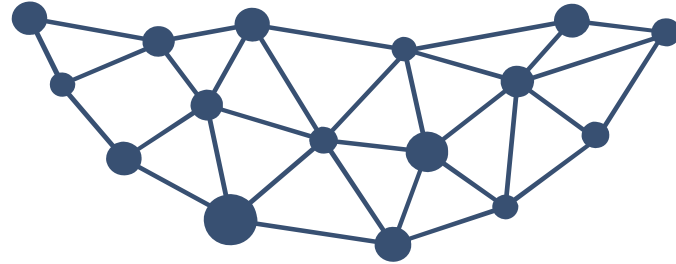


# Smart5Grid



Demonstration of **5G** solutions for  
**SMART** energy **GRIDS** of the future

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KIOS CoE University of Cyprus



5G-PPP IA: WG Trials Meeting

5/07/2021

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the European Union's *Horizon 2020*  
*research and innovation programme*  
under grant agreement n° 101016912



# Summary

Content overview



- General Information
- Objectives
- Energy Vertical
- From SGAM to innovations of the Smart5Grid Architecture
- Smart5Grid Demos
- Consortium and Project Info

# Smart5Grid

Demonstration of 5G solutions for SMART energy GRIDs of the future



## GENERAL INFORMATION

THE CONSORTIUM

24 EUROPEAN  
PARTNERS  
COVERING  
7 EU STATES

DURATION

**3 YEARS**  
Started  
1/01/2021

TOTAL BU

**8 M€**



# Smart5Grid

Demonstration of 5G solutions for SMART energy GRIDs of the future



## OBJECTIVES

### Objective #1

To specify the critical architectural and technological enhancement **from previous 5G PPP phases** needed to fully enable **an open experimental platform** for the **Energy Vertical**

### Objective #2

To design, deploy, operate, and evaluate in real world conditions the **baseline system architecture** and **interfaces** for the provisioning of an integrated, open, cooperative, and **fully featured 5G network platform, customised for smart energy distribution grids**

### Objective #3

To develop an **open NetApp repository**. In conjunction with the 5G network facility, the **Open Service Repository** will have access to network resources, and it will be used to develop and accommodate NetApps, providing rapid access and execution **environment to developers, third parties, and SMEs** from the energy vertical sector

### Objective #4

To develop **high-performance NetApps** that will support the ambitious Smart5Grid energy-oriented use cases

### Objective #5

To provide a **Validation and Verification (V&V) experimentation framework** for NetApp **automatic testing, certification, and integration**

### Objective #6

To **realise four advanced 5G real-life demonstrations** over a wide set of energy related use cases. To exhibit that performance has been conforming to **5G PPP KPIs**

### Objective #7

To conduct a **market analysis** and to establish new business models. Detailed techno-economic analysis and road mapping towards exploitation and commercialisation by industry partners and **SMEs** are also of high priority for the project

