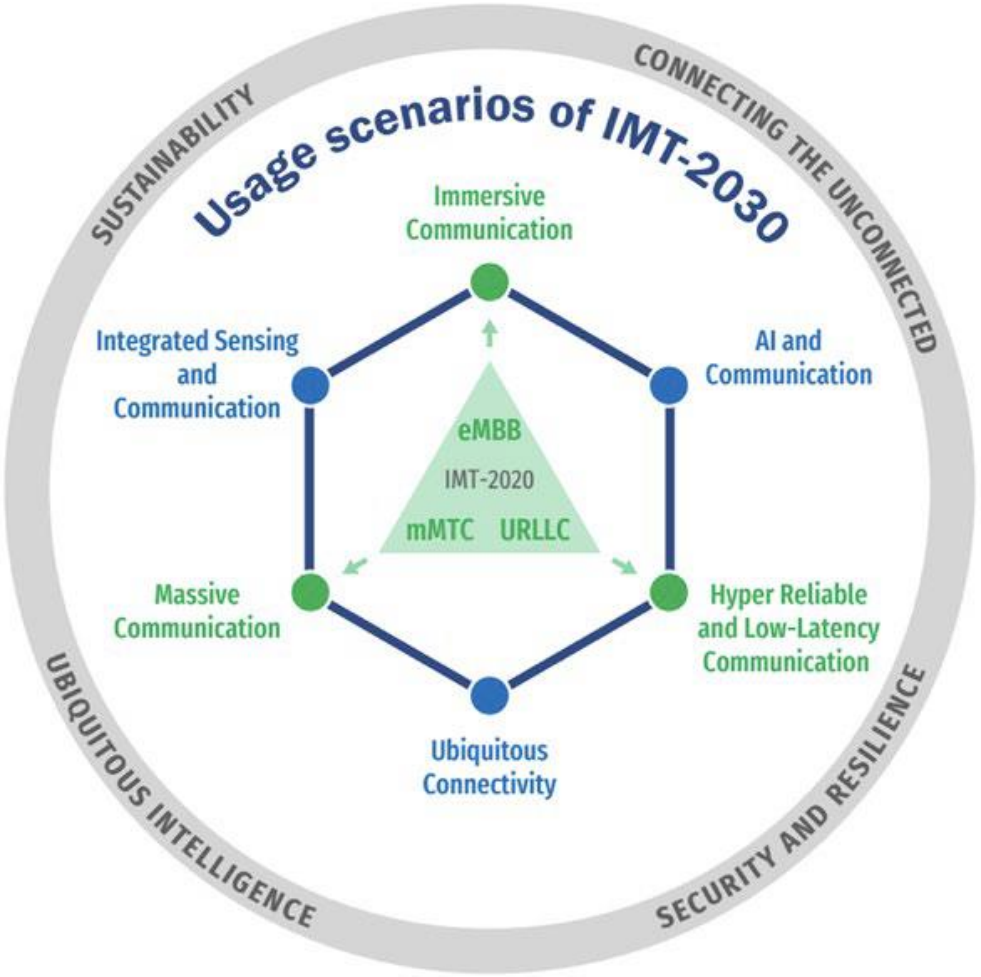


More Information and Download:

https://www.ngmn.org/highlight/ngmn-publishes-6g-position-statement.html

Usage scenarios and overarching aspects of IMT-2030 (Source: ITU-R M.2160)

- The IMT-2030 framework highlights ***sustainability, connecting the unconnected,*** security and resilience, and ubiquitous intelligence as overarching aspects which act as design principles commonly applicable to all usage scenarios.
- It goes on to describe six usage scenarios, three of which expand existing IMT-2020 usage scenarios and three new usage scenarios.
- The first three categories of IMT-2030 framework - immersive, reliable, massive - can directly be taken as an expansion of IMT-2020 usage scenarios such as eMBB, URLLC and mMTC.
- These usage scenarios are to cover a range of environments including hotspots, urban and rural, and together create increasing demands on aspects such as spectrum efficiency, higher data rates, lower latency, and increasing density. The IMT-2030 framework goes on to identify new capabilities related to sensing, AI, and positioning that may be used to enhance usage experience of each.



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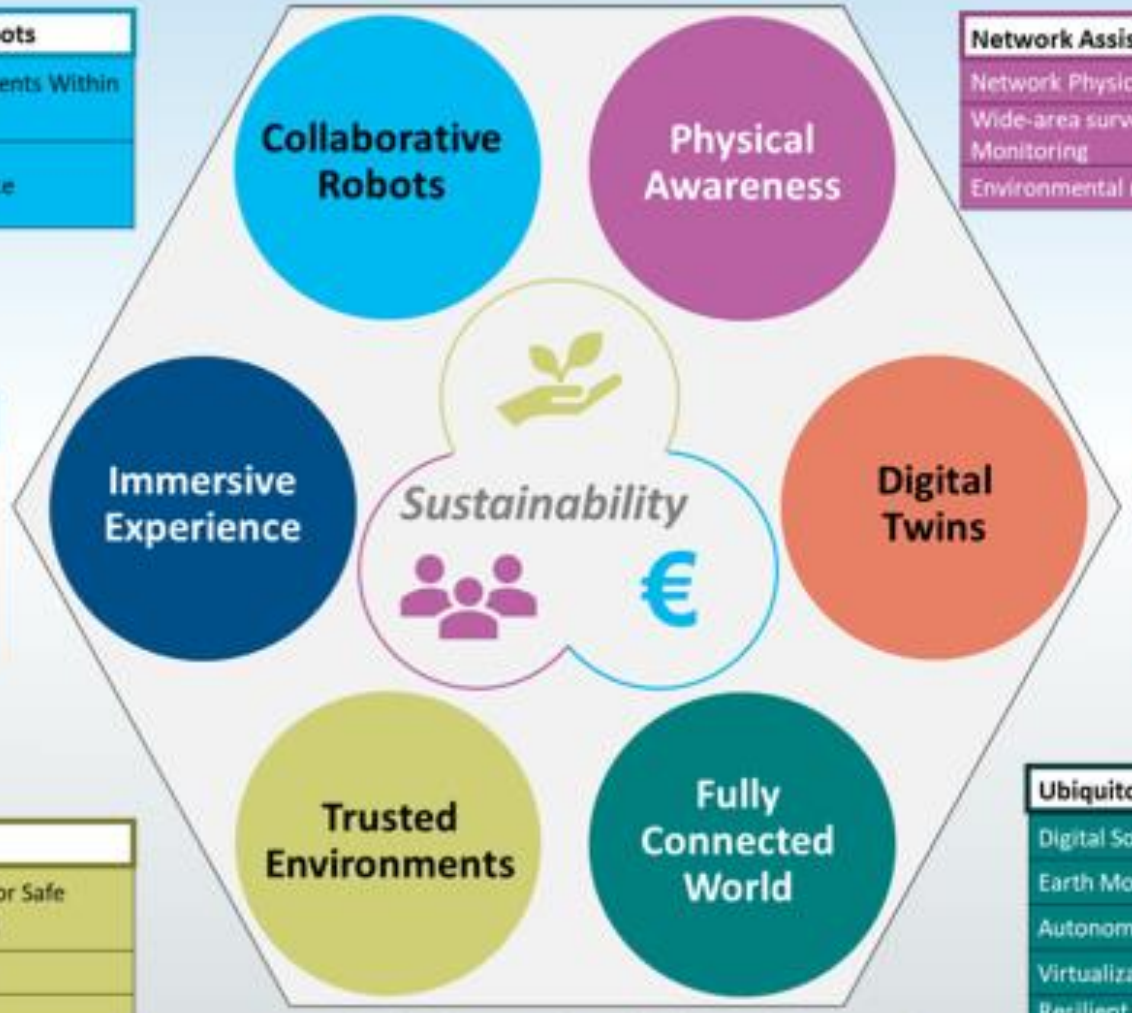
Use case families



Cooperating Mobile Robots

- Autonomous Embodied Agents Within Flexible Manufacturing
- Mesh Embodied Intelligence

Network Assisted 3D Mobility

- Network Physical Data Exposure
- Wide-area surveillance/Smart Crowd Monitoring
- Environmental radio sensing

Seamless Immersive Reality

- Immersive Enterprise & Industry
- Immersive Education
- Immersive Gaming
- Live and Interactive Immersive Content Creation

Realtime Digital Twins

- Cloud Continuum
- Smart Maintenance
- Digital Twins (Building Model)
- Public Protection & Disaster Relief Digital Twin

Human-Centric Networks

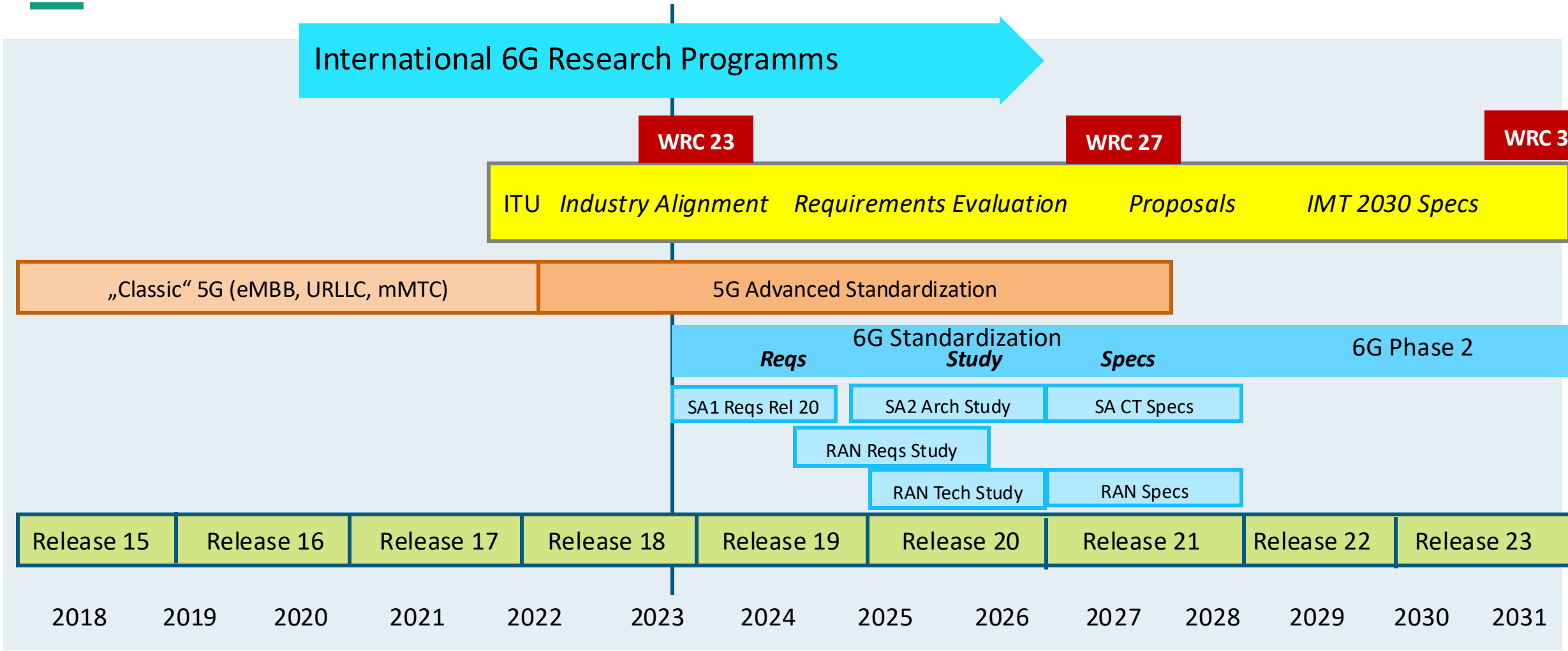
- Industrial Sensors Network for Safe Production & Manufacturing
- Wireless In-Vehicle Network
- Virtual Control Room

Ubiquitous and Resilient Network

- Digital Sobriety and Enhanced Awareness
- Earth Monitor, Sustainable Food Production
- Autonomous Supply Chain
- Virtualization of Device Functionalities
- Resilient Communication for Safety critical Applications

More detailed material avajlable in the Appendix

Timeline towards 6G Standardization in 3GPP



6G will start with Release 21

A Global Initiative for enabling early non-discrimentory access to 6G

6G can't be a "one size fits all" network – Build your own 6G

This global initiative aims to allow every country / region to build its own local 6G ecosystem, ranging from advanced industrialized countries up to developing countries

- Lesson learned from 5G: huge complexity in use cases and technologies, slow adoption of 5G
- Global 5G standards are too complex and late, so what will be the outlook for 6G?
- Private / Enterprise / Campus Networks gain momentum and show the directions
- Targeted 5G/6G Application domains have their own ecosystems and connectivity becomes an integrated part of the verticals
- Local skills development requires ***open research infrastructures and toolkits*** ➔ OpenRIT
- So lets enable the early exchange of best practices in building these OpenRITs

Depending of who you are (Operators, Integrators, Providers, Enterprices, etc)

Opportunities and Challenges of Software-based Open Architectures

Opportunities

- More commercial flexibility to react to dynamic markets
- Implementation of different business models
- More flexibility for network customization
- Lower prices due to more competition
- More innovation in specific areas
- Easier entry for new players, i.e. SMEs
- Building of local eco systems – digital sovereignty

Challenges

- Company readiness for business model diversity
- Increasing complexity of value chains
- Integration complexities and costs
- Performance and efficiency limitations
- Limited size of existing eco systems
- Interoperability and Certification
- Legacy Interworking & Migration
- Skill transition / human resources education

What does „Open“ mean?

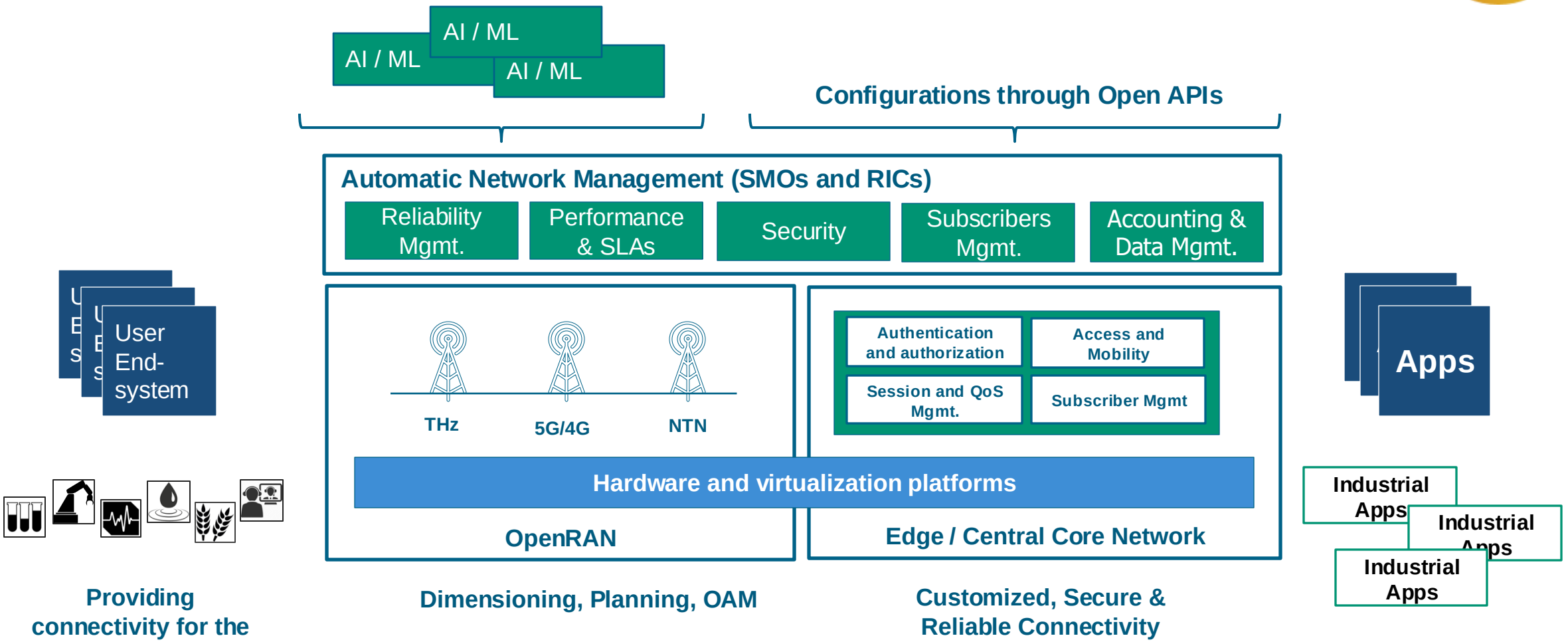
Openness is used in telecommunications since many years in many contexts …

Motivated to create innovations and flexibility many different approaches have been taken:

- Open APIs – typically on top of a closed (black box) network exposing network funntions
- Open Business Models – flexibility in building and operating networks
- Open Eco Systems – an increasing / open number of (local) suppliers / providers
- Open Data – reuse of typically IOT data in a borader context (like Smart Cities)
- Open Source – tricky – free license but probably high costs in integrating / maintaining
- Open RAN – Disaggregation of the Radio Network Components pushing competition and innovation
- Open Architectures – Modularity, Interoperability and Plug & Play to provide flexibility

➔ ***Open Testbeds allow to validate these approaches and establish the related eco systems!***

An simplified Open 6G-ready Testbed – to be seen as a 5G Evolution …



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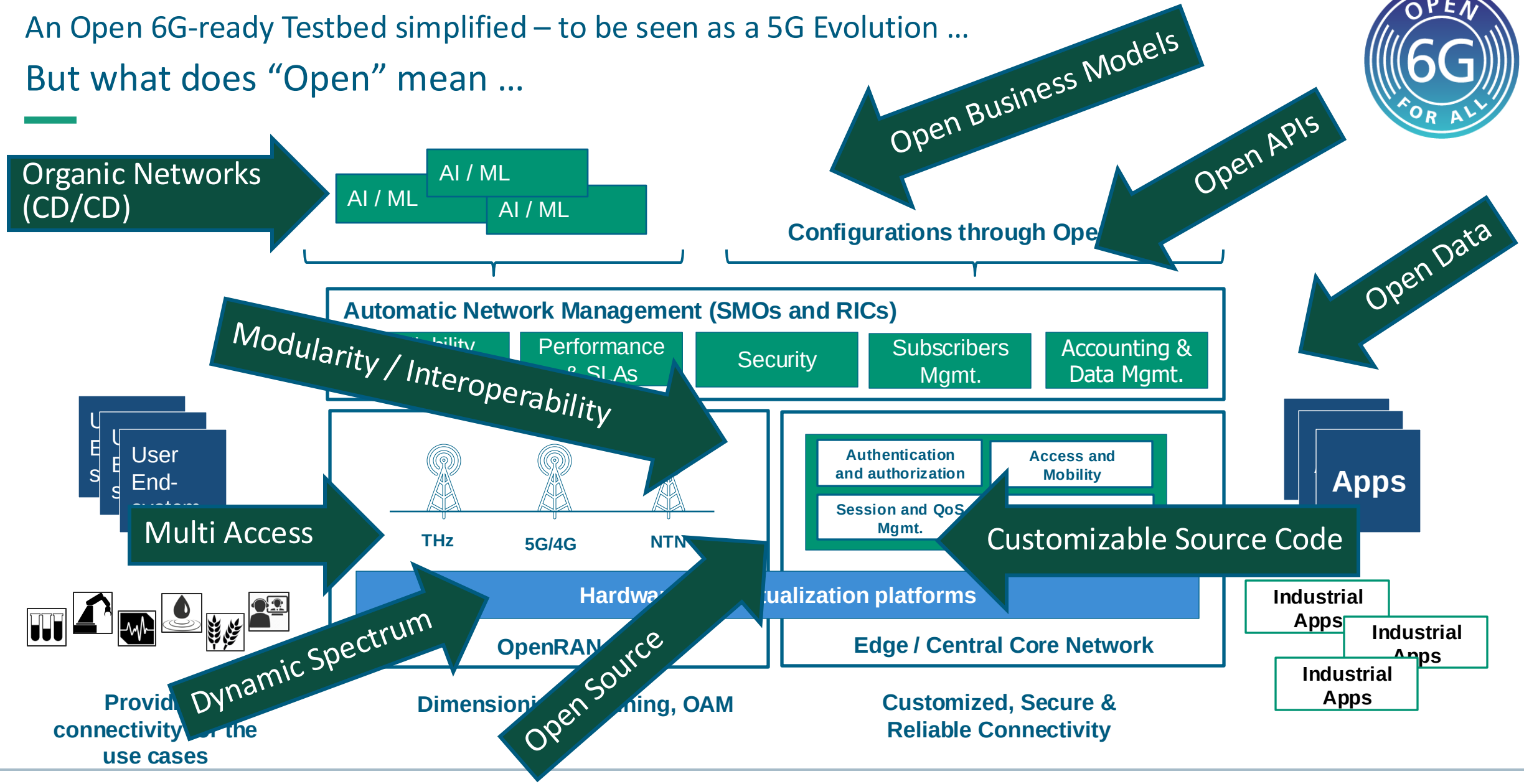
An Open 6G-ready Testbed simplified – to be seen as a 5G Evolution …

But what does “Open” mean …



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Mapping current 5G Campus Network Innovation Areas to the 6G Continuum

Research / Innovation Area	5G Campus Networks	6G Continuum
Higher frequencies	mmWave	THz
Localization	Positioning	Positioning and Sensing (JCAS)
Softwarization	Cloud-native	Organic
Virtualization	Edge	Infrastructure FREE
Disaggregation	SBA, OpenRAN	Organic
Management	AI/ML optimizations	Holistic/scheduled network management
Rural coverage	Direct-to-(GEO/MEO) Satellite	multi-orbit/3D NTN

CampusOS

Building an ecosystem for 5G campus networks with open and modular network technologies and interoperable components

info@campus-os.org | www.campus-os.io

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CampusOS in a nutshell

The German flagship project CampusOS

Supporting the establishment of the related local / sovereign ecosystem

for open and modular 5G campus networks in the German and European context

- Architecture building blocks, blueprints, HW / SW components
- System design and business models
- Testbeds, demonstrators and pilot applications in production, intra-logistics, connected mobility, construction sites and agriculture
- Complemented by application projects in safety services, wharfs, hospitals, science parks, …

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Why Open and Modular 5G Campus Networks?

Disaggregation and a new German / European Ecosystem

Expected Benefits:

- Application-tailored networks
- Interoperable HW/SW components
- Openness for automation and AI innovations
- Faster innovation & time to market
- Digital sovereignty

- **Lower market entry barriers (e.g. for SMEs and startups)**
- **New operating and business roles**
- **Larger ecosystem**

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CampusOS Project & Ecosystem

Flagship project funded by the German Federal Government

CONSORTIUM
- 18 Industry partners
- 4 Academic partners

TOTAL COST
- 30.1 Mio. €

FUNDING
- 18,1 Mio. €

DURATION
- 01.01.2022 – **31.03.2025**

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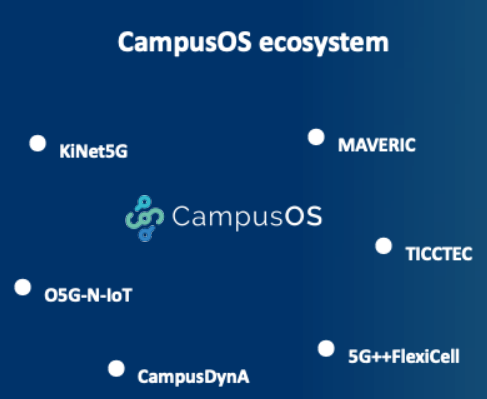

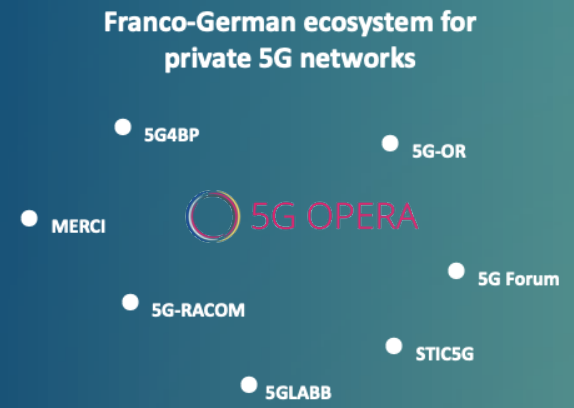

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Flagship Project CampusOS across Germany

Reference Testbeds & 4 Industrial demo case sites

Nomadic Construction Sites

TOPCON

Industry 4.0 Intralogistics (SCS*)

STILL

Supported by: DEMATIC

* ITS = industrial transport system
SCS = supply chain system

Industry 4.0 Intralogistics (ITS*)

STILL

Connected Mobility

BOSCH

Reference Testbeds

Fraunhofer HHI

Fraunhofer FOKUS

5G BERLIN

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CampusOS Use Cases (1/2)

Industrial & Mobility Use Cases (with Still and Bosch)

Industry 4.0 Intralogistics

- Communication in challenging environments
- Low-latency and resilient control of vehicles
- Volume-based data transmission of imaging mechanisms

Connected mobility

- Mobility applications in logistic yards, production sites
- Examples: autonomous/teleoperated driving, mobile robots
- Challenging requirements: asymmetric data rate & latency in UL and DL

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CampusOS Use Cases (2/2)

Nomadic Use Cases – Construction sites and neutral host (with Topcon)

Construction Site logistics and workflow management

- Application scenarios in the field of networked construction sites and construction site logistics supported by nomadic node
- Near real-time coordination of distributed and partially mobile workflows using digital construction site twins

Neutral Host for agriculture

- Nomadic 5G cells based on the "neutral host" principle
- Use of licensed operator frequencies

© Topcon Positioning Systems, A 5G Campus Network connects humans and machines at a construction site.

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5G Standalone Testbed @ FOKUS Atrium

Indoor & Outdoor

Core-RAN Integration & Interoperability

E2E System Performance

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FOKUS Open Modular Nomadic 5G Node

Validated Design for 1st Responder Use Case

Coverage Schönhagen Airport

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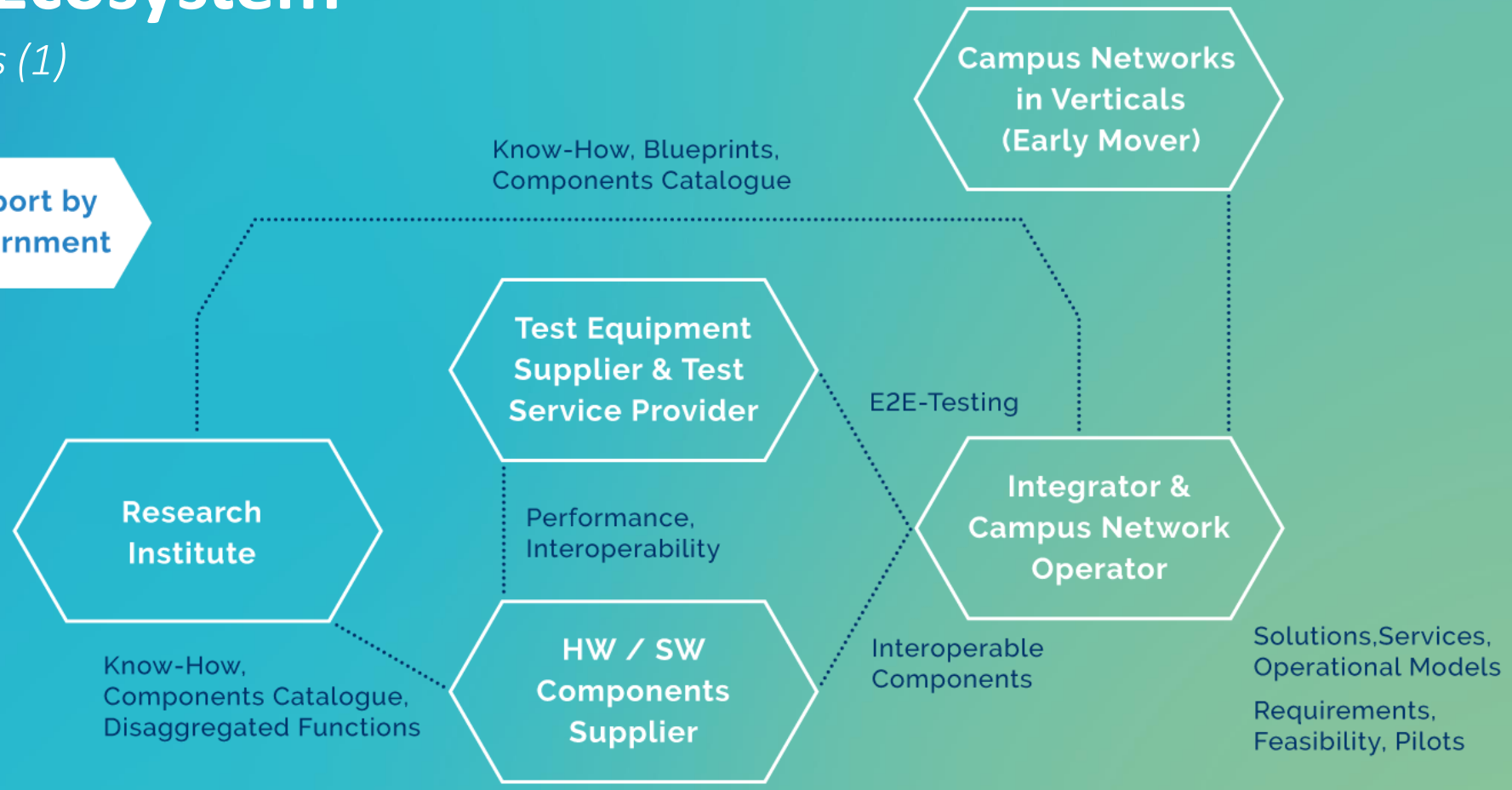
View on Ecosystem

Roles & Relations (1)

- New roles (network integration, disaggregated network testing, …)
- Broader spectrum of HW/SW suppliers



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CampusOS – Value chains & Operating models

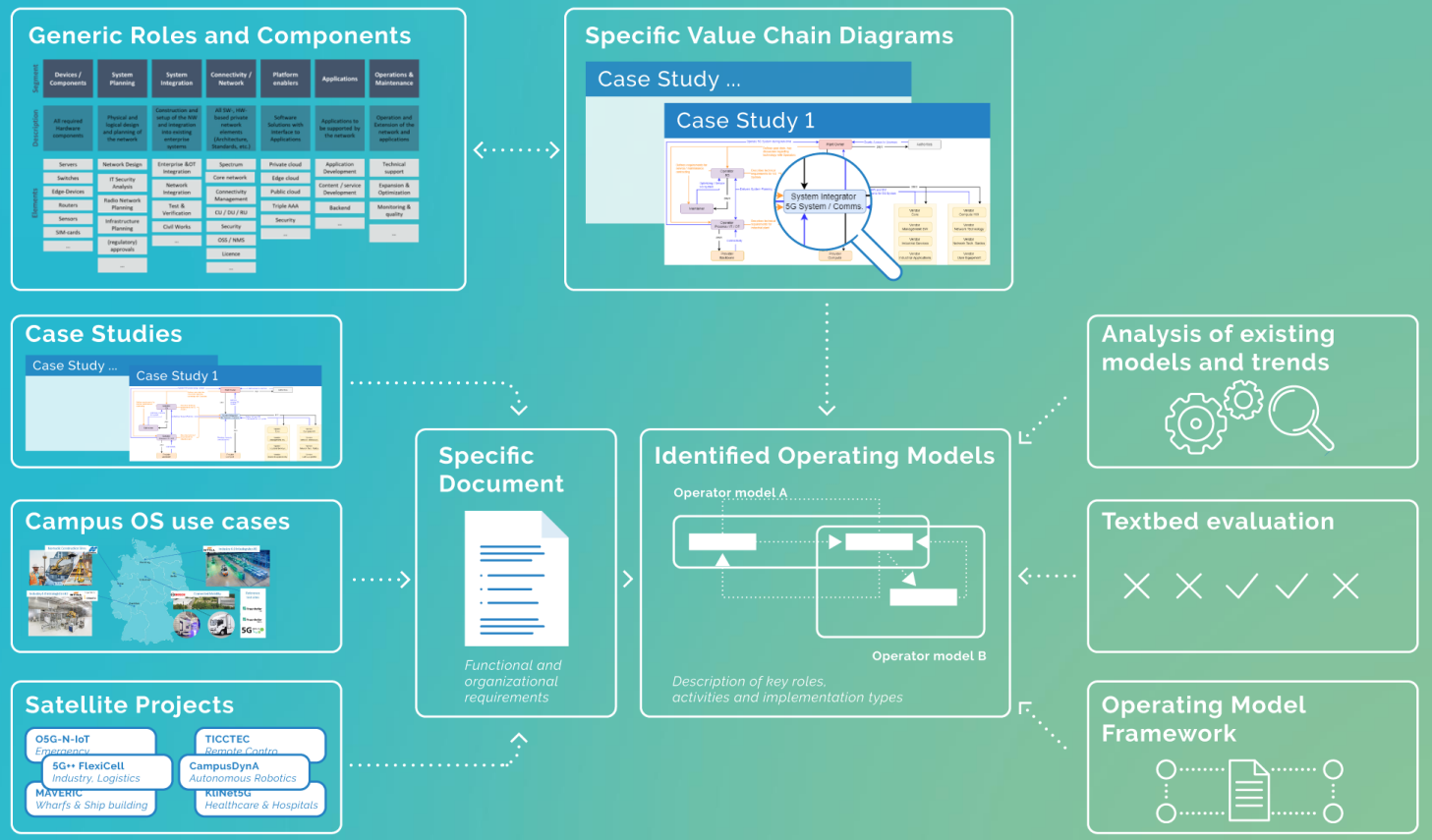
Understanding the underlying relationships and value streams

Value chain analysis and new business opportunities

- Differentiating factors of use cases
- Identify roles in the value chain
- Visualize value chains

Identification of operating models

- Role description
- Analyse trends of network operation
- Identify promising operating models



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CampusOS – Operating Models

Broad variety of operating models

5G self operated

Hybrid operated

5G as a Service

How to find the best operating model for my use case?

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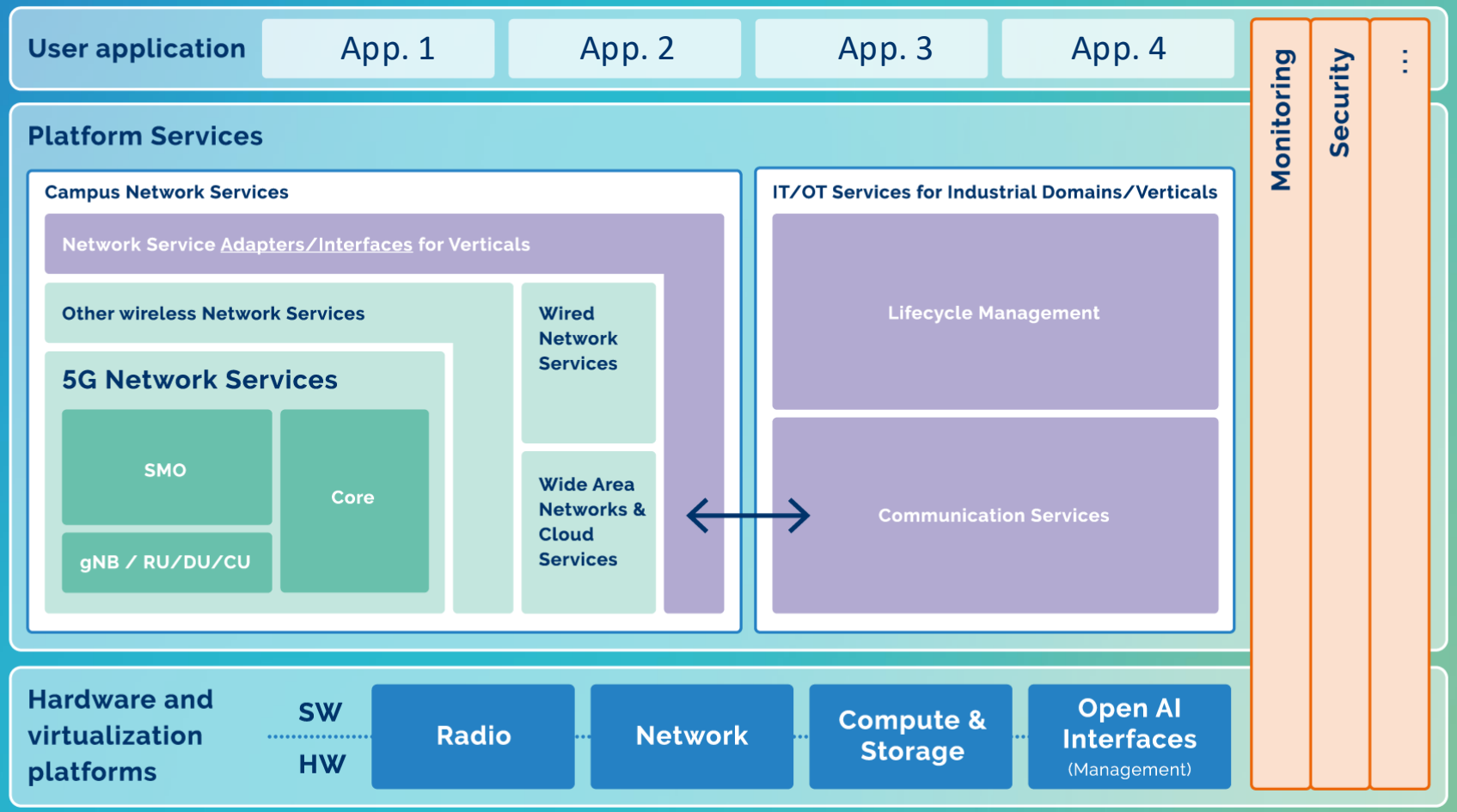
CampusOS Architecture Approach

End-to-End integration of campus networks and industrial environments



Architecture Blueprints · Component Catalog · Operating Models · **Ecosystem, Partnership**

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Component Catlogue

Architecture building blocks (ABBs)

architectural components that form an open and modular 5G campus network, e.g., a radio unit (RU) or distributed unit (DU)

Blueprints

Architecture instantiation (end-to-end view of ABBs and patterns*) for different use cases / requirements

Tested solution building blocks (SBBs)

individual technical solutions realizing one or multiple architecture building blocks

***Pattern:** combination of ABBs that occur frequently in a certain combination; helpful to map, e.g., meaningful combinations of ABBs into different disaggregation options or splits.

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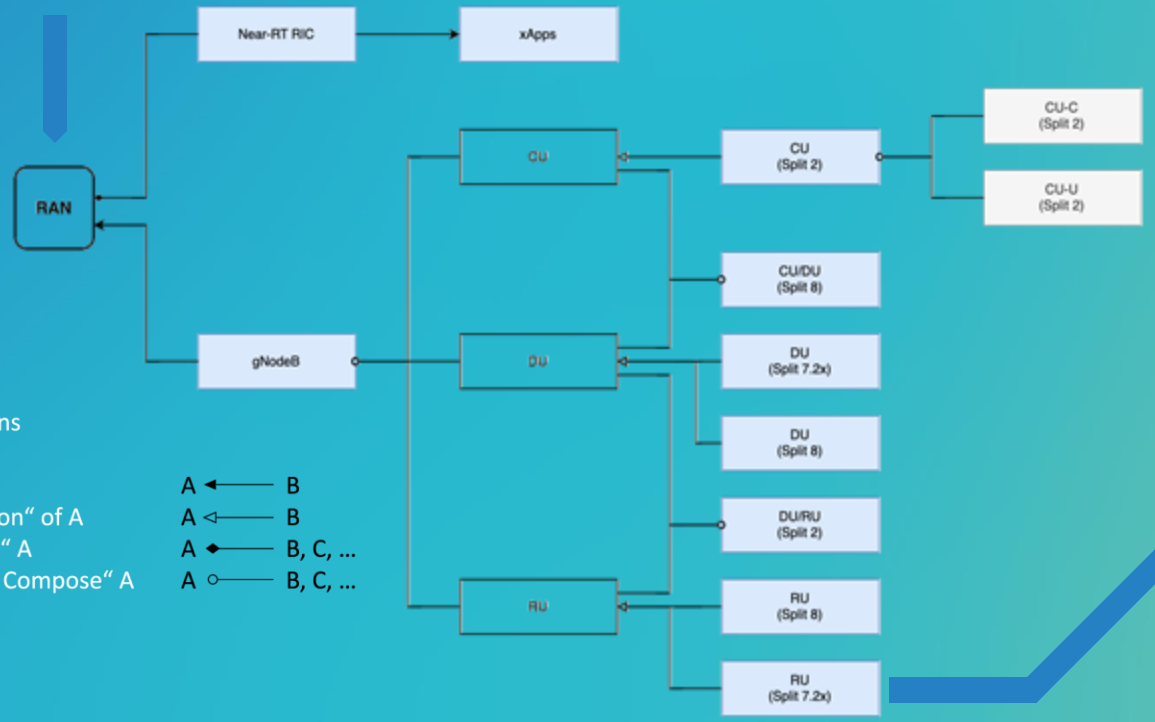
Architecture building blocks (just some examples …)

Abstract description and attribute definitions

Compute | RAN | 5G Core | Synchronization | Test & Measurement | Services & Apps | UEs | Operation & Management | Network | …



Legend of Relations

A „Requires“ B	A ◄— B
B is „Specialaziation“ of A	A ◁— B
B. C, … „Compose“ A	A ◆— B, C, …
B. C, … „Required Compose“ A	A ○— B, C, …

Example: Radio Unit

General attributes
- RF Range
- Bandwidth
- Transmit Power
- Fronthaul Protocol
- Antenna Configuration
- …

Experience in Testbeds
- Interoperability
- Performance measurements
- Test configuration
- Badges
- …

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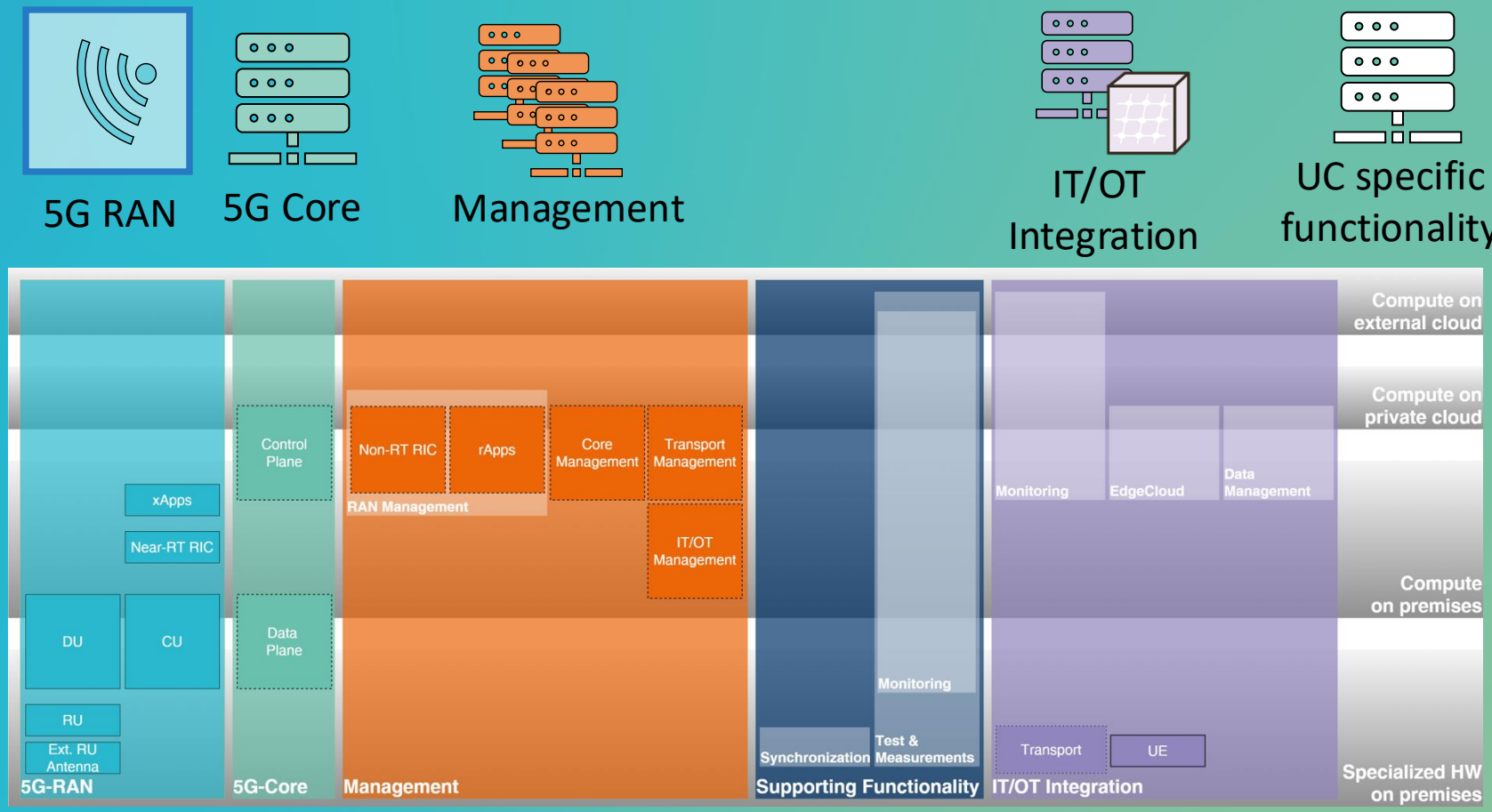
Blueprint

Definition

- Description of application-specific end-to-end architecture of a 5G campus network
- Simplifies the implementation of an application scenario (use case)
- Includes all relevant functional components (ABBs) and enables visualization of interfaces
- Establishes connection to solution components (SBBs) via the component catalogue



Generic Blueprint for low latency and on premise data handling use cases

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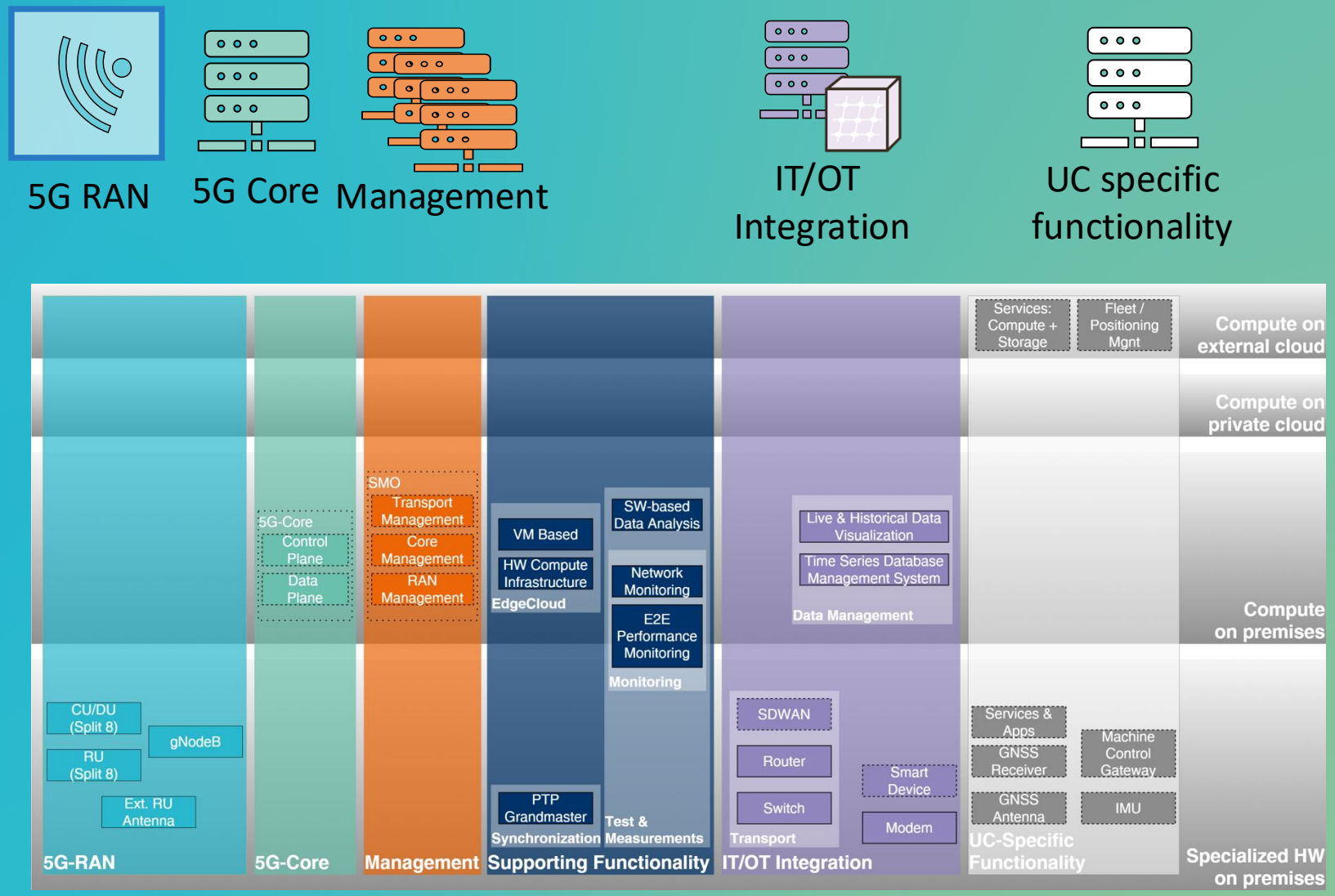
Blueprint Construction Site

- Modular Nomadic 5G campus network used as construction sites only exist temporarily and sometimes change location
- Correction values that support the required precision in earthmoving and construction work are transmitted to the machines via the 5G network
- Data sovereignty for the construction company carrying out the work
- Blueprint shows 5G campus network architecture with ABBs mainly deployed on premise to meet the special requirements of construction sites



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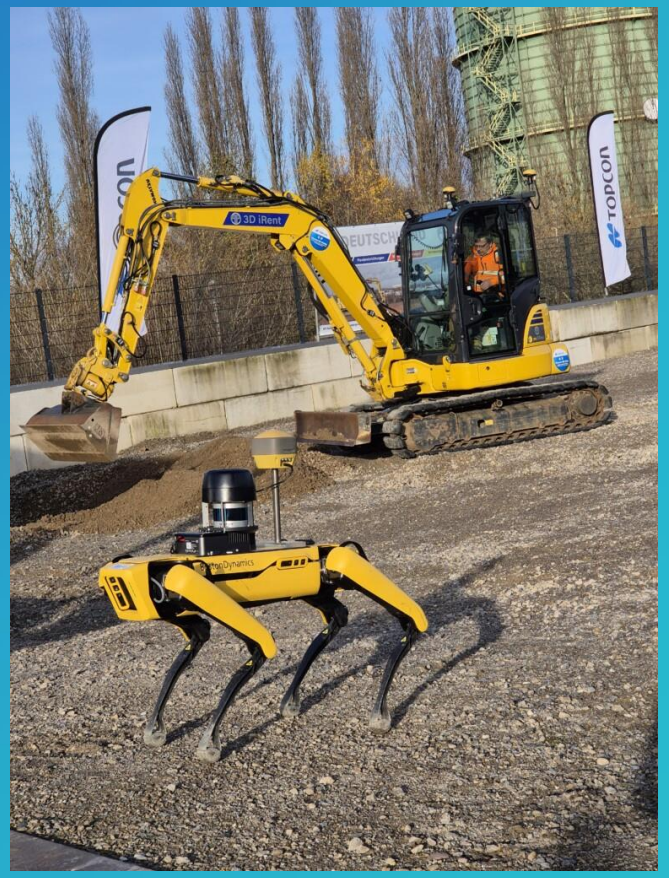
Final Roadshow @TOPCON



Final Demonstrator – Connected Construction Site @ TOPCON
November 21, 2024

The following demos were presented:

- Nomadic 5G Node, Fraunhofer FOKUS
- Site Management Suite, TOPCON
- O-RAN Network Management and Optimization, Fraunhofer FOKUS
- 5G Open RAN, Node-H GmbH
- 5G-capable multi-purpose robot platform, Heinrich Hertz Institute HHI
- O1 Performance Monitoring, Technische Universität Berlin
- Neutral Host, brown-iposs GmbH
- Video Orchestration, Smart Mobile Labs
- IoT Sensoring, BISDN GmbH
- Drive test scanner, Rohde & Schwarz

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OpenRAN-based System Layout in a Warehouse

5G Core

Management

IT/OT Intergration

UC specific functionality

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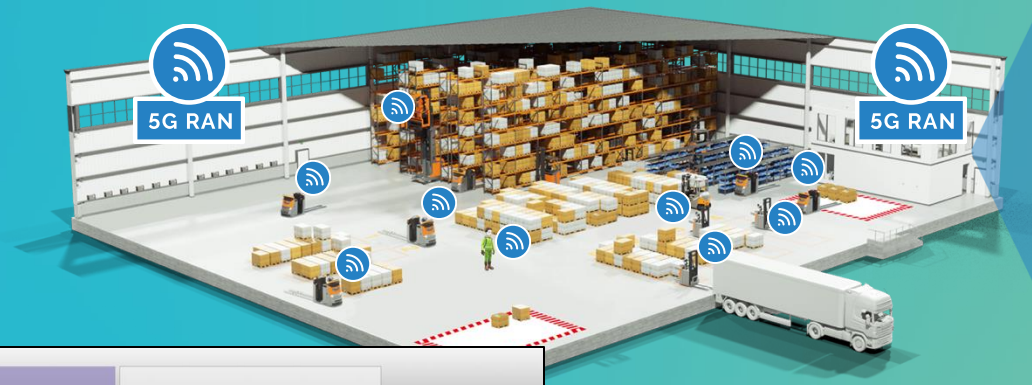
Blueprint



5G Core

Management

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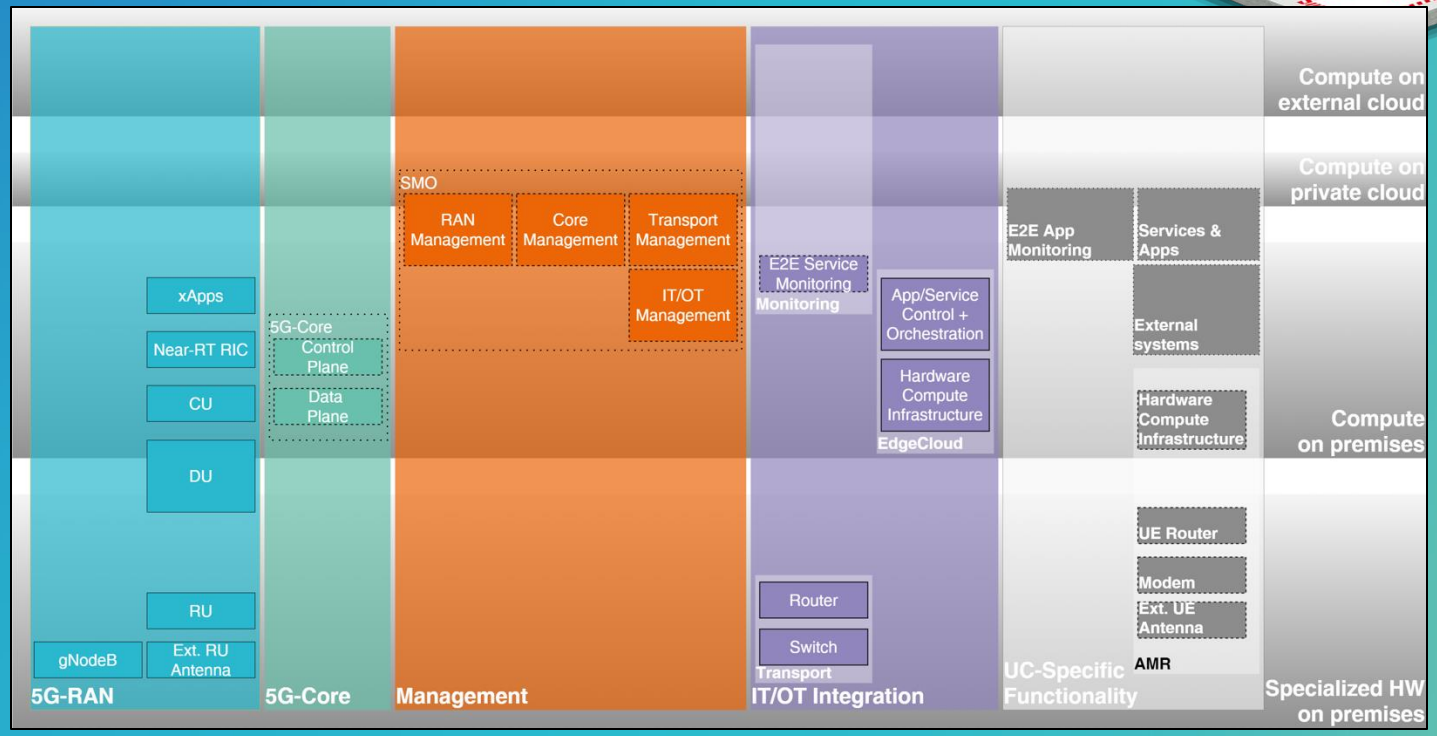

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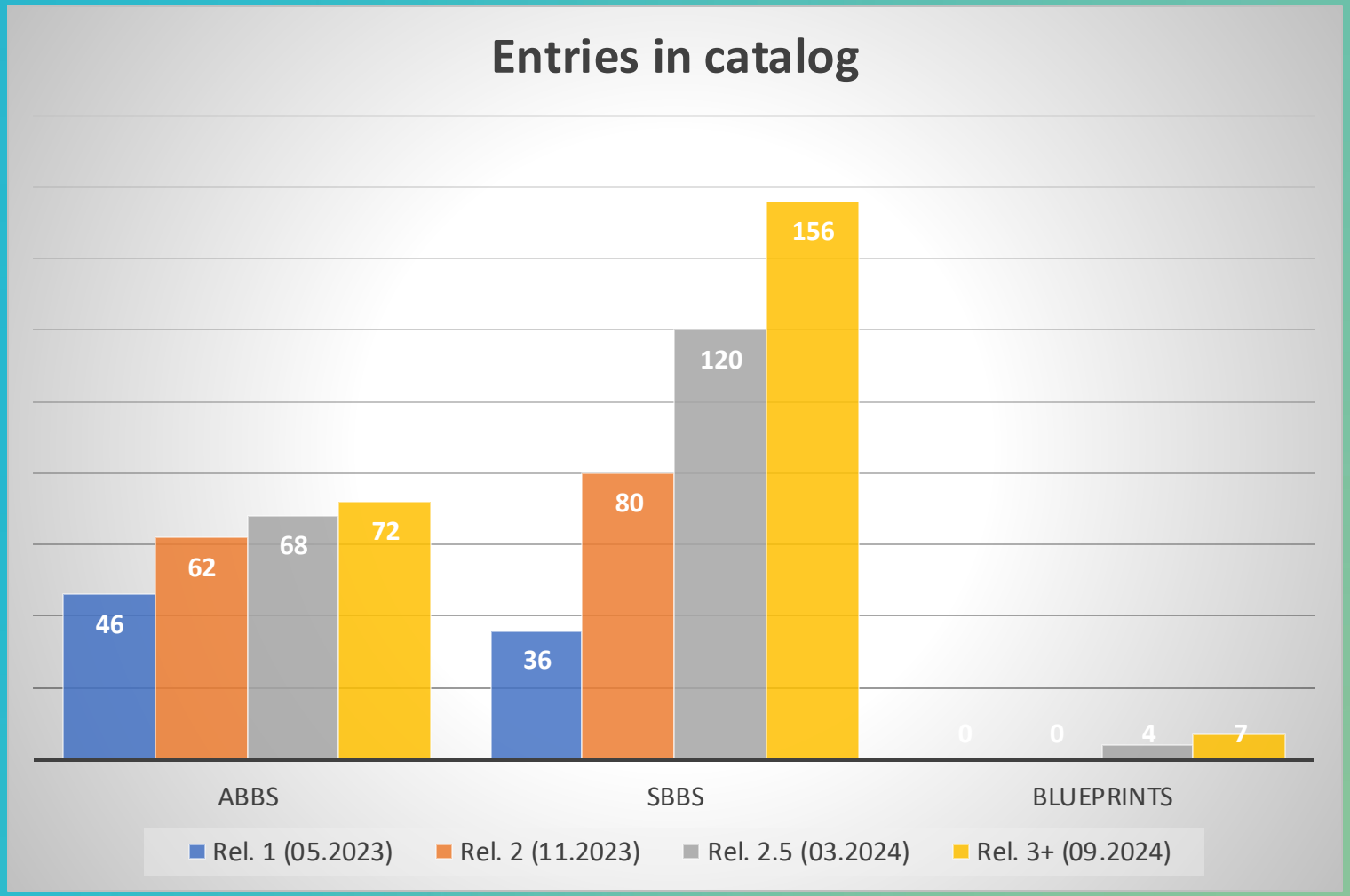
CampusOS - Private 5G Components Catalog – Release 3

Evolution of Releases

Release 3

- Release date: 06.2024
- Version 2 of the tooling implemented
- Further update in 09.2024
- Blueprint visualization included
- Important contributions from satellite projects
- From now on, no more releases but continuous updates



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Roadmap of Perpetuation through 5G-ALOE

03/2024
- Release 2.5

04/2024
- Presentation at HMI

06/2024
- Software Version v2

07/2024
- Release 3 (and start of continuous release process)
- Start of collaboration with selected partners (towards public access in 09/24)

10/2024
- Major feature update
- Internal catalog no longer required

Q2/2025
- Start of **5G-ALOE (Allianz for Open Enterprise Network)**

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5G-ALOE

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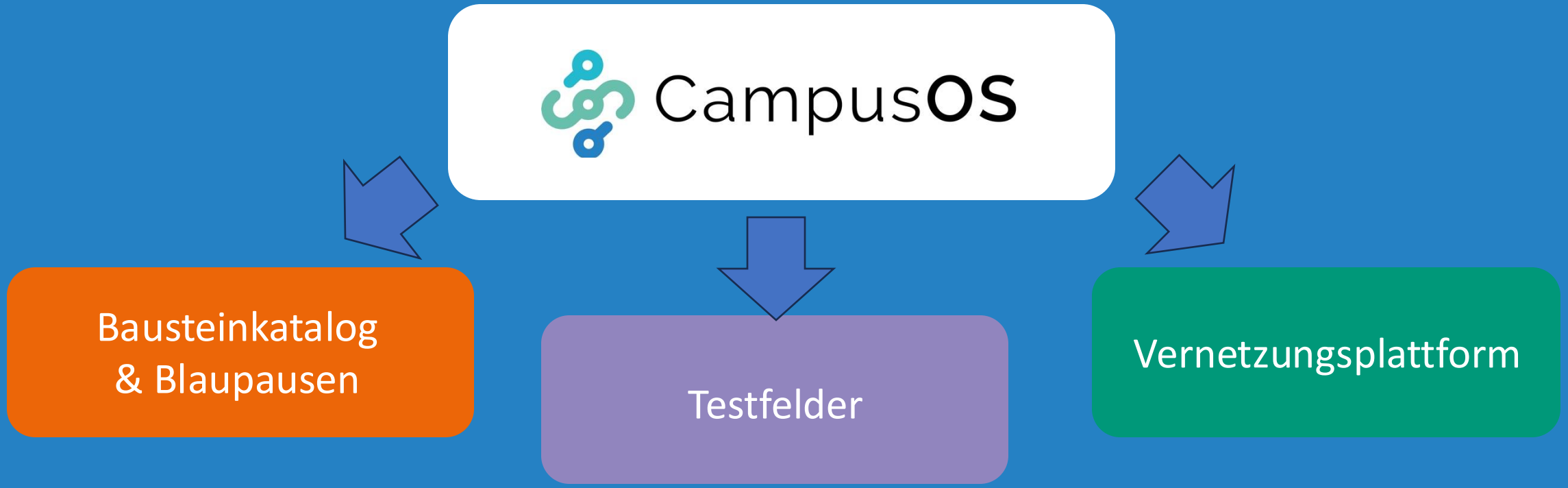
5G-ALOE: Verstetigung des Momentums aus CampusOS

Weiterentwickeln des Ökosystems, Stärkung von Partnerschaften, Fortführung der Projektergebnisse



5G-ALOE

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CampusOS | Final Event, March 26, 2025

We would like to invite you to our final Event.

Location: Fraunhofer HHI | Science Tech Space | Salzufer 15/16, 10587 Berlin

Please register:

CampusOS

5G-ALOE

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Private / Enterprise Networks are gaining global momentum

Lessons learned from the German CampusOS Activities

- The CampusOS activities are planned to end in spring 2025
- However, CampusOS will be consolidated as a sustainable initiative to grow the ecosystem
- Although CampusOS is not targeting 6G, as 5G technologies are in main focus, we can witness:
  - Network customization is key for deploying 5G, but complex to implement with an open ecosystem
  - Different business models and operation models are possible and guide network deployments
  - Trusted integrators will become key to bridge between enterprises and component providers
  - Maintenance of a Catalogue of tested components and related blue prints is key
  - Testbeds are key for component and end-to-end testing to fill up the ecosystem
  - Automation of various phases of a network life cycle will be key for the future to lower costs

Towards an Open 6G for all ➔ Build your own 6G where ever you are!

Open 5G/6G Research Infrastructures and Toolkits enabling sustainable R&D

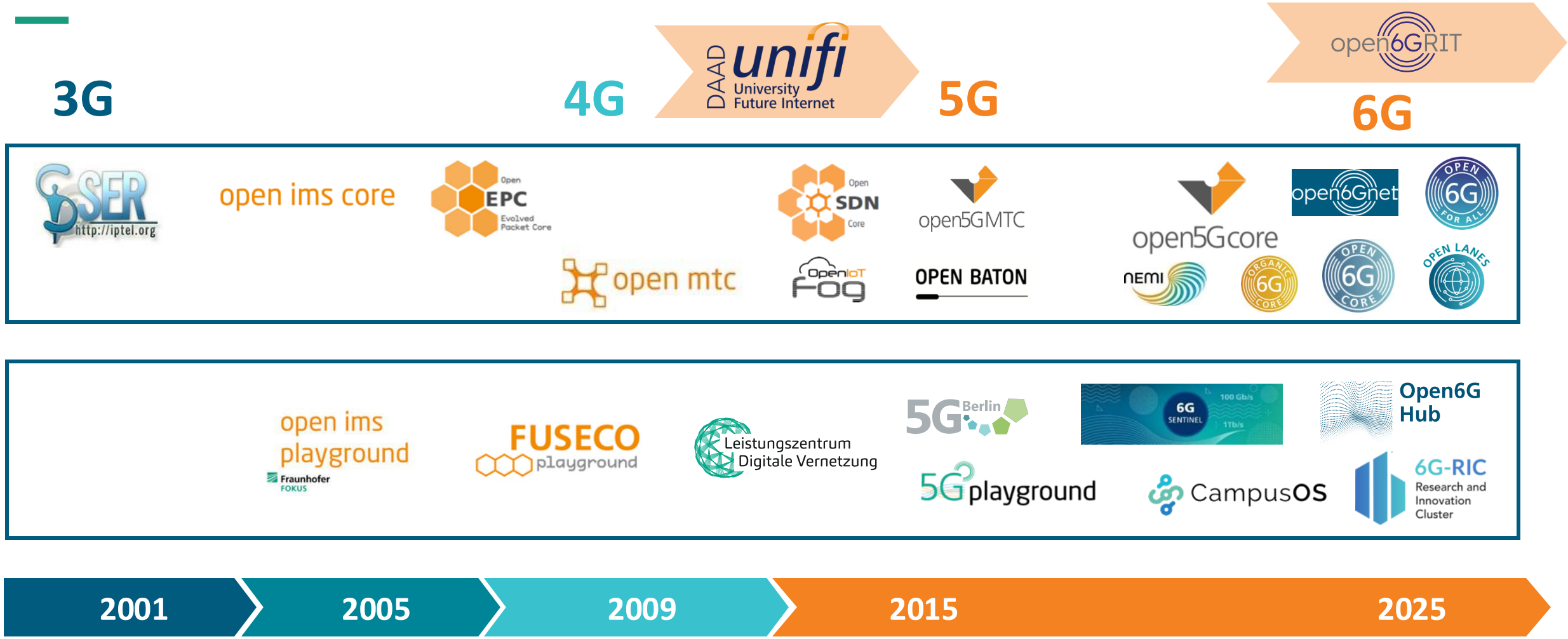
- 6G should be an evolution of 5G according to NGMN and operator statements around the world
- 6G research topics are very overlapping to current Campus Network research topics

  ➔ 5**G Evolution is driven by emerging Open Modular Campus Networks**
- But the open, modular network eco system is developing slowly but globally
- As shown by the German Flagship Project **CampusOS** the eco system needs reference architectures, blue prints, and component catalogues
- Open Source and Open Toolkits are becoming key for get every country started on its 6G journey
- We at FOKUS are open testbed and toolkit pioneers since 3G (IP-fication) and the softwarization of networks, and aim to help with the ***Open 6G for all*** and associated ***Open6GRIT*** **initiatives**

Open6GRIT - Open 6G Research Infrastructures and Toolkits

- Global Initiative supported by 6G Platform Germany and many other initiatives in Europe, USA, Asia, and Africa, Including IEEE Furuture Networking Initiative, PAWR, Slices.RI,
  - Based on a former DAAD Initiative called UNIFI, which run 2012 – 2015 to build up unified 4G testbeds around the globe
  - See www.daad-unifi.org
- International Workshop Series to unite passionate 5G/6G researchers looking for open testbeds
  - First Workshop held in Cape Town in March 2024
  - Next Workshop at IEEE Globecom 2024 in Cape Town in December 2024
- More at https://openrit-6g.org/

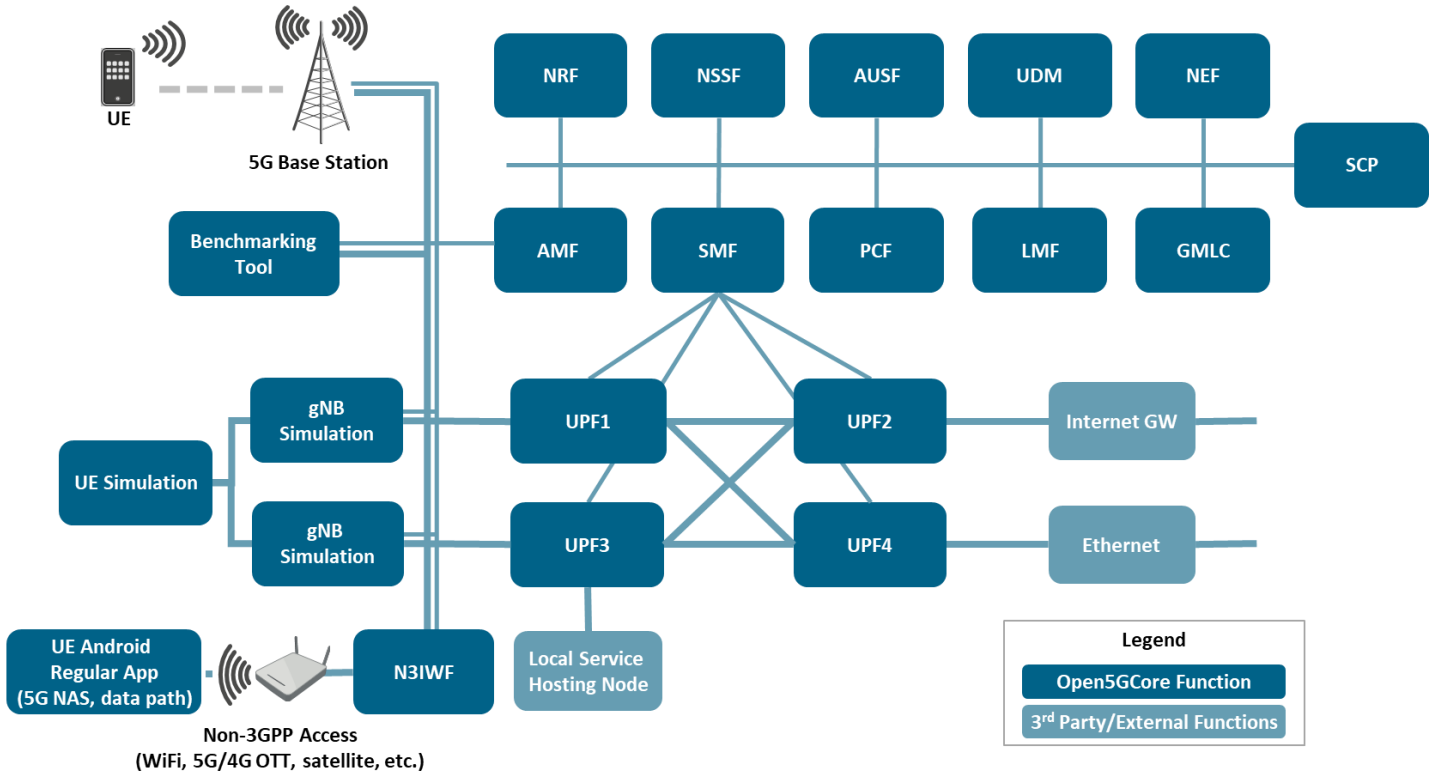
FOKUS/TUB Testbeds and Toolkits Evolution - Foundation for R&D Projects



Open5GCore Rel. 8

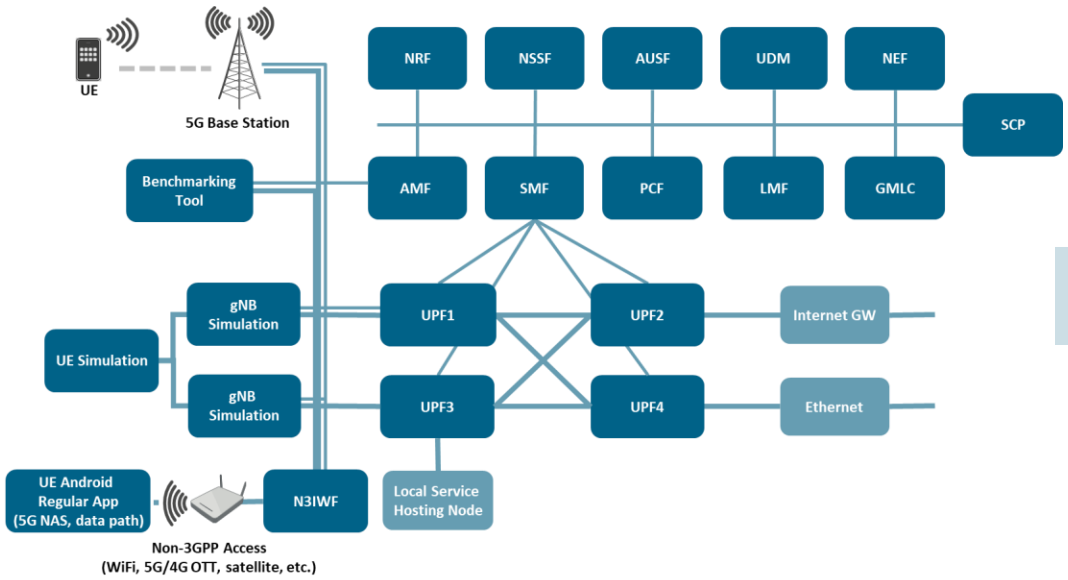
An extended R&D oriented implementation of the 5G core network (3GPP Release 16 and 17)

- Software based core network – programs that can be deployed as containers, pods, VMs, …
  - Fundamental 5G core network functionality: AMF, SMF, UPF, PCF, UDM, AUSF, …
  - Additional services: non-3GPP, location
- Main features for 5G:
  - Integrating with 5G NR SA, non-3GPP and satellite
  - Data path diversity, local offload
  - Advanced bearers, QoS and session management
  - Network slice support
  - Location service support
  - Performance Benchmarking
  - Own UE emulation of regular Android OS App
- Highly configurable for:
  - Edge-central split
  - Dedicated, private and campus networks



Ready-to-Run Open5GCore Setups

Open5GCore runs as user space programs on top of common Linux OS distributions (Ubuntu 20.04+)



Public cloud

Virtual Machines

OpenStack

Kubernetes

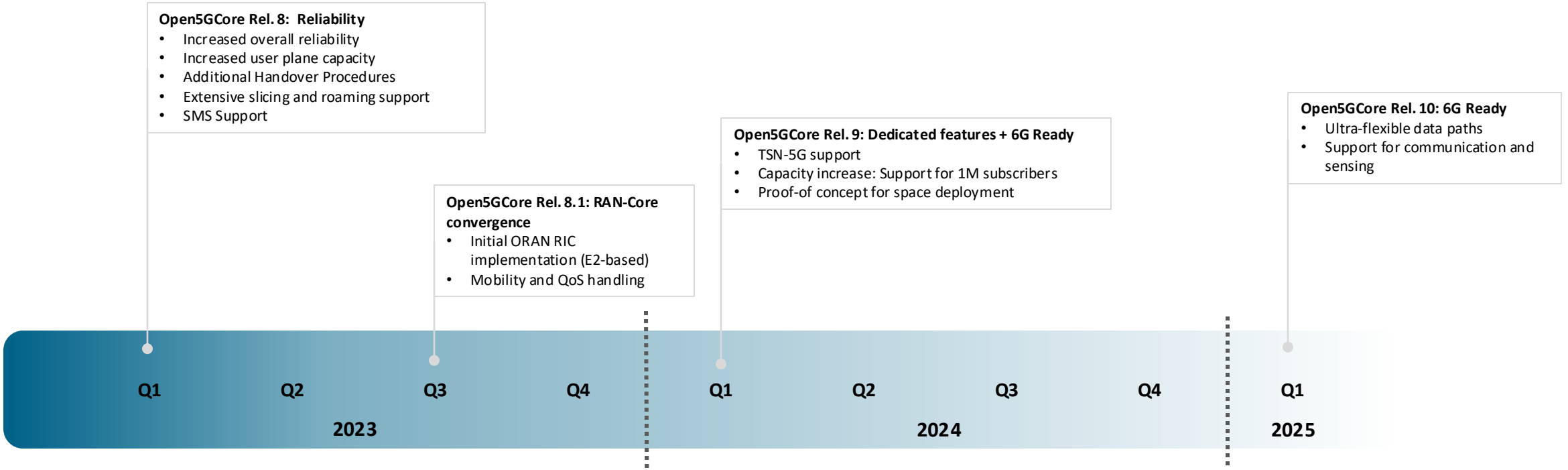
Single machine

Bare Metal

- Best effort support for integration with gNBs and UEs is provided in each license (please ask about current interop list)

Roadmap for Open5GCore

- Customization of testbeds towards use cases and specific deployments (user equipment, hardware, virtualization, integration with applications etc.), integration of base stations and end devices is available anytime on-demand.
- We have already customers for Open5GCore until 2027



Engagement Models

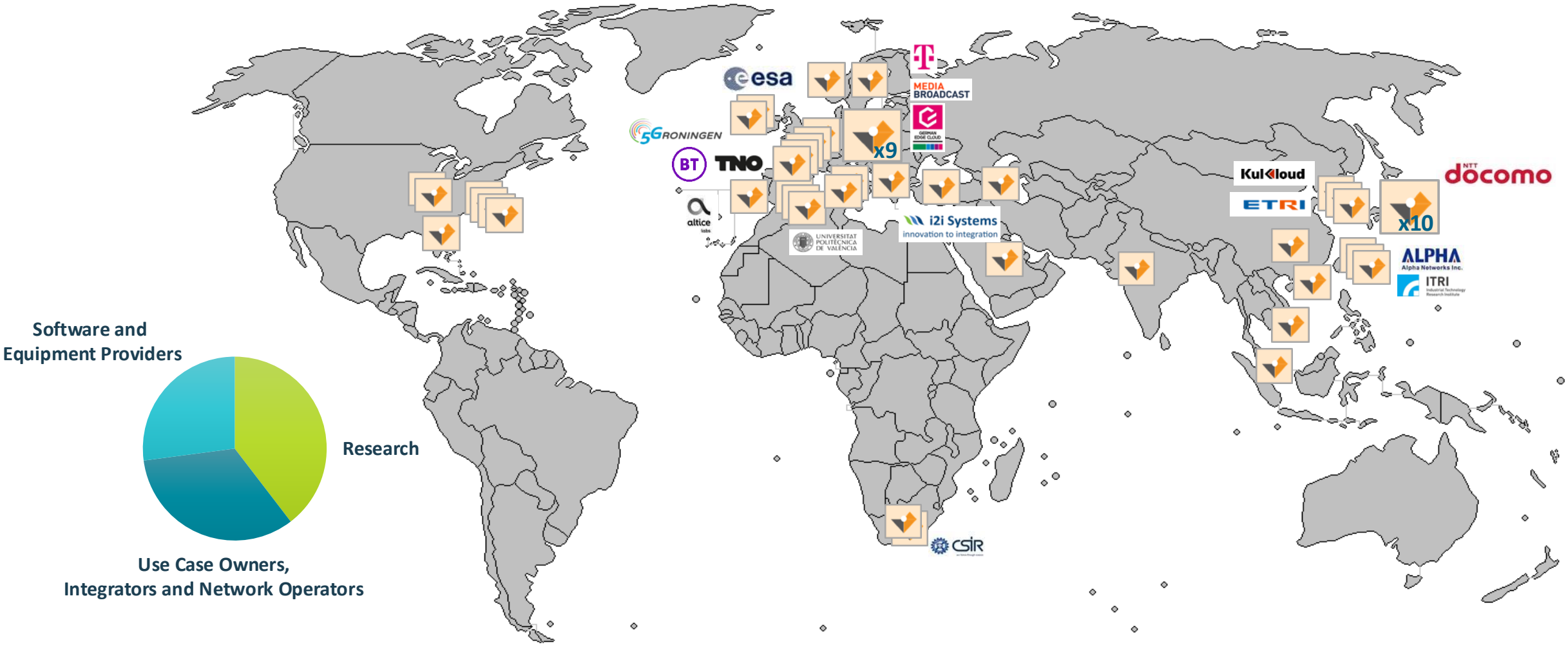
1. Use Open5GCore as it is for demonstrations or building things on top

2. Extend Open5GCore with new features

    1. Independent developments (with different partners involved)
        1. No involvement of Fraunhofer
        2. Partners with licenses can collaborate

    2. Fraunhofer developments
        1. For the next release – adding the features to the roadmap
        2. As project – with tight work contacts, milestones etc.

Deployments and Reference Customers (from 2014 on)



5G Playground: Implemented Use Cases based on Open5GCore Customization Options

Public Events: 5G Nomadic Node at Festival of Lights 2019 in Berlin

Industry 4.0: 5G-ACIA Testbed, 5G Campus Network for the Software-defined Factory

Disaster Management: ALADIN project, Forest Firefighting in Brandenburg with 5G

eHealth: FUDGE-5G project, Private 5G Networks for hospitals

Railway: 5G VICTORI project, 5G Campus Network in the train stations

Aeronautics: ESA SATis5, In-cabin entertainment with local 5G network

Mobile testbed: 5Genesis project, ALADIN, CampusOS 5G out of the box with our modular Nomadic Node

Fraunhofer FOKUS

FOKUS Nomadic 5G Node – an open, modular, scalable 5G testbed in a box to go

open5Gcore

An adapted solution, addressing all the high variation in mobility, coverage area variation, energy consumption and size

1 **Large scale nomadic network for long duration setups**
for infrastructure failures, construction sites
Small size racks including large battery supplies, COTS servers and macro-base station

2 **Portable in-car setup for long duration emergencies**
for firefighters, disaster relief, maritime
Small size rack with environment protection with 1-2 COTS server and macro-base station and battery

3 **Small size setup for nomadic 5G hotspot connectivity**
for portable 5G networks, logistics, public transport
Single PC and micro-base station

4 **Low energy/low size for constraint environments**
for backpacks and space payloads
ARM based board (with FPGA) & micro-base station

5 **Smallest of them all**
for a new ultra-dense IoT 5G environment
All in micro-base station or raspberry.pi and micro-base station

- https://www.fokus.fraunhofer.de/en/fokus_testbeds/5g-node

Fraunhofer FOKUS

Nomadic and Mobile 5G Networks

Comprehensive systems which can be dynamically deployed at use case location

- Integrate with local devices
- Fit the local constraints: energy, weight, size, vibrations, weather, etc.
- Support for localized communication
- Trustful and reliable communication

This functionality is developed as part of:

CampusOS ALADIN Advanced Low Altitude Data Information System Open6G Hub Germany SATis5

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5G out of the box

Robust, transportable set-up

Edge Compute and Network

Virtualization environment for Open5GCore of Fraunhofer FOKUS and for application services

Radio Technology and battery

5G SA multi-vendor support (band n78)

Various backhauling and non-3GPP technologies

Satellite backhaul and WiFi-6 / 60GHz links for front- or backhaul access

Nomadic version of a 5G-ACIA approved tested

Blueprint for 3rd party, industrial nomadic deployments

Open5GCore licensable for R&D and proof-of-concepts

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Towards an Open 6G for all - Roadmap

Demonstrations of limitations of 5G

5G-6G features which could be immediately used in the 5G+ core

First 6G-ready 5G Core network 6G features in the 5G core

6G-ready End-to-end Demonstration A complete 6G ready system

Open6GCore Version 1 New software toolkit addressing the specific 6G architecture

Open6GCore Version 2 New software toolkit addressing the specific 6G architecture

2020 2021 2022 2023 2024 2025 2026

6G SENTINEL 100 Gb/s 1Tb/s

ORGANIC 6G CORE

OPEN 6G CORE

open6Gnet

6G-RIC Research and Innovation Cluster

Open6G Hub Germany

Standardization Start

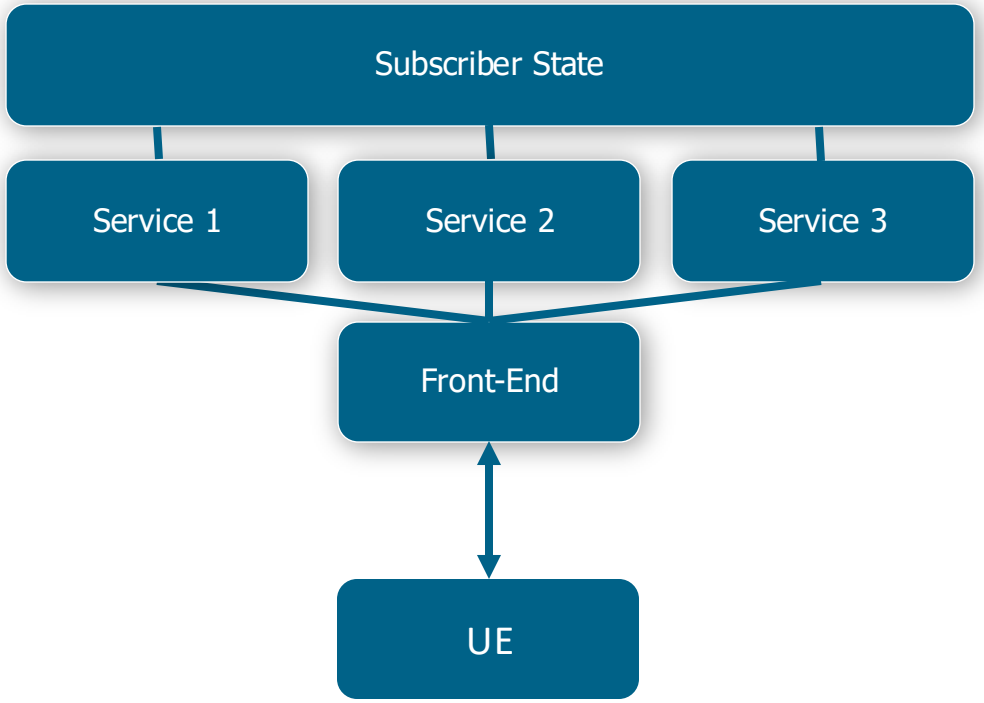
6G Organic Core Network Concept

Dual usage of the web-services architecture

1. Implement the core network functionality as a macro-web service
   - Different front-ends for UE, RAN, data path, external, …
   - Single subscriber state

2. Implement the macro-web service workers as stateless micro-services
   - Services are fully stateless
   - Services should be procedural oriented – as much of a procedure as possible to reduce horizontal communication between micro-services

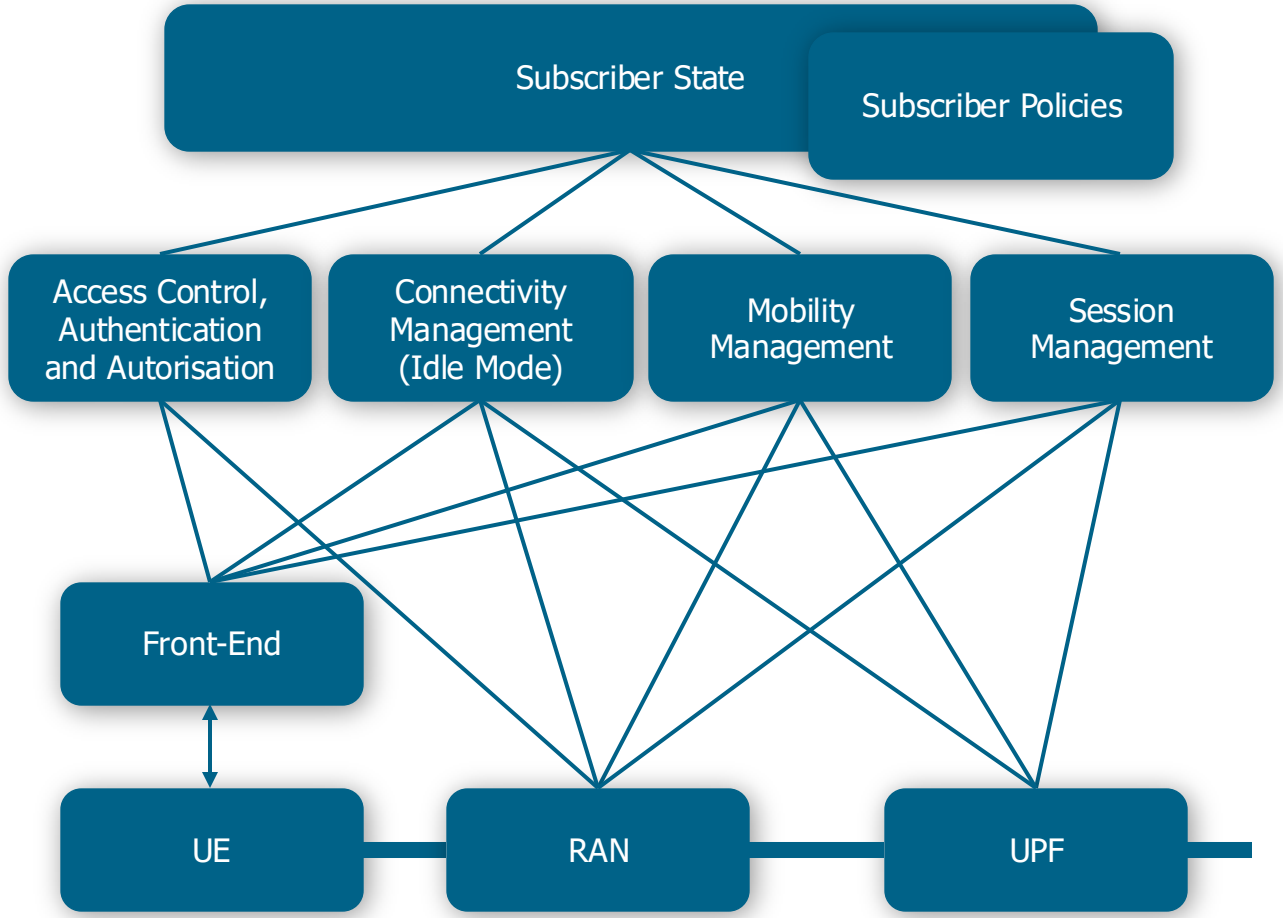
- Other requirements:
  - No parallel requests from the same UE – regulation at Front-end possible
  - Requests are triggered by the UE – or a “puppet UE” in the core
  - Unified subscriber state



Open6GCore - Implementing Organic 6G Networks

Each high-level functionality of 5G Core Network is a separate service

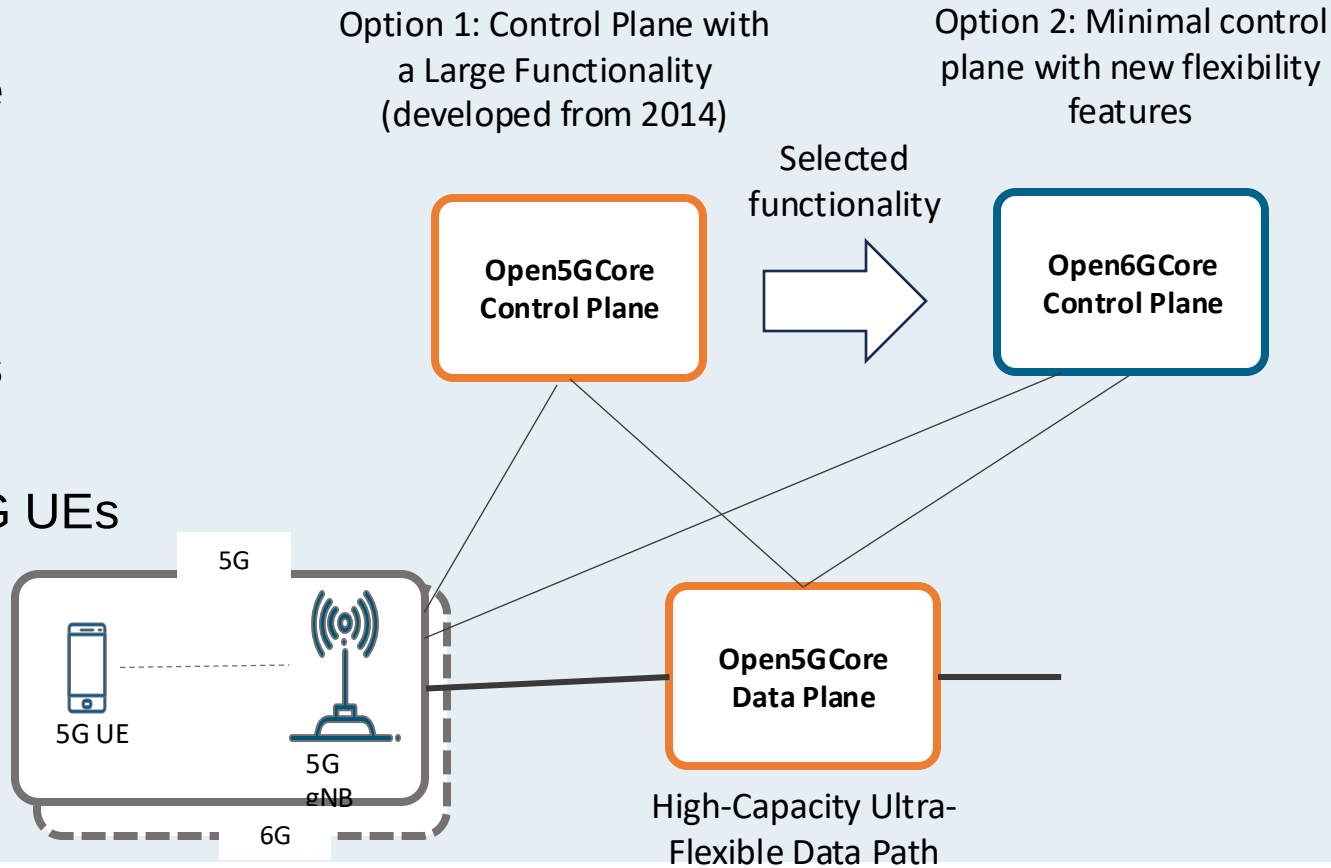
- Access Control, Authentication and Authorization (ACAA) –subscriber authentication and authorization to use the network
- Connection Management (CM) – idle mode related operations
- Mobility Management (MM) – handover procedures
- Session Management (SM) – data path resource allocation procedures



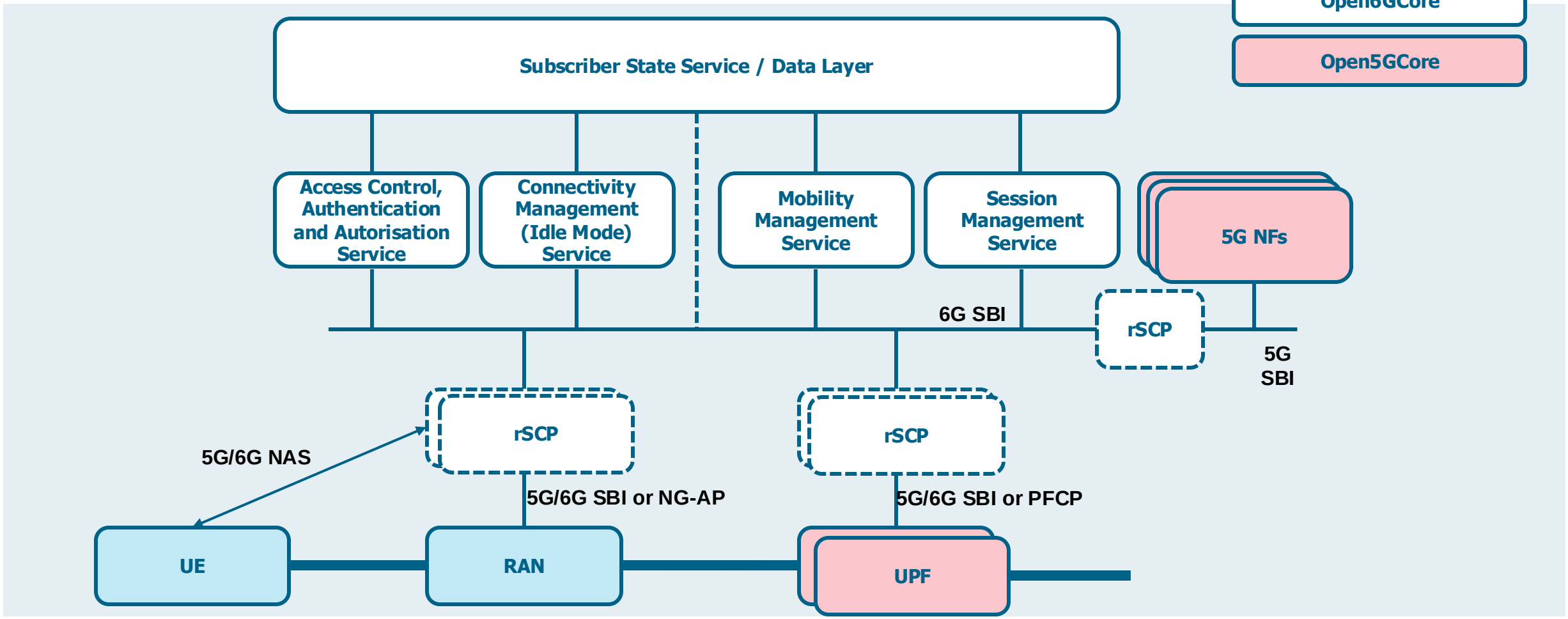
Open 5G and 6G Core Toolkits

Two toolkits with different goals:

- Open5GCore:
  - further development of beyond 5G core network functionality
  - customized deployments for use cases
- Open6GCore:
  - New flexibility, low complexity concepts
  - Docking of new services e.g. sensing
- Both should be able to connect to 5G and 6G UEs and RAN
- At the current moment we assume data path remains the same
- In time, Open6GCore would replace the Open5GCore



Open6GCore Architecture



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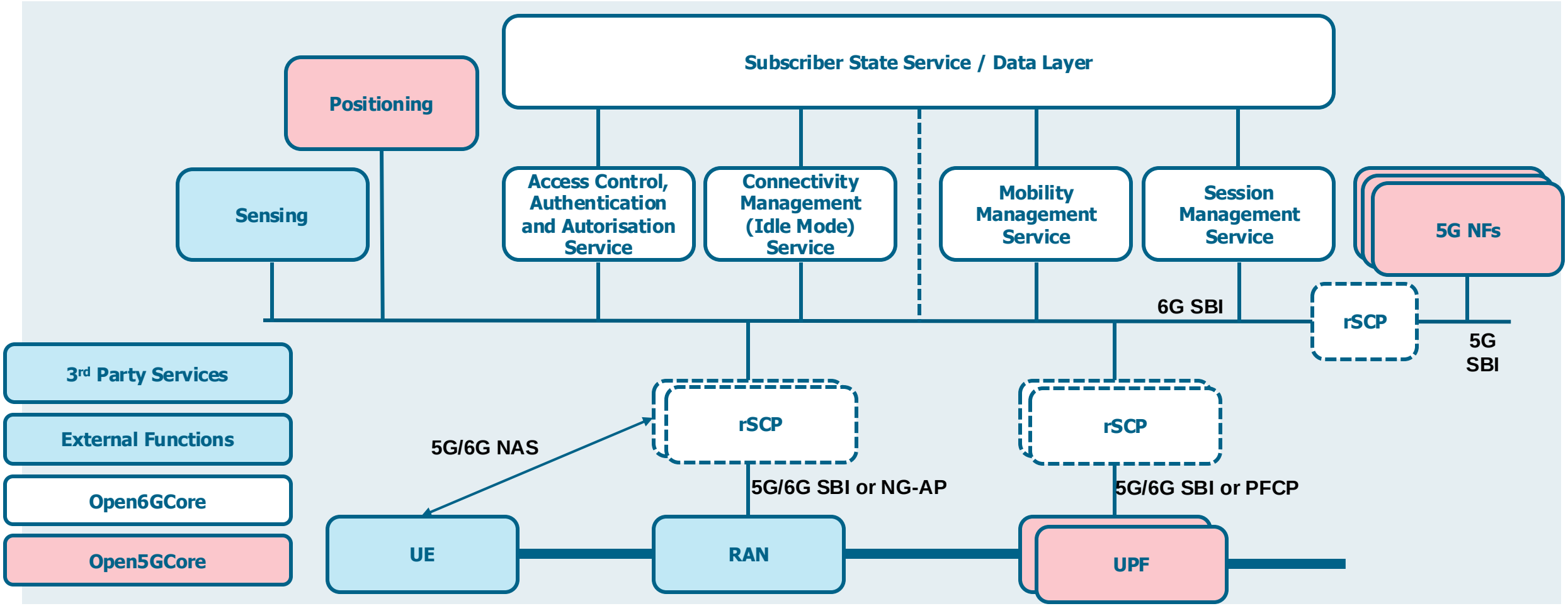
Open6GCore – binding of new services from 3rd Ptys



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Open6GNet.org - one way of contributing to Open 6G for all

Initiative from TUB and UCT looking at Open Source Toolkits

- Motivation:
  - Open5GCore might be to expensive for some universities and R&D partners
  - TU Berlin studends don´t have access to Open5GCore due to IP protection
  - We need some low cost 5G end to end Testbed (UE + RAN + CORE + SMO) for students to get hands onto 5G
- Initiative started with UCT in 2023
- Mission: Build a catalogue of useful 5G toolkits, plus useful blueprints plus tutorials to get students started
- Traget is to evolve from 5G towards 6G in the future

Open6GNet.org Initiative – State of Play

- 5G-Beyond testbed infrastructure and toolkits‘ collection for teaching and research:
  - students at TUB
  - visiting students
  - researchers

- Workshops for students to deploy 5G private networks setups using open source tools guided by experienced researchers

- Fostering open source adoption, dedicated events to meet open source projects‘ representatives

Open6GNet.org Initiative – How to contribute

- Prepare a concise good description of the 5G setup and of the outcomes (proposal)
  - hardware used
  - architectural design picture
  - configuration of the deployed software tools
  - report on performances/outcomes achieved with the testbed experiments
- Submit the proposal for review
- More on www.open6gnet.org
- Contact: Ramona Modroiu, elena-ramona.modroiu@tu-berlin.de

Mapping of SLICES-RI and Open6GRIT


OPEN
6G
FOR ALL