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

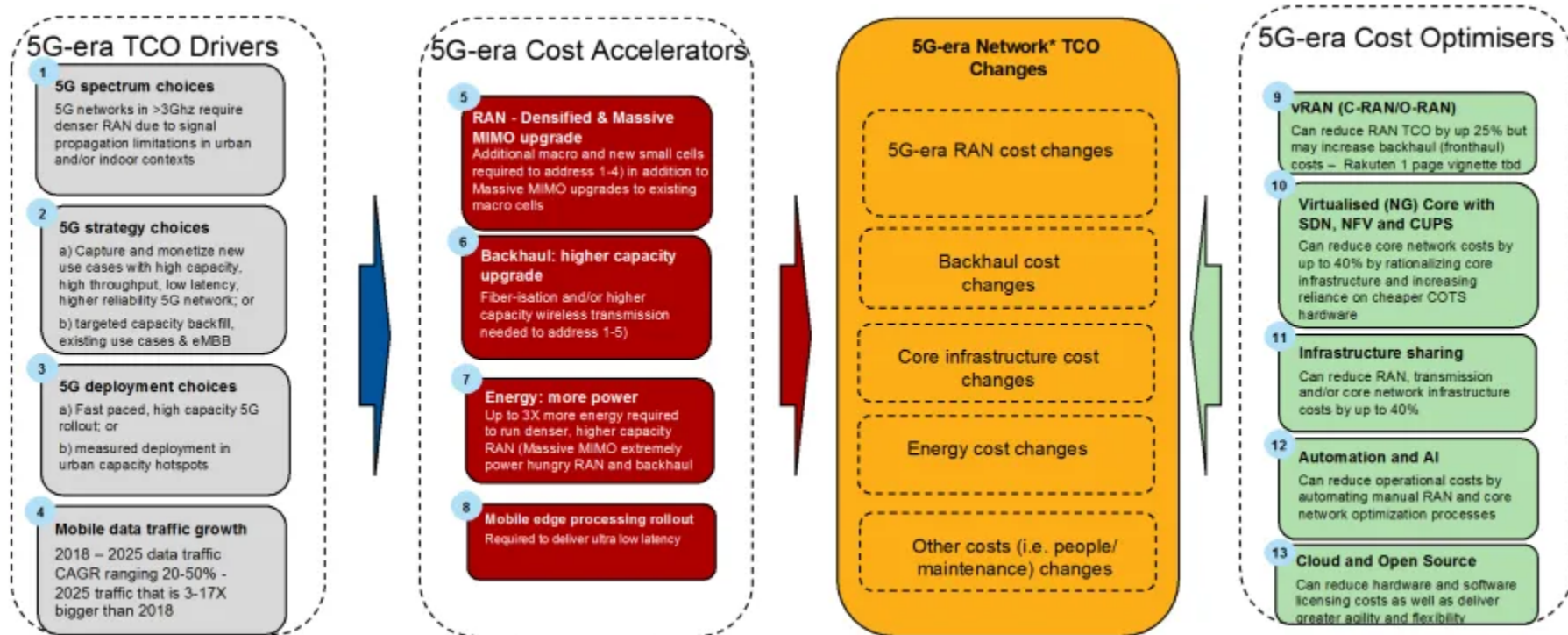**5GPPP ICT42 webinar**
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5G-era network cost optimization

5G-era TCO Drivers

1 **5G spectrum choices**
5G networks in >3Ghz require denser RAN due to signal propagation limitations in urban and/or indoor contexts

2 **5G strategy choices**
a) Capture and monetize new use cases with high capacity, high throughput, low latency, higher reliability 5G network; or
b) targeted capacity backfill, existing use cases & eMBB

3 **5G deployment choices**
a) Fast paced, high capacity 5G rollout; or
b) measured deployment in urban capacity hotspots

4 **Mobile data traffic growth**
2018 – 2025 data traffic CAGR ranging 20-50% - 2025 traffic that is 3-17X bigger than 2018

5G-era Cost Accelerators

5 **RAN - Densified & Massive MIMO upgrade**
Additional macro and new small cells required to address 1-4) in addition to Massive MIMO upgrades to existing macro cells

6 **Backhaul: higher capacity upgrade**
Fiber-isation and/or higher capacity wireless transmission needed to address 1-5)

7 **Energy: more power**
Up to 3X more energy required to run denser, higher capacity RAN (Massive MIMO extremely power hungry RAN and backhaul

8 **Mobile edge processing rollout**
Required to deliver ultra low latency

5G-era Network* TCO Changes

- 5G-era RAN cost changes
- Backhaul cost changes
- Core infrastructure cost changes
- Energy cost changes
- Other costs (i.e. people/ maintenance) changes

5G-era Cost Optimisers

9 **vRAN (C-RAN/O-RAN)**
Can reduce RAN TCO by up 25% but may increase backhaul (fronthaul) costs – Rakuten 1 page vignette tbd

10 **Virtualised (NG) Core with SDN, NFV and CUPS**
Can reduce core network costs by up to 40% by rationalizing core infrastructure and increasing reliance on cheaper COTS hardware

11 **Infrastructure sharing**
Can reduce RAN, transmission and/or core network infrastructure costs by up to 40%

12 **Automation and AI**
Can reduce operational costs by automating manual RAN and core network optimization processes

13 **Cloud and Open Source**
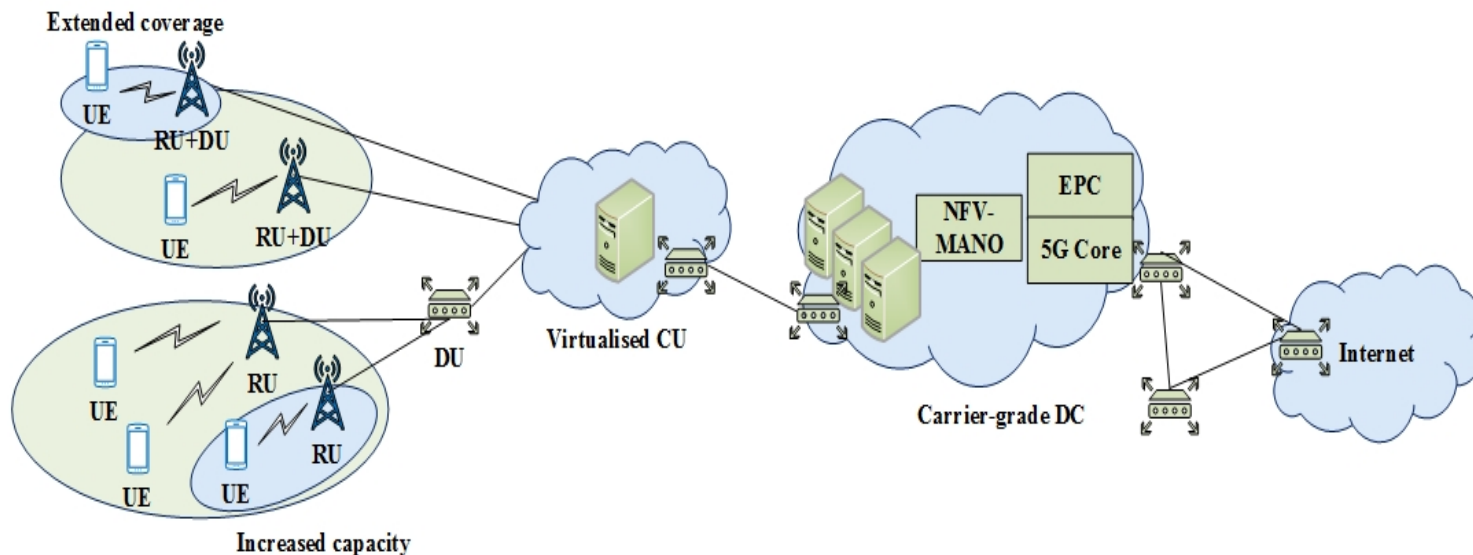Can reduce hardware and software licensing costs as well as deliver greater agility and flexibility
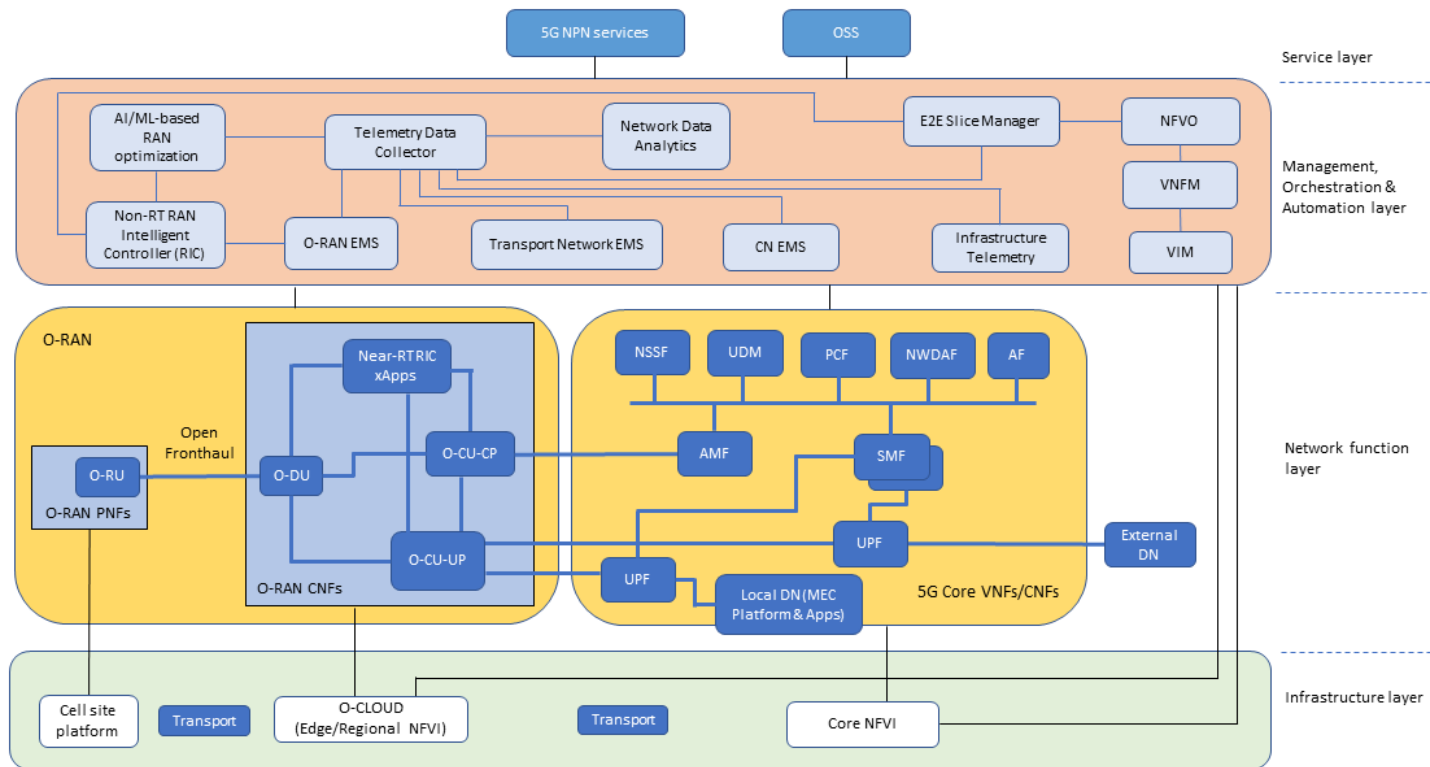
5G-era cost accelerators and optimizers (Source: GSMA)

Affordable5G in a nutshell

- 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

System Architecture

Affordable approach

- 5G roll-out with cell densification

- Remote Unit (RU)/Distributed Unit (DU)/Central Unit (CU) split

- Hardware acceleration (FPGAs, GPUs)

- Edge computing and core network virtualization, seamlessly combined with the adoption of *open solutions*: O-RAN, MEC (Multi-access Edge Computing) and open-source MANO (Management and Orchestration), for cloud-native, micro-service deployments

- The solution will be evaluated and validated in three vertical pilots

Objectives

- OBJECTIVE 1 – OPTIMIZE 5G *HARDWARE* ELEMENTS
- OBJECTIVE 2 – 5G DIMENSIONING FOR *DENSE DEPLOYMENTS*
- OBJECTIVE 3 – ADDRESS *NETWORK SHARING* STRATEGIES AS COST-SAVINGS
- 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

AFFORDABLE 5G

- 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 optics core (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

o 1. Emergency communication critical services system (MC-PTT, MC-Video, MC-Data)

o 2. Smartcity Edge and Lamp post IoT deployment

o 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
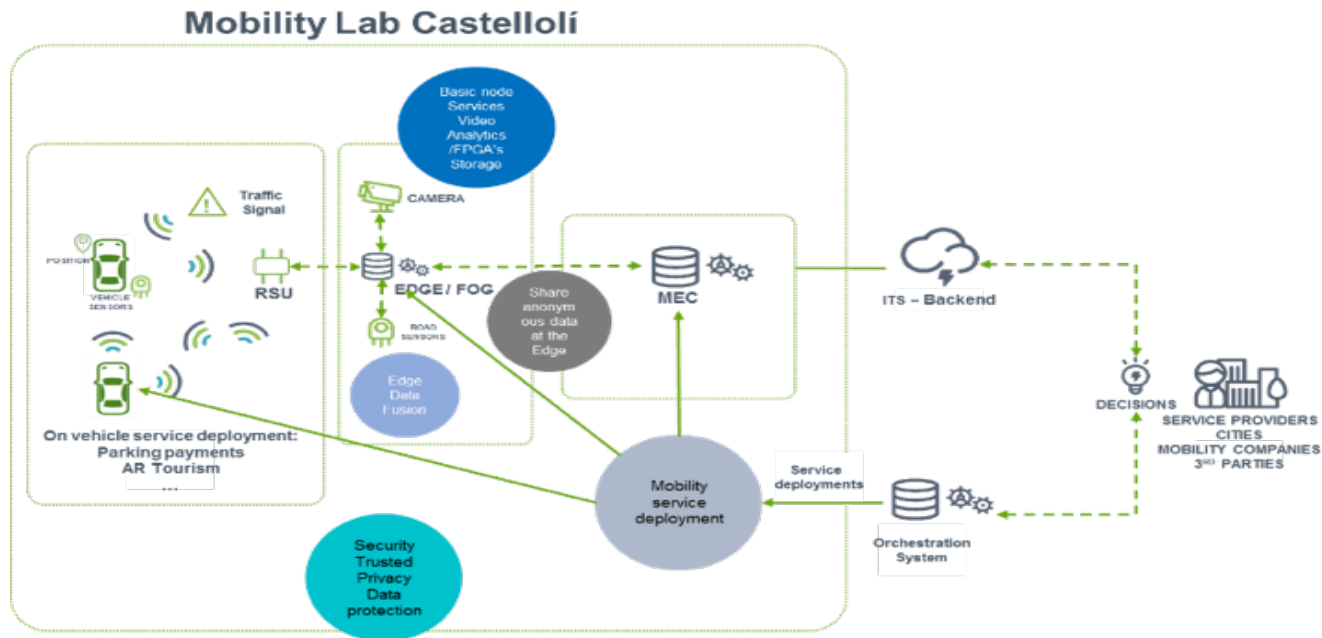
Available 5G sites (1/2)

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

GET IN TOUCH

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THANKS FOR YOUR ATTENTION

Backup