### Objective #8

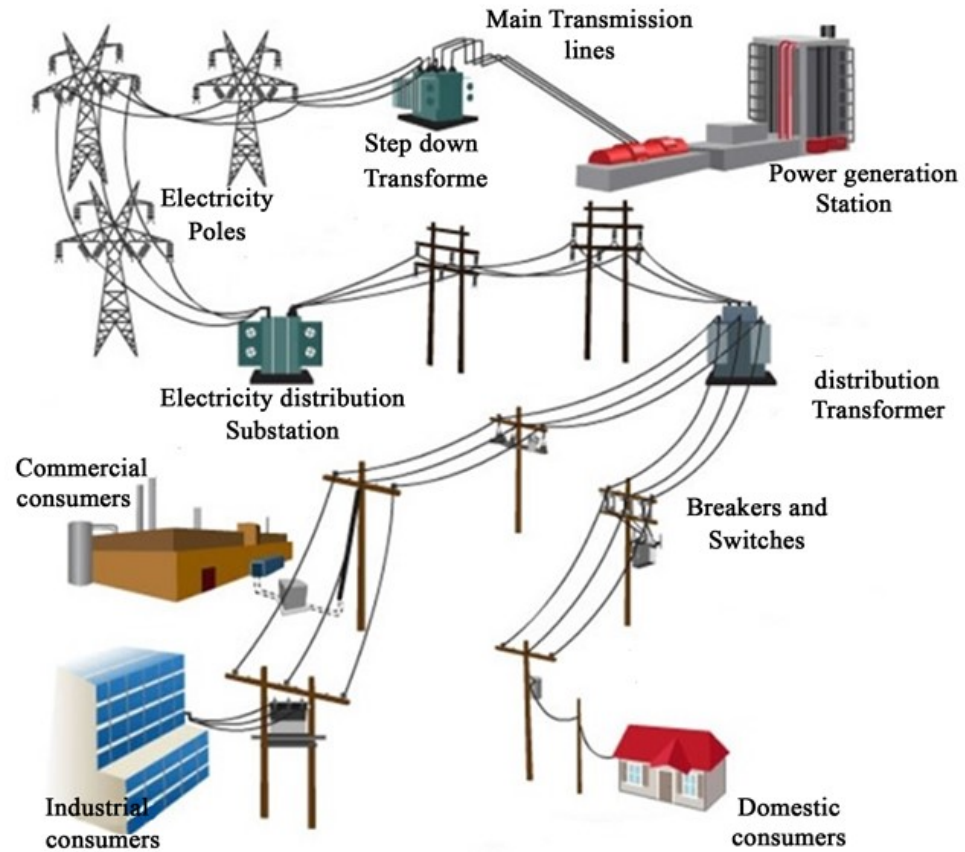
To ensure **maximisation of Smart5Grid impact** to the **realisation** of the **5G vision** by establishing close liaison and synergies with 5G PPP Phase-2 and 3 projects and the 5G PPP. To pursue extensive dissemination and communication activities, as well to assess the perceived impact from the stakeholders and the wider community

# Smart5Grid

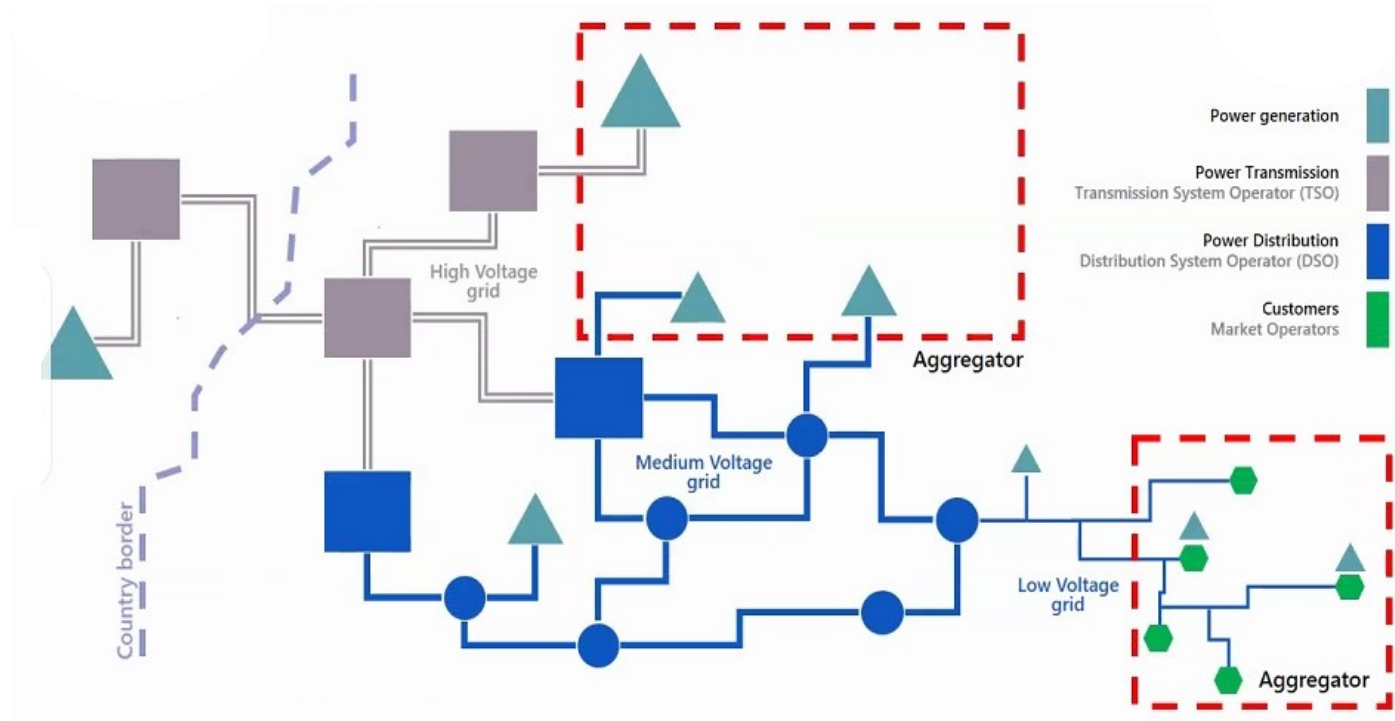
Demonstration of 5G solutions for SMART energy GRIDs of the future



