

# Real-time Wide Area Monitoring Opportunities and Challenges for DSOs/TSOs

## *Vertical Use Case*

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UC Leader



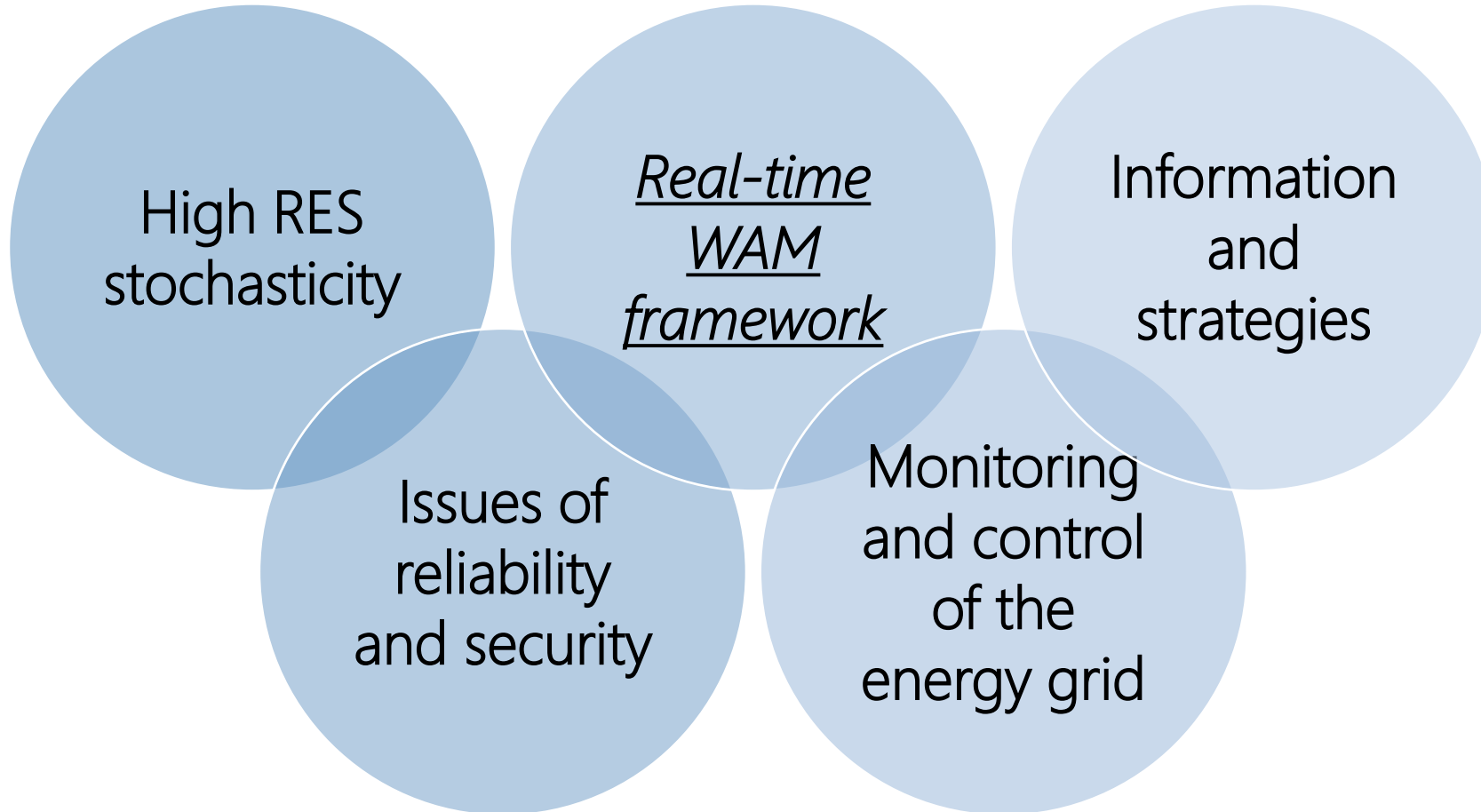
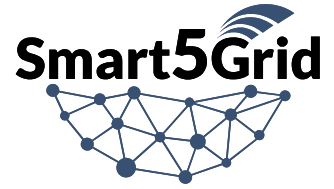
Demonstration of 5G solutions for  
SMART energy GRIDs of the future

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*research and innovation programme*  
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# Business Goals

Real-time Wide Area Monitoring



# Objective

Real-time Wide Area Monitoring



Creation of Wide Area Monitoring tool



