



9th June 2020

Online Workshop

5Growth

Welcome and Introductory Panel:

“Key challenges and requirements for 5G experiments with verticals”

Xi Li (NEC, Technical Manager)

Vertical Pilots

- 5Growth aims to perform real field trials involving customer sites of four vertical locations in Portugal, Spain & Italy
- This requires the development, installation, validation and testing of pre-commercial 5G radio, transport and core technology in vertical sites, connected via the ICT-17 platforms

Pilots

Industry 4.0:

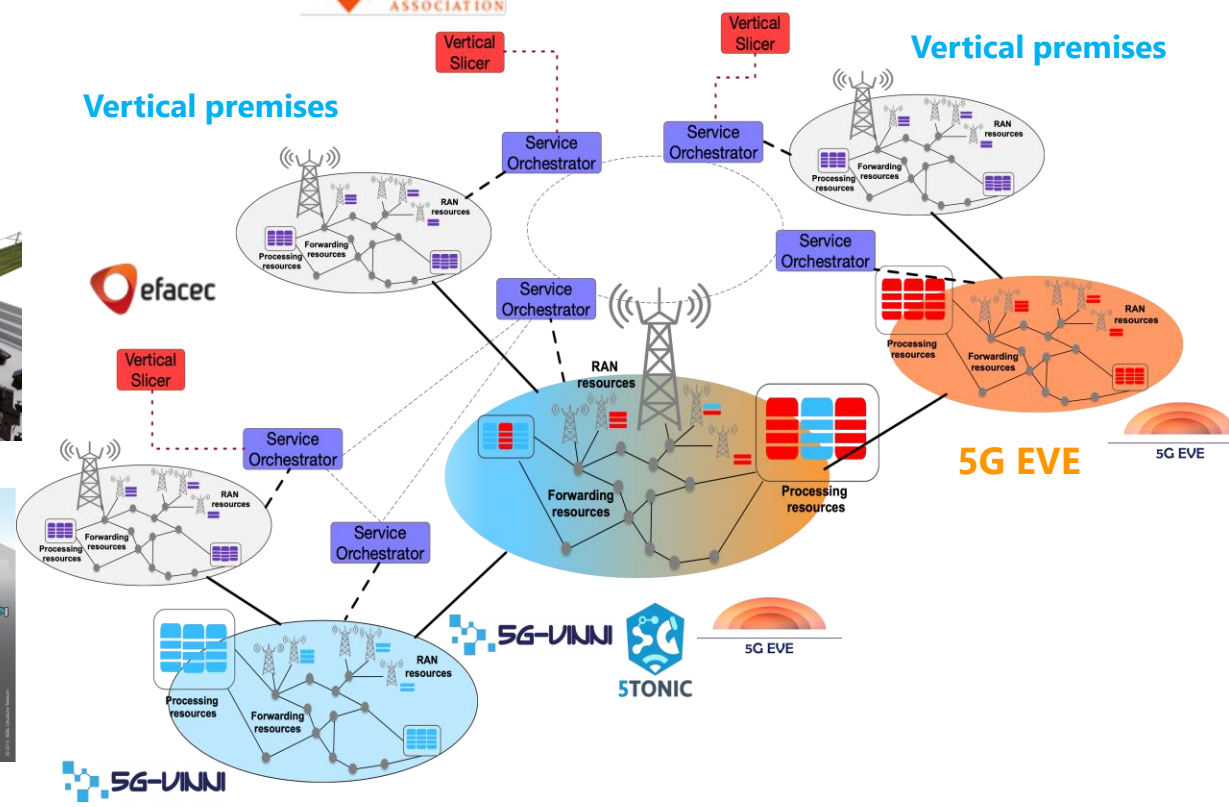
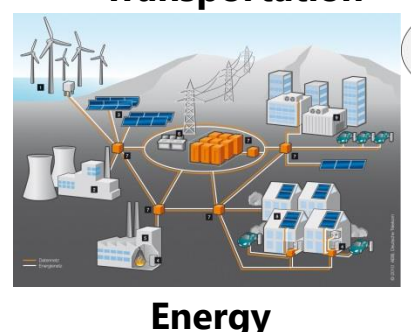
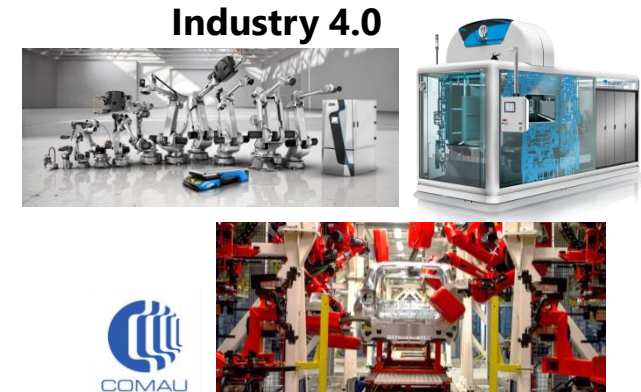
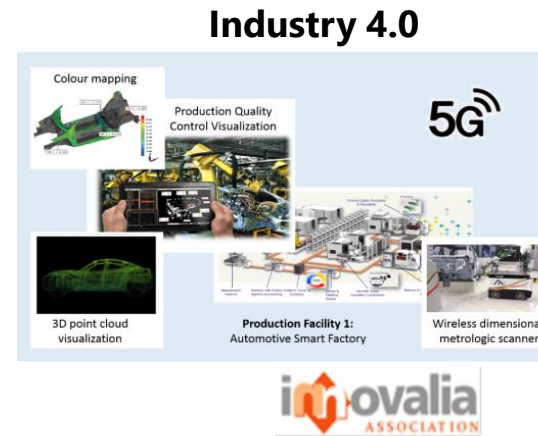
- INNOVALIA
- COMAU

Energy:

- EFACEC_E

Transportation:

- EFACEC_S



Use Case Families

Industry 4.0: Smart factory

- Remote Operation of equipment
- M2M collaboration for factory automation
- Digital Twin
- Telemetry/Monitoring
- Digital tutorials and remote support



Digital twin

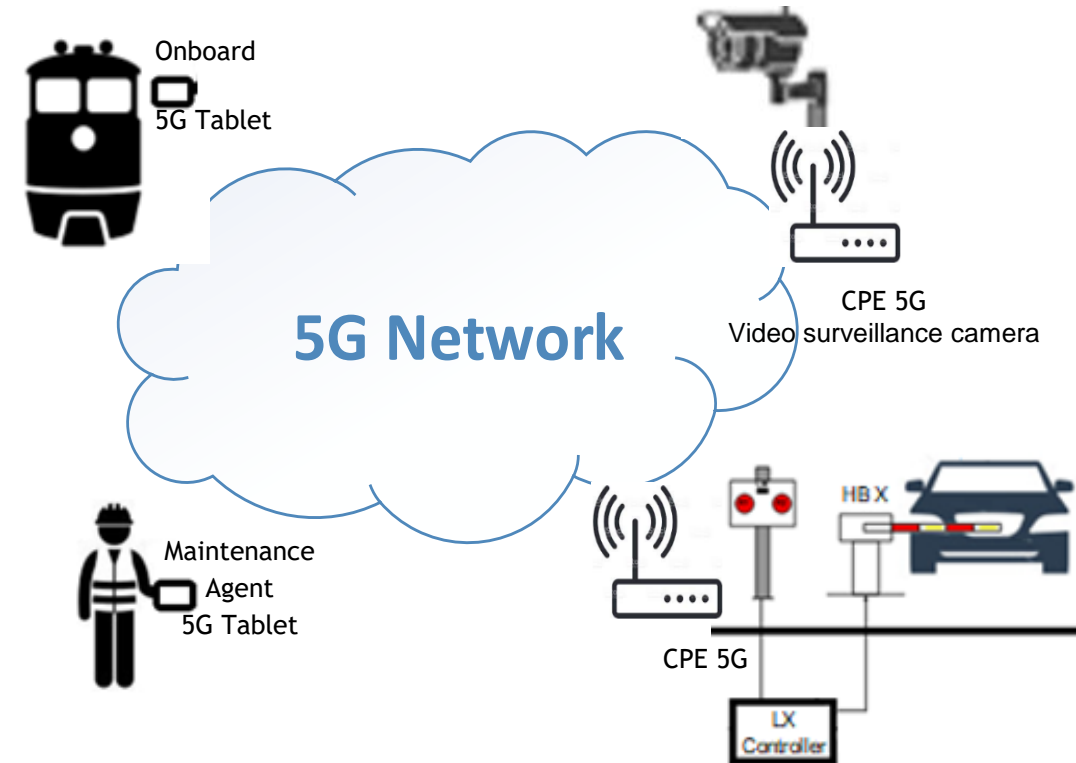


Real plant

Use Case Families

Transportation : Safety control of the railway level crossing

- Safety critical communications between *the* train approaching detecting sensors and Level Crossing (LX) controller
- Real-time video transmission between the level crossing site and the train driver/Maintenance staff + Level Crossing Supervision

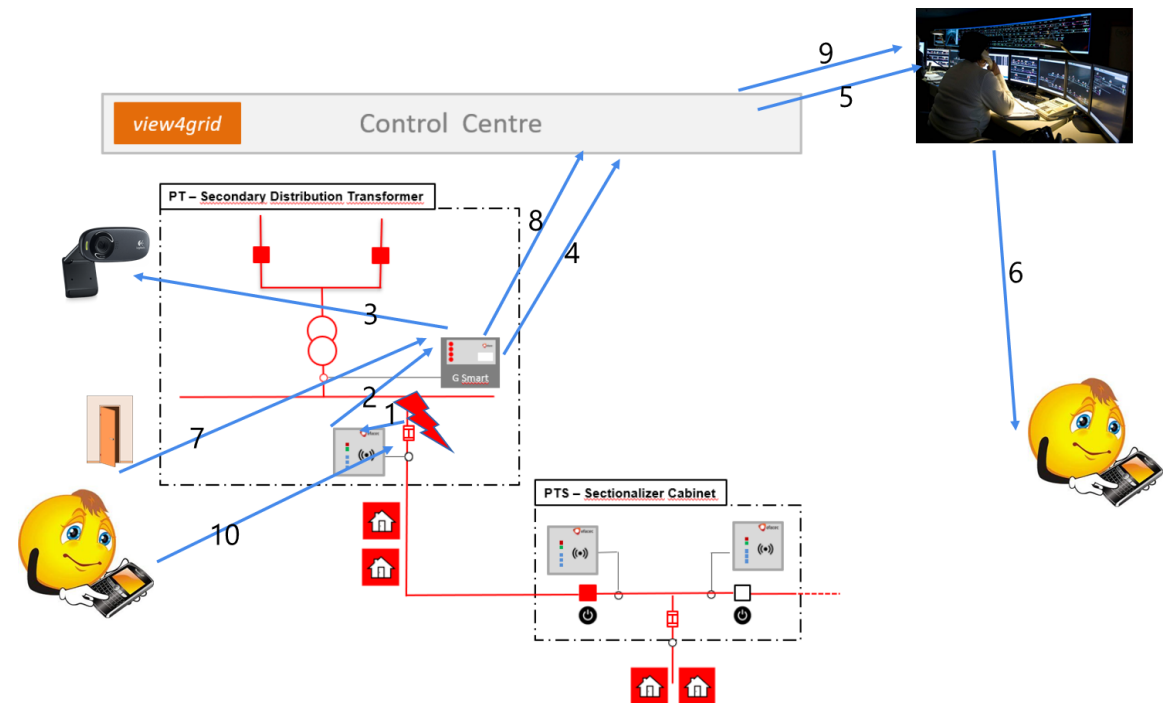


EFACEC Engenharia e Sistemas, Portugal

Use Case Families

Energy : Improve the maintenance of secondary substations on medium voltage/low voltage (MV/LV) distribution network

- Advanced monitoring and maintenance support of secondary substation
- Advanced critical signal and data exchange across wide smart metering and measurement infrastructures



EFACEC Energia, Portugal

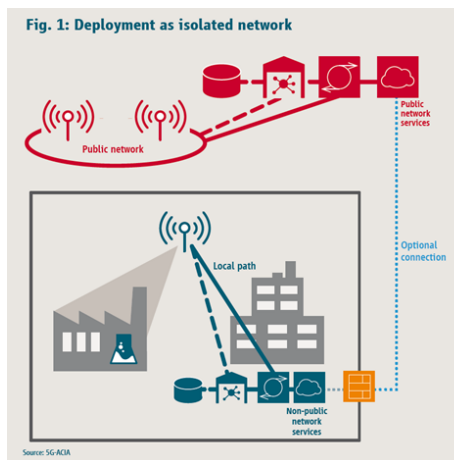


Main Requirements

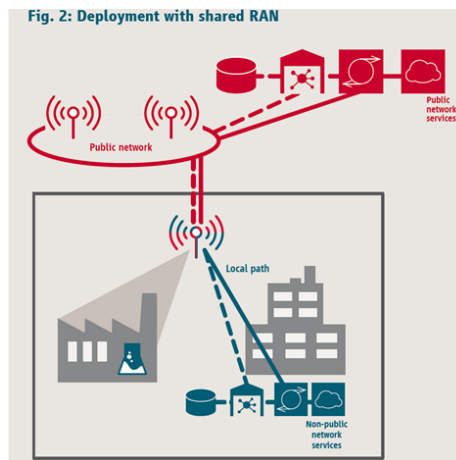
- Require real 5G deployment including radio, transport and 5G core (NSA or SA), as well as may need cloud infrastructure at the edge (e.g. within the vertical premises) or in the core
- Require to support multiple slice types (eMBB, URLLC, mMTC) to enable different service components of the pilot
- Require a portal and standard interface for the verticals to define their services (vertical service blueprints) and specify their experiments
- Require service monitoring and evaluation of the service KPIs
- Some use cases may also require automated real time service management over run time (e.g. auto-scaling, self-healing, etc.)

Key Challenges

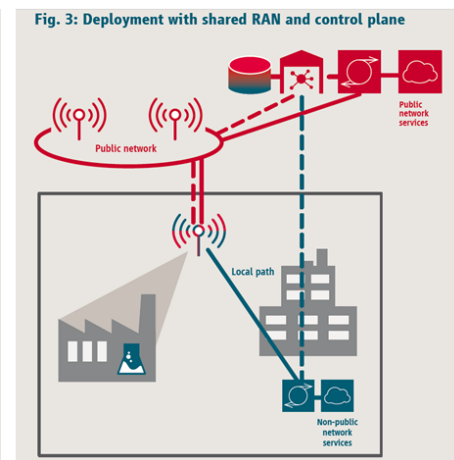
- How to integrate vertical's private 5G network, a.k.a. Non-Public Network (NPN) deployed at vertical premises, with the public networks owned and controlled by operators (i.e. ICT-17 platforms in the context of the project)?
 - Which of the NPN deployment model?
 - What parts will be shared or what parts will be dedicated to the verticals?
 - Who controls what?
 - What interfaces to request the services?
 - What kind of service requests (the whole E2E service or only a subset of the service)?



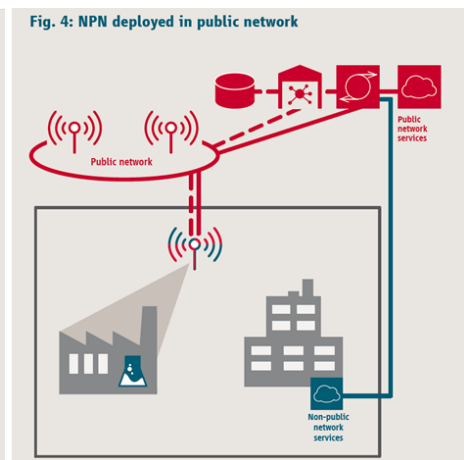
**1) Standalone NPN
(Isolated Deployment)**



2) Shared RAN



**3) Shared RAN
and Control Plane**



**4) NPN hosted by
public network**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 856709.

5Growth

- **Objectives**

- The main objective is the technical and business validation of 5G technologies from the verticals' points of view, by performing field-trials on 4 vertical sites
- Leverage on the results of 5G-PPP Phase II project: 5G-TRANSFORMER
- Apply and enhance two ICT-17 5G End-to-End platforms: 5G EVE and 5G-VINNI

- **Pilots and field trials**

- 4 pilots across 4 vertical industries ((Industry 4.0, Energy, Transportation)
- 9 use cases will be field-trialed on 4 vertical-owned sites (in Spain, Italy, Portugal) in close collaboration with the vendors (Ericsson, Interdigital, NEC, Nokia) and the operators (Telefonica, Telecom Italia and Altice Labs/PT)

- **Consortium (21 partners)**

- Verticals: Innovalia, EFACEC Engineering/Systems, Comau
- Operators: Telecom Italia, Telefonica, Altice Labs
- Vendors: NEC, ERICSSON Spain/Italy, NOKIA Bell Labs, IDCC
- SMEs: Nextworks, Mirantis, Telcaria
- Research Centers: CTTC
- Universities: POLITO, SSSA, UC3M, NKUA, ITAv



5growth.eu



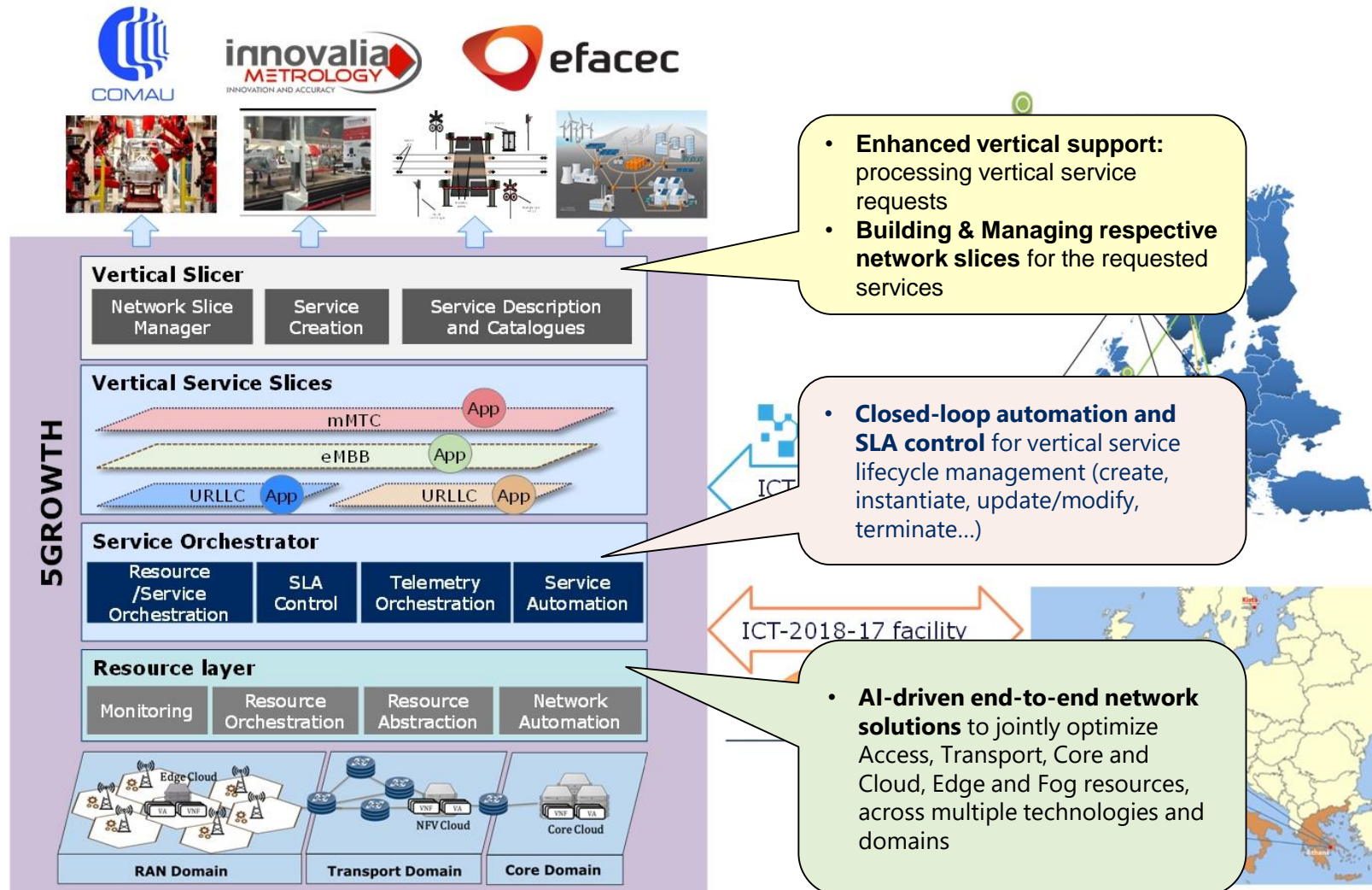
twitter.com/5growth_eu



linkedin.com/in/5growth-project

5Growth Vision on Innovations

To empower vertical industries, such as **Industry 4.0, Transportation, and Energy** with an **AI-driven Automated and Shareable 5G End-to-End Solution**



- **Develop the 5Growth platform** to create, provision and manage the vertical services with AI-driven innovations
 - Leverage on the 5GPPP Phase 2 project 5G-TRANSFORMER platform
- **Interaction with ICT-17 Platforms** to provide E2E Solution
 - Via standard Interfaces
 - Develop adaptations to each platform



Vertical use cases

Field-trial-based approach on vertical sites (TRL 6-7). In total, 4 pilots across 4 verticals and 9 use cases:

Industry 4.0 (INNOVALIA1): Connected Worker Remote Operation of Quality Equipment

Industry 4.0 (INNOVALIA2): Connected Worker Augmented Zero Defect Manufacturing (ZDM) Decision Support System (DSS)

Industry 4.0 (COMAU1): Digital Twin Apps

Industry 4.0 (COMAU2): Telemetry/Monitoring Apps

Industry 4.0 (COMAU3): Digital tutorials and remote support

Transportation (EFACEC_S1): Safety Critical Communications

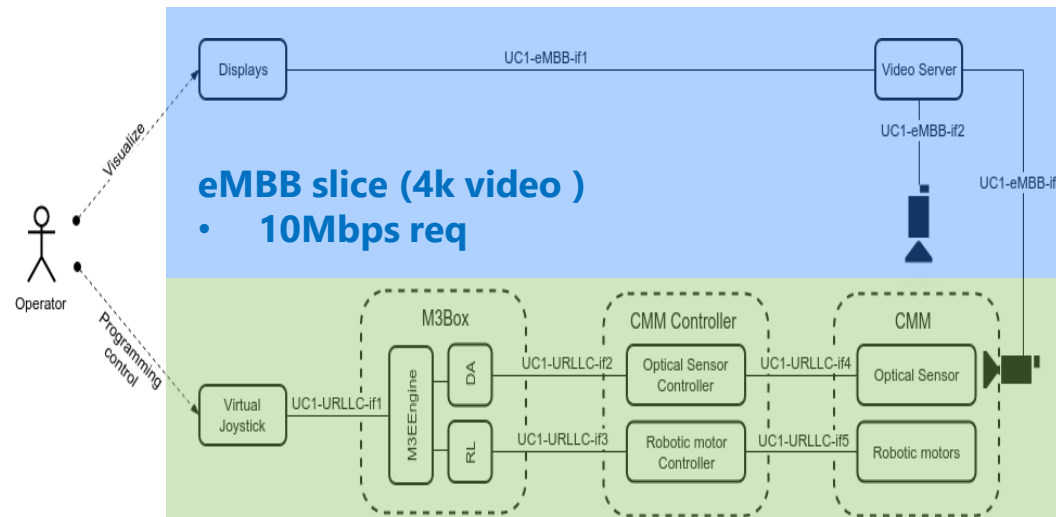
Transportation (EFACEC_S2): Non-safety Critical Communications

Energy (EFACEC_E1): Advanced monitoring and maintenance support of secondary substation - Medium Voltage/Low Voltage (MV/LV) distribution substation

Energy (EFACEC_E2): Advanced critical signal and data exchange across wide smart metering and measurement infrastructures

Example of Industry 4.0 UC: Connected Worker Remote Operation of Quality Equipment (INNOVALIA Pilot)

- Remote real-time operation via a virtual joystick by worker for remote control and programming of CMM
- 5G requirements: high data rate, reliability and low latency
- Potential benefits: Remote expert manpower and time/travel savings



Stakeholders

- **Vertical:** INNOVALIA
- **Operator:** Telefonica
- **HW/SW provider:** Ericsson
- **Video streaming service provider:** InterDigital
- **Operation Support Provider:** TELCA

- URLLC slice (control)**
- **Reliability: 99.99%**
 - **E2E Latency < 5ms**

Coordinate Measuring Machine (CMM)



5G

Hybrid Sensors

Manufacturing Process

Measurement machine

4K Video Camera

Production Facility 1:
Automotive Smart Factory

Process Quality Assurance & Traceability

Material & Consumable automated management

Design & Planning Station

Machine Group Execution Coordination

Interface with Factory Analytics Server & logistics and planning

Work Shop Manager

OPW

Deployment Setup