## ENERGY VERTICAL



Traditional power systems



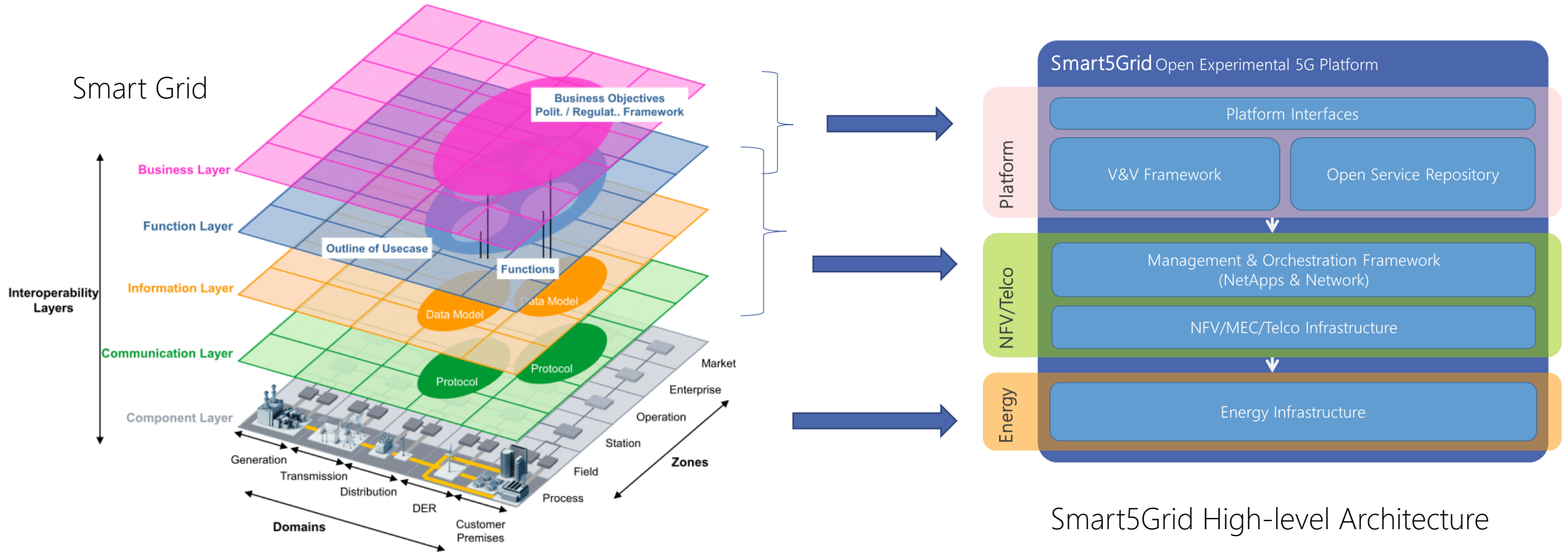
Smart Grid

# Smart5Grid

Demonstration of 5G solutions for SMART energy GRIDs of the future



## ENERGY VERTICAL – SGAM VS Smart5Grid Architecture



Source: , CEN-CENELEC-ETSI, Smart Grid Coordination Group, *Smart Grid Reference Architecture*, Tech. Rep., 2012

# Smart5Grid – innovation for the energy ecosystem

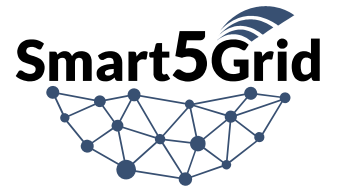
Demonstration of 5G solutions for SMART energy GRIDs of the future



- Complement contemporary energy distribution grids with **access to 5G network** resources through an **open experimentation 5G platform** and **innovative Network Applications (NetApps)**
- Four use-cases to demonstrate **efficiency, resilience** and **elasticity** provided by the **5G networks** (slicing and millisecond-level latency)
- **Open environment to third parties** for experimentation (Open Service Repository, V&V Framework)
- **Innovative NetApp Controller and MEC Orchestrators**

# Smart5Grid – Demos

Demonstration of 5G solutions for SMART energy GRIDs of the future



**Italian Demo | Olbia**

Automatic Power Distribution Grid Fault Detection



**Spanish Demo | Barcelona**

Remote Inspection of Automatically Delimited Working Areas at Distribution Level



**Bulgarian Demo | (Southern region)**

Millisecond Level Precise Distribution Generation Control



**Bulgarian-Greek Demo | (Cross-border)**

Real-time Wide Area Monitoring



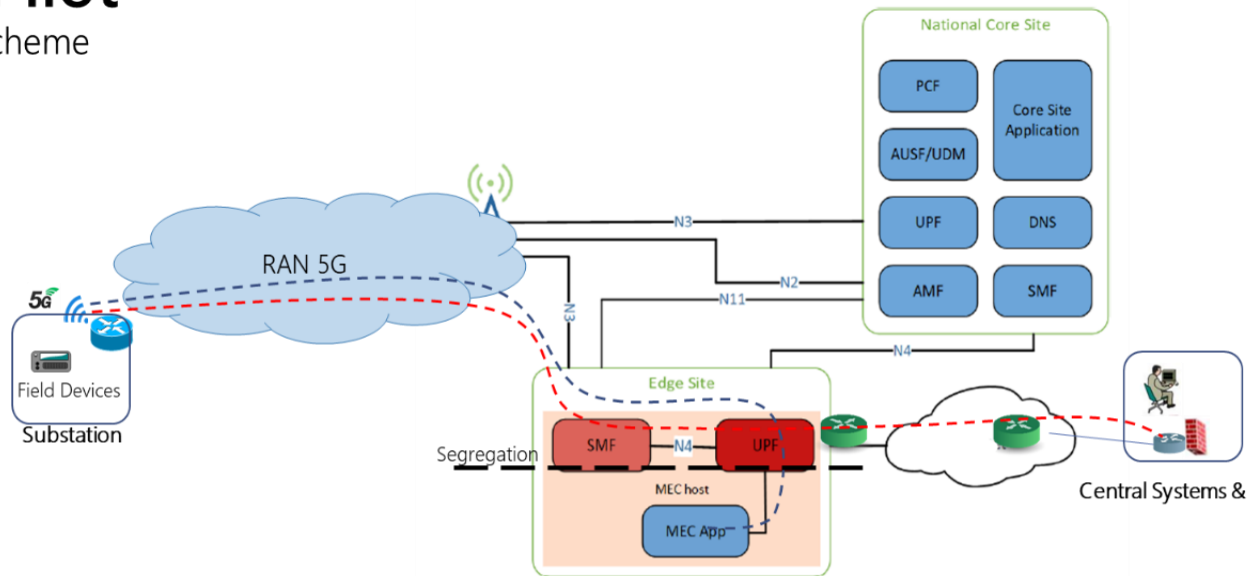
# Smart5Grid – Demos

Demonstration of 5G solutions for SMART energy GRIDs of the future



## Italian Pilot

Net Logical scheme



### LEGENDA

- - - Remote Control traffic in end to end tunnel
- - - Monitoring Traffic by NetApp

(UC#1) (DSO-Operation)

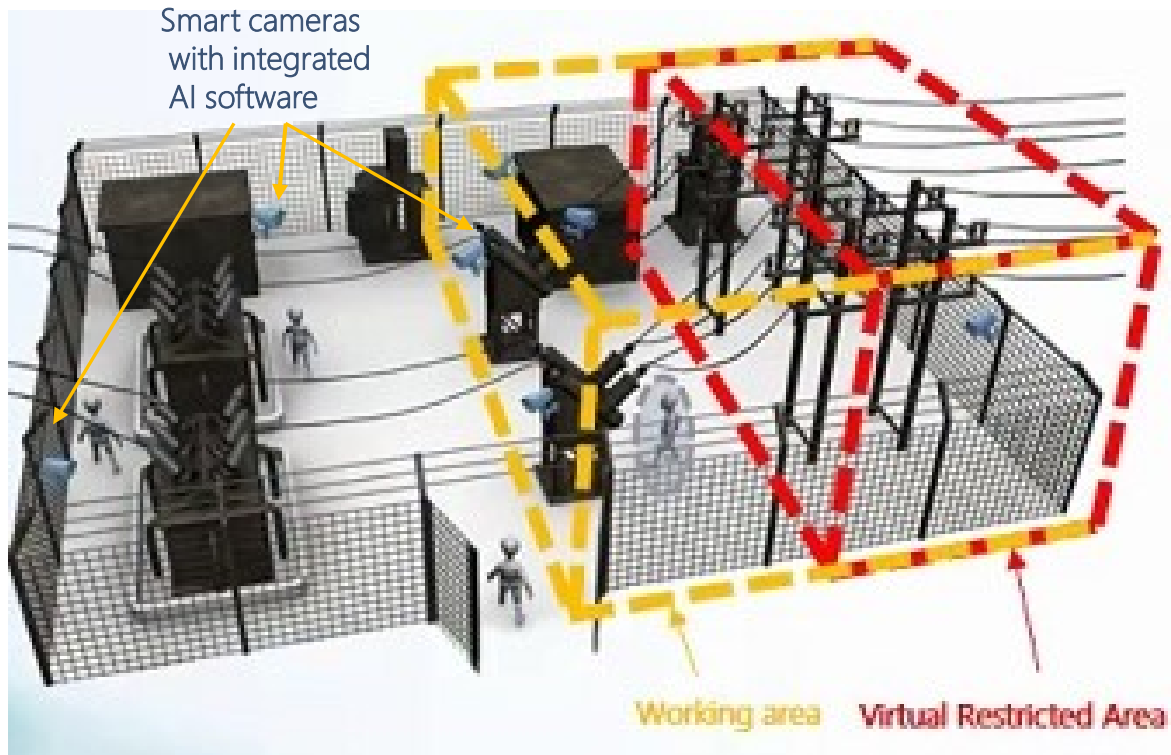
Automatic Power Distribution Grid Fault Detection, Olbia Region of Italy.

Advanced grid automation developed by E-Distribuzione for real-time fault detection, isolation and self-healing in distribution power grids, able to reconfigure the grid during a power outage, minimizing the number of affected customers.

**Business goal:** to reduce the time and the effort needed while performing the troubleshooting when a communication problem occurs between the central HUB and the field devices involved in the real-time self-healing automation system of E-Distribuzione. To expand the implementation of this solution at a larger scale in the power distribution grids, with reduced costs for the communication system.

# Smart5Grid – Demos

Demonstration of 5G solutions for SMART energy GRIDs of the future



(UC#2) (DSO- Safety)

Remote Inspection of Automatically Delimited Working Areas at Distribution Level, Garraf Natural Park, Barcelona, Spain.

A system for monitoring the safety of workers performing maintenance tasks in HV power substations, using a private 5G facility. High resolution 3D cameras with integrated AI software will assist workers during their maintenance, avoiding them to reach energized power equipment, which could endanger their lives.

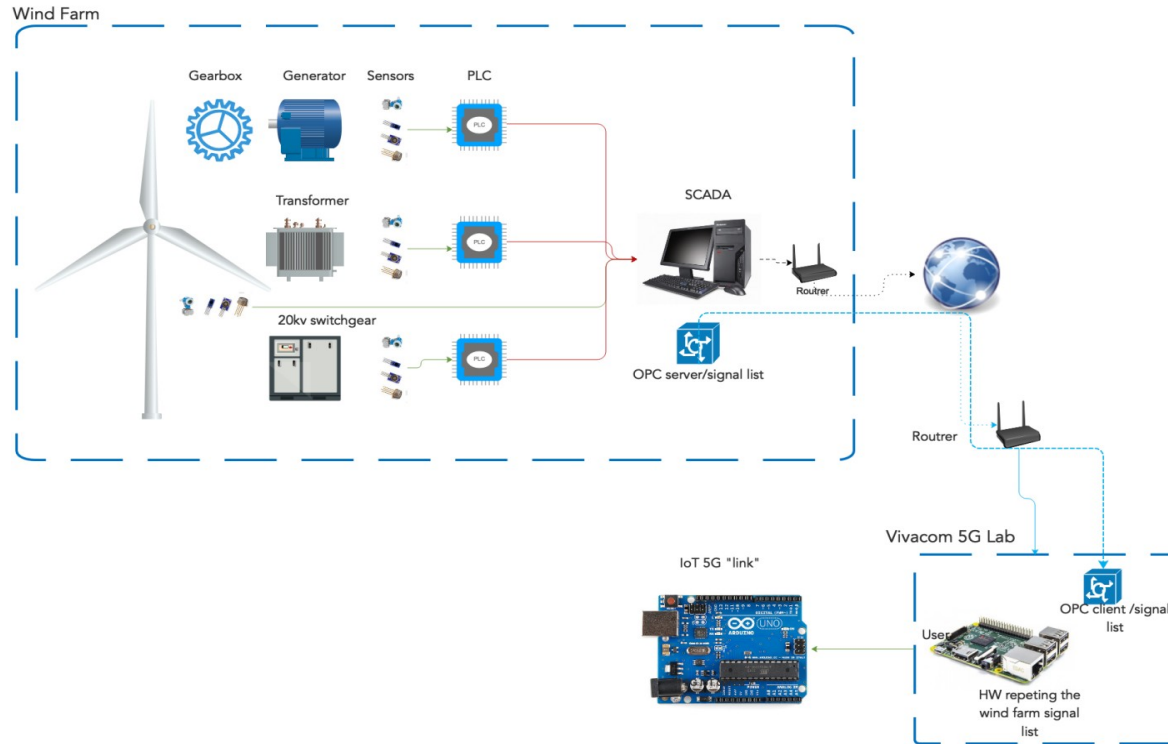
**Business goal:** to introduce an **automated process** that enables the detection of workers and their working tools that are accessing a primary substation and crossing the borders of a delimited safety working area.

# Smart5Grid – Demos

Demonstration of 5G solutions for SMART energy GRIDs of the future



Wind farm demo case topology



(UC#3) (Aggregator)

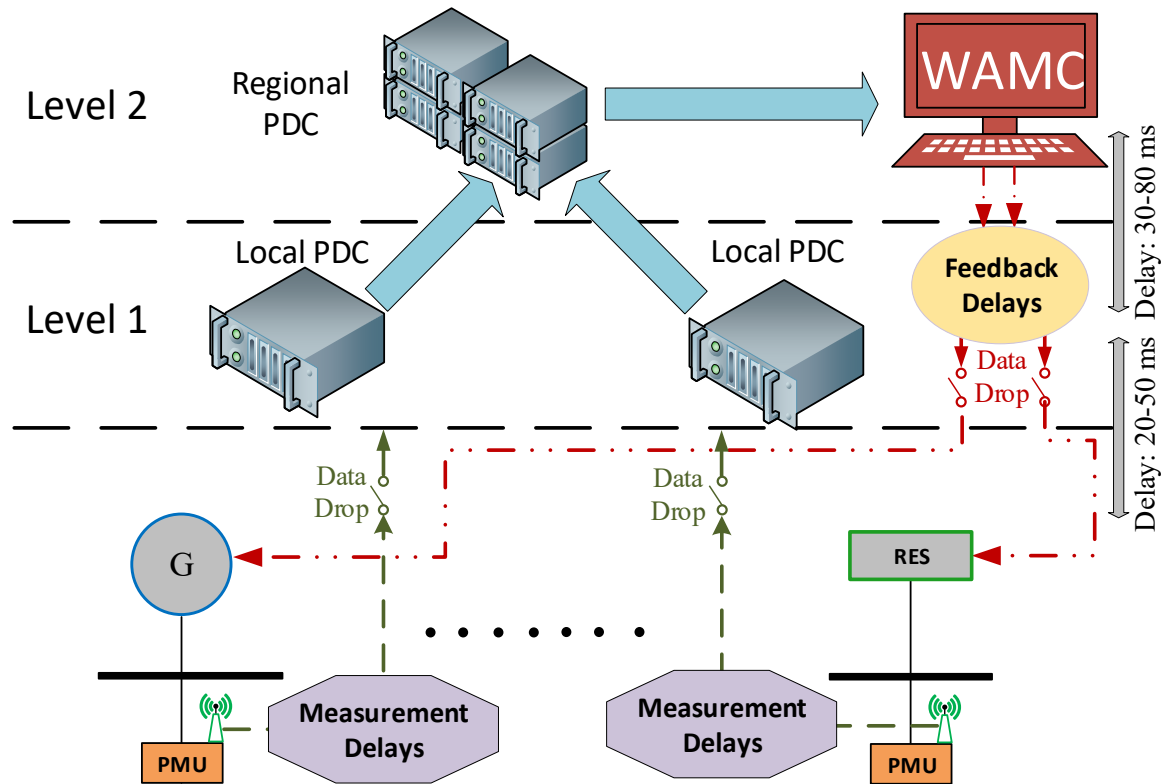
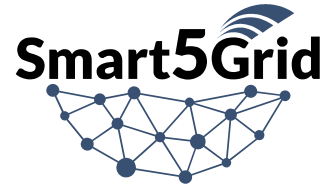
Millisecond Level Precise Distributed Generation Monitoring, Silven region of South-East Bulgaria.

Smart5Grid will enable the connection of thousands of MV & HV decentralised RES units and their inverters to a platform with installed 5G communication protocols, which will allow their aggregation and control in milliseconds rates, thus low latency, high reliability and high availability are mandatory requirements.

**Business goal:** to assist wind farm owners in real-time monitoring of their asset such that to minimize the operation and maintenance cost, and at the same time, being eligible for the provision of ancillary and innovative flexibility services on electricity markets through flexible plant management.

# Smart5Grid – Demos

Demonstration of 5G solutions for SMART energy GRIDS of the future



## (UC#4) (TSO-TSO)

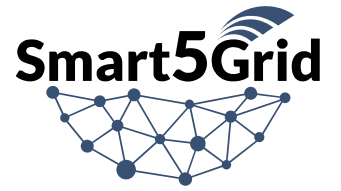
Real-time wide area monitoring, cross-border Greece and Bulgaria, Thessaloniki area.

Monitoring the interconnection power flow between Greece and Bulgaria is monitored leveraging the advantages of 5G technology in terms of **latency, high reliability and high availability**. This function will be executed from the newly established Regional Security Coordinator (RSC) in Thessaloniki, making use of a new element 5G enabled virtual PDC unit collecting and processing data coming from PMUs.

**Business goal:** to ensure high fidelity real-time monitoring of the supervision area of the grid under RSC and the provision to the TSOs of the information and strategies for the proper coordinated security analysis and operation of the system in real-time conditions.

# Consortium

24 partners, 2 linked third-parties, 13 SMEs



## Coordinator



## TELCOs



GROUP OF COMPANIES

## SMEs



EIGHTBELLS  
Independent Research & Consultancy



NBYCOMP  
NearbyComputing

## Tech Companies



## Universities/Research institutions



## DSOs



## TSOs



(Linked third-parties of Enel GI&N)

# Find out more and follow us on:



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[smart5grid.eu]



# Thank you

Any questions?