



AFFORDABLE 5G

HIGH-TECH AND AFFORDABLE 5G NETWORK ROLL-OUT TO EVERY CORNER

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Definition: A private 5G network is a particular realization of the 5G system, designed and configured for private use by an enterprise or an exclusive group of users. It can be deployed to cover the needs of a specific application or multiple applications or even a vertical domain.

- A stand-alone Non-Public Network (SNPN)
- A NPN hosted by a public PLMN (PNI-NPN)

Advantages (over public 5G networks):

- configured to the specific needs
- instantiated for special purpose/time
- share only secured subset of data
- SLA tailored to sudden needs
- complete control to the enterprise



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DEFINITION OF PRIVATE 5G
NETWORKS FOR THE PURPOSE OF
AFFORDABLE5G*

* as described in Deliverable 1.1

Affordable5G provides a first-class opportunity to highly-innovative 5G-related SMEs across Europe to **align with recent changes in 3GPP specifications, adopt 5G emerging technologies** and accordingly enhance the functionality of their product and service portfolio. The target is to **equip these SMEs with competitive advantages** in order to reach and penetrate new market sectors, such as **private and enterprise networks**, offering innovative and affordable solutions with clear advantages related to **network capillarity, host neutrality and small-cell densification**.



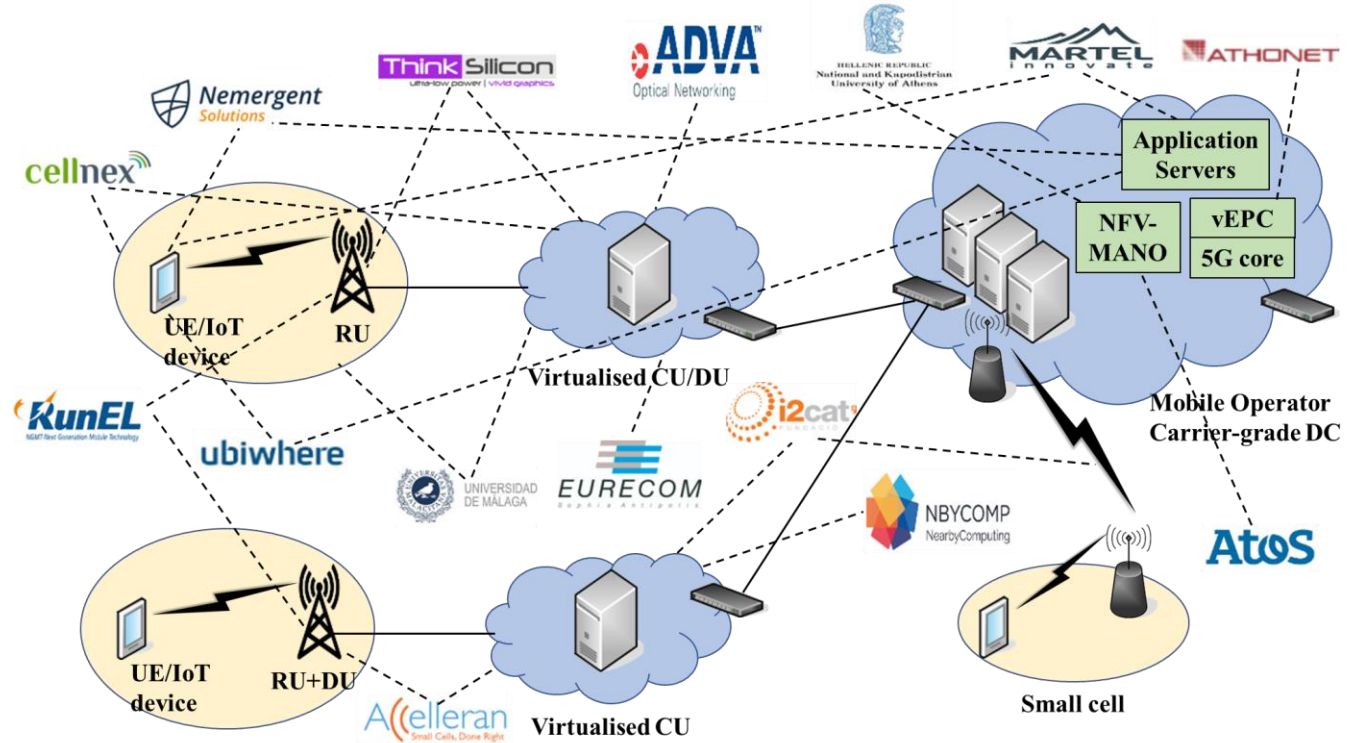
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IN A NUTSHELL

<https://www.affordable5g.eu>

Positioning in 5G network architecture

Affordable5G will deliver a complete and affordable 5G solution covering the needs of private and enterprise networks through technical innovation spanning all parts of the network

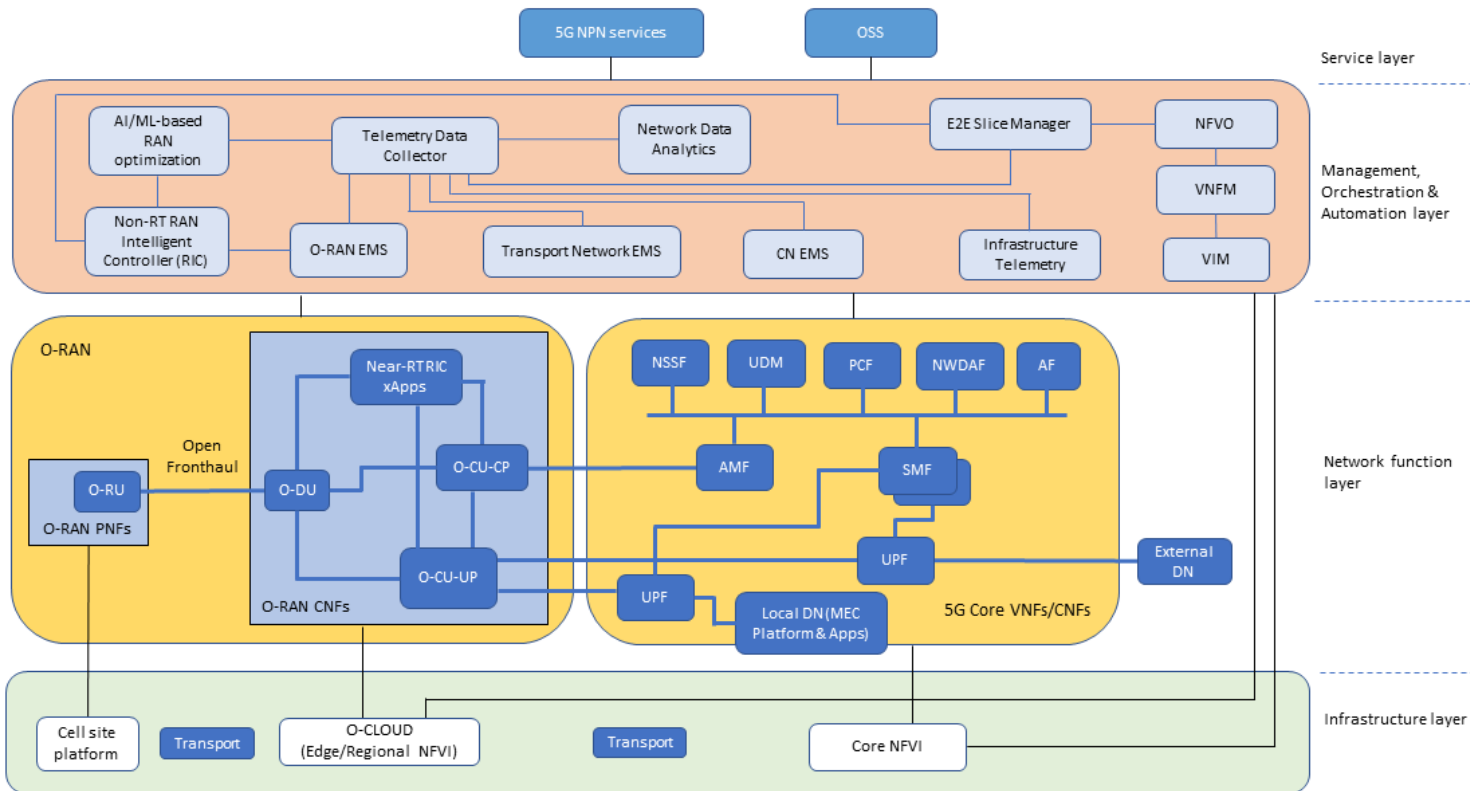


Affordable5G architecture pillars



- Support several deployment options & interoperability
 - Split 7.x, Split 8, UP-CP, follow open APIs (no vendor lock-in)
- Support several operational options
 - Sharing strategies, neutral hosting, slicing, billing
- Reuse existing infra/devices & support specific requirements
 - Building on WIFI (access or fronthaul and/or backhaul)
- Introduce intelligence across all parts of the network
 - Including both RAN and Core network part
- Support specific characteristics
 - Time Sensitivity Networking, multiple PDU sessions, positioning

System Architecture



Objectives

- OBJECTIVE 1 – OPTIMIZE 5G *HARDWARE* ELEMENTS
- OBJECTIVE 2 – 5G DIMENSIONING FOR *DENSE DEPLOYMENTS*
- OBJECTIVE 3 – ADDRESS *NETWORK SHARING* STRATEGIES
- OBJECTIVE 4 – CONSOLIDATE THE USAGE OF *OPEN PLATFORMS*
- OBJECTIVE 5 – SOUND VALIDATION & EVALUATION
- OBJECTIVE 6 – BUSINESS SUSTAINABILITY & COMPETITIVE ADVANTAGE

Optimize 5G hardware elements

- Affordable5G aims at the optimisation of the hardware of the devices forming its cost-efficient and high-performance network
- Field-Programmable Gate Array (FPGA)-based hardware acceleration is an ideal solution for the network's edge to ensure optimal performance and cost efficiency in the execution of specialised functions
- The objective is to adopt enhanced low-power Graphics Processing Units (GPUs) and hardware accelerators at edge Data Centres (DCs), where there are limitations, such as room space and heat dissipation

5G Dimensioning for dense deployments

- Affordable5G will integrate and enrich the available solutions (Core & RAN) of its SMEs with open-source solutions
- Investigate Time Sensitive Networking (TSN) as a strategy to enable connectivity with deterministic latency over 5G for private networks, addressing real market needs, such as 5G in Industry 4.0
- Develop cost-effective wireless backhauling technologies that support 5G small cell requirements, while providing an integrated management and control plane for both wireless backhaul devices and small cells

Address network sharing strategies as cost savings



- Develop sharing strategies comprising diverse users, service providers and network operators for reduced ownership costs
- Study neutral host strategy and its implications
- Enhance existing network sharing solutions in two directions:
 - The Affordable5G management plane will enable the dynamic deployment of per-tenant customized slices with minimal operational costs
 - Develop isolation mechanisms at the various levels of the 5G network, including the radio access, which are key to define enforceable Service Level Agreements (SLAs) towards prospective tenants

Consolidate the usage of open platforms

- Adopt open interfaces & platforms, enhanced for radio (O-RAN), edge (Akraino, OpenNess, edgeX foundry), cloud-native network management (OSM, ONAP) and core network (ONOS, ODTN)
- Affordable5G aims not only to strengthen the use of open-source solutions in these distinct network areas, but to jointly use them into an overall open-source 5G network architecture

Validation and evaluation

- The project's outcomes will be evaluated in heterogeneous environments, comprising diverse RAN units, network resources, edge hardware and user requirements, as well as virtualized networks elements to demonstrate their wide applicability in 5G commercial and hybrid infrastructures
- The added-value and effectiveness of the project's outcomes will be demonstrated in three 5G pilots promoting cost efficient roll-outs of private networks

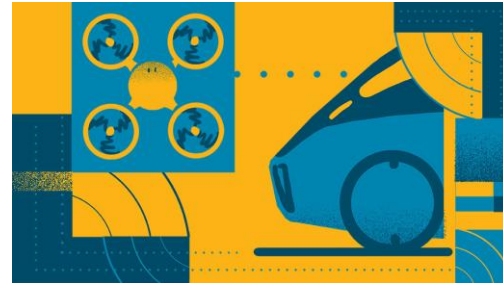
Business sustainability and competitive advantage



- During the project's lifetime new business models, (e.g., cooperative business models) and the formation of new ecosystems for managing services and actors will be developed
- Affordable5G will create competitive advantages to SMEs, facilitating them in their commercialization paths and strategies
- Results will be disseminated through contributions to 5G standardization bodies and open-source communities

Project pilots

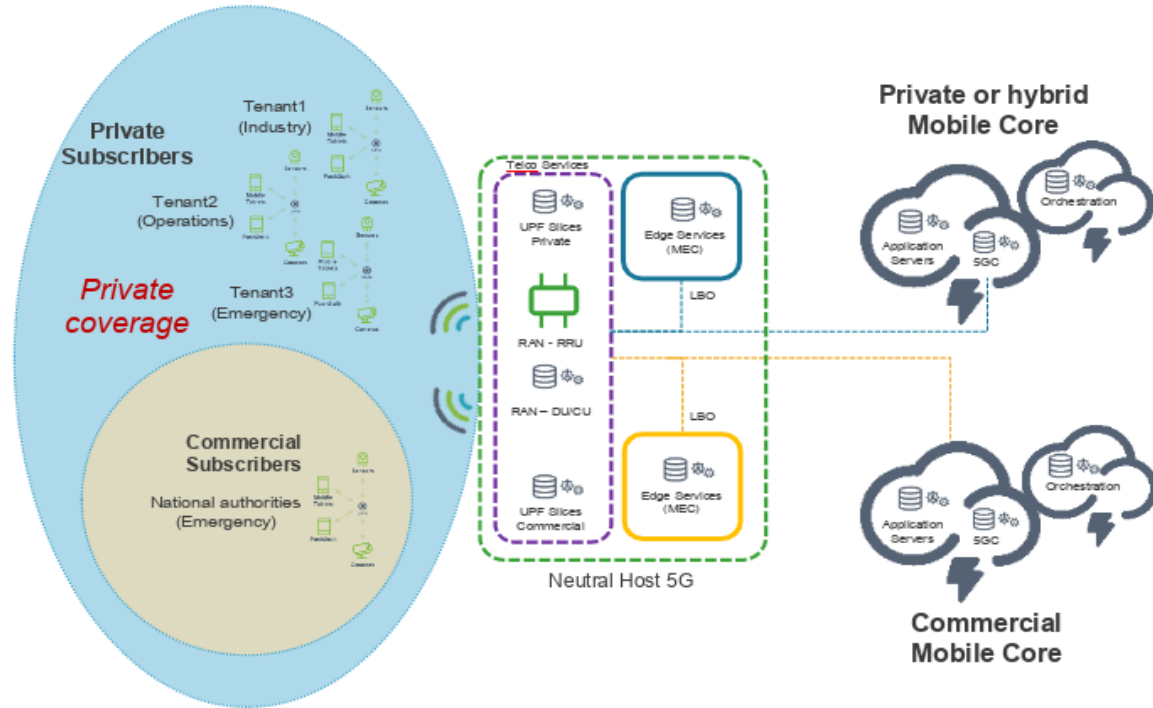
- 1. Emergency communication critical services system (MC-PTT, MC-Video, MC-Data)
- 2. Smartcity Edge and Lamp post IoT deployment
- 3. Industrial/manufacturing private network



Pilot 1: Mission critical services

Focus on

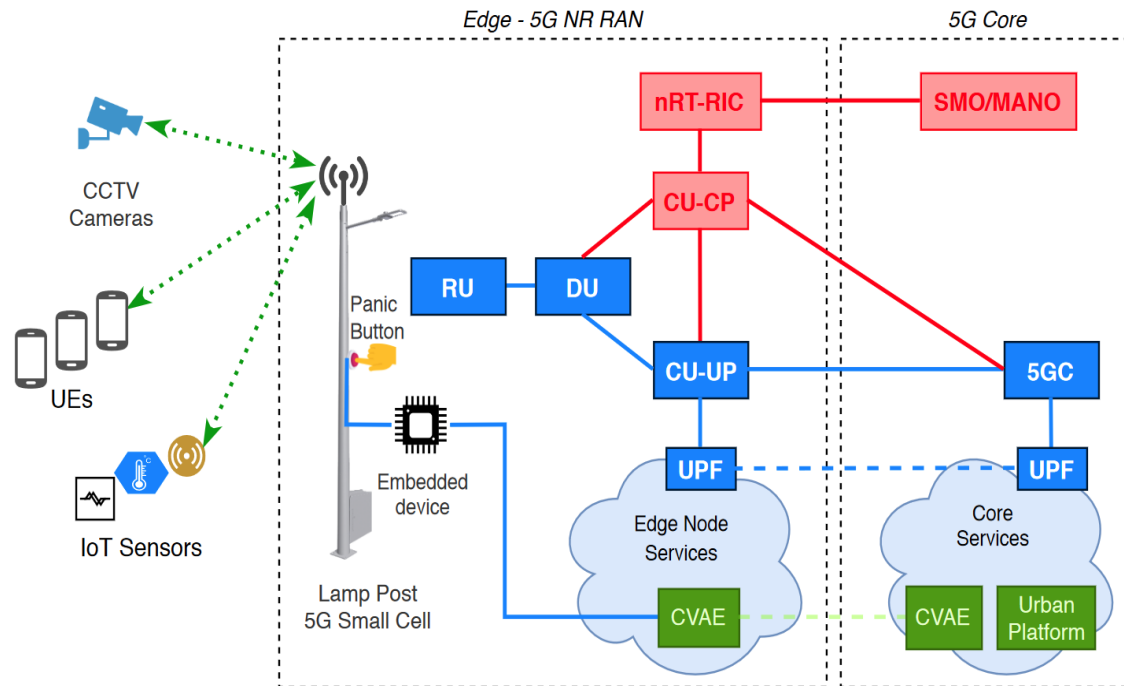
- ✓ MCS scaling (through the deployment of a new MCS VNF) in case of service overload
- ✓ MC service instantiation at the edge in case of increased latency
- ✓ Service delivery through the edge NFVI in case of main core outage



Pilot 2: Smart City Edge and Lamp post IoT deployment

Focus on

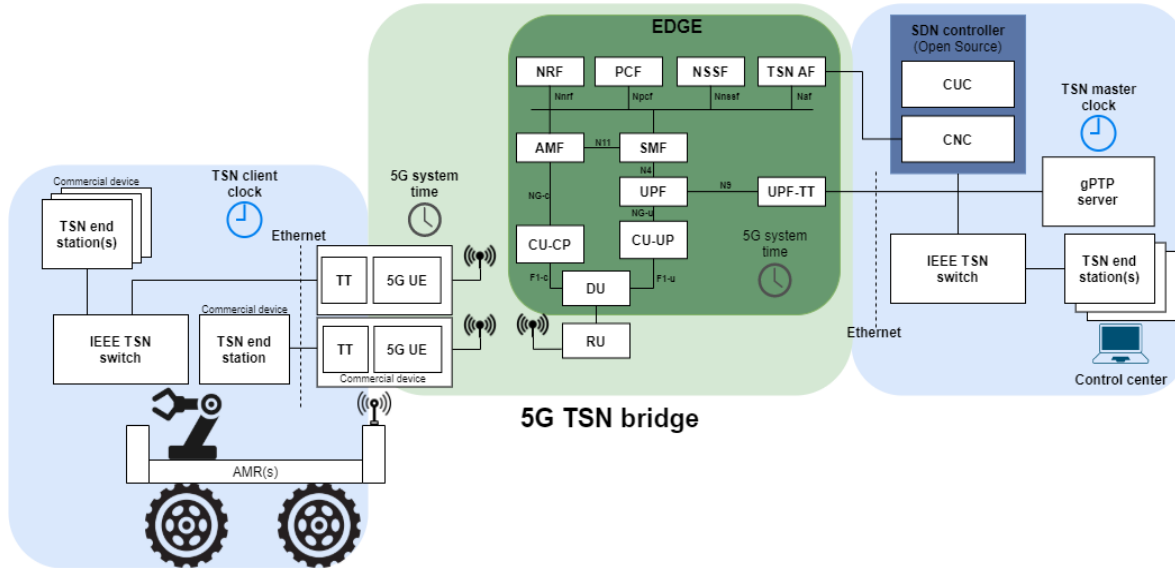
- ✓ Potential of 5G video streaming in dense scenarios
- ✓ Video processing employing computer vision at the network edge



Pilot 3: Industrial/manufacturing private network

Focus on

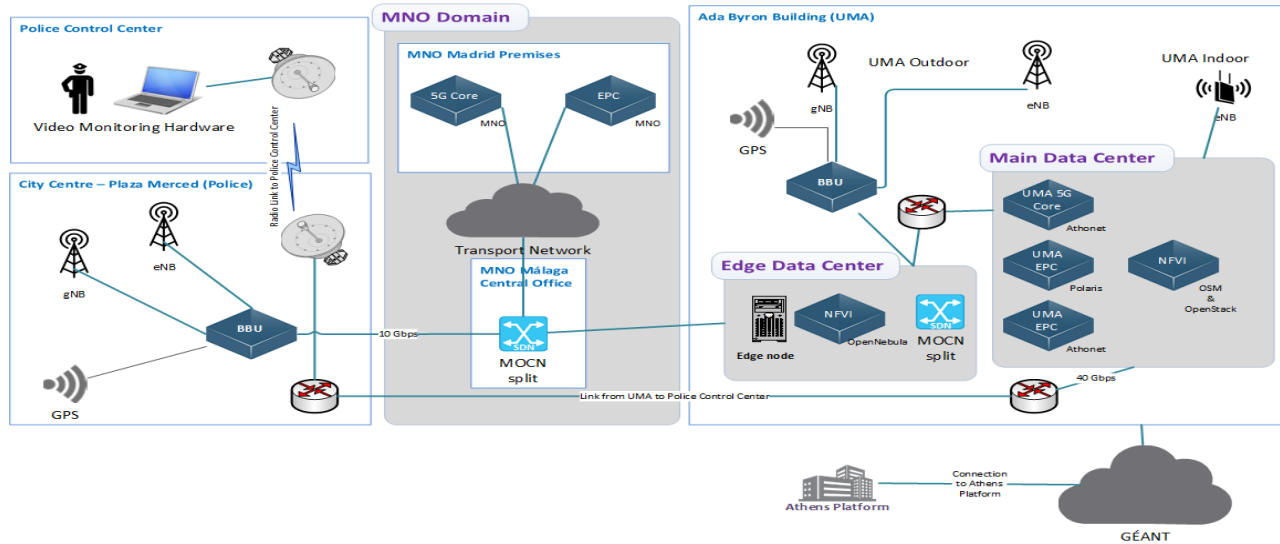
- ✓ TSN concept to manage Autonomous Mobile Robots (AMRs)
- ✓ Process automation in the context of the Factories of the Future



Available 5G sites (1/2)

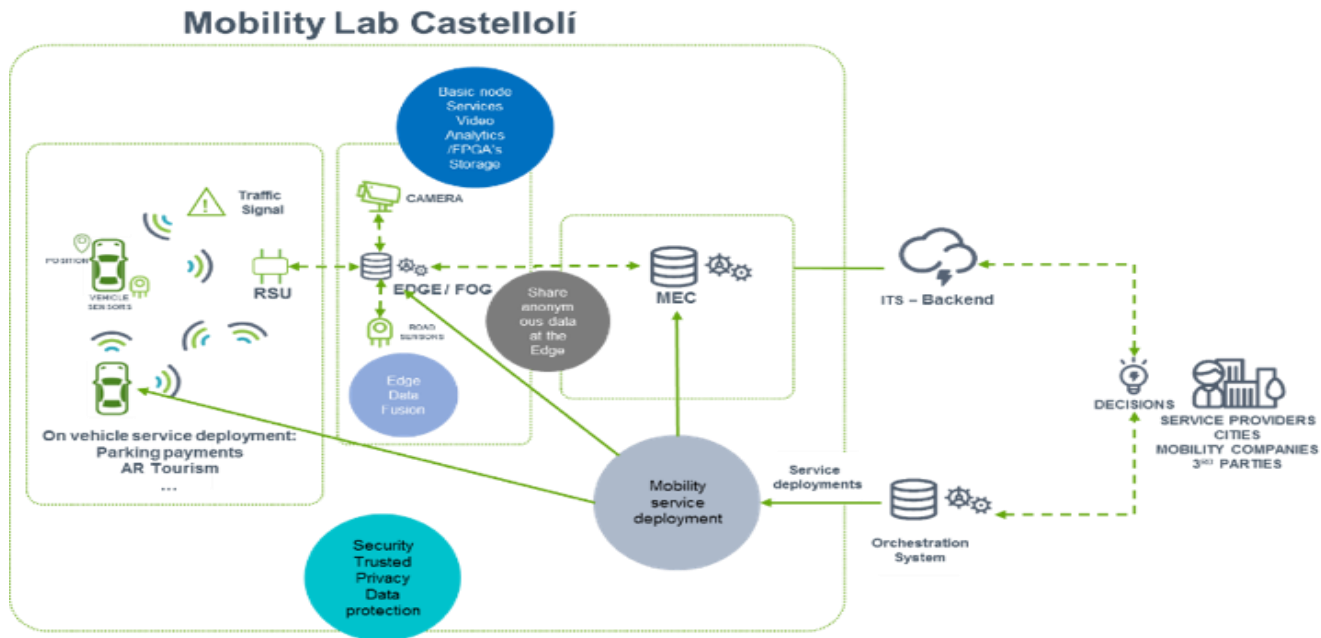
5GENESIS Málaga node (Spain)

- ✓ 5G platform deployed at UMA campus and connected to the Málaga city in the context of the phase 3 project 5GENESIS



Available 5G sites (2/2)

Circuit ParcMotor Castelloli (Spain)



Partners



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THIS PROJECT IS PART OF THE 5G PUBLIC AND
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5G PPP WWW.5G-PPP.EU



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THANKS FOR YOUR ATTENTION

Backup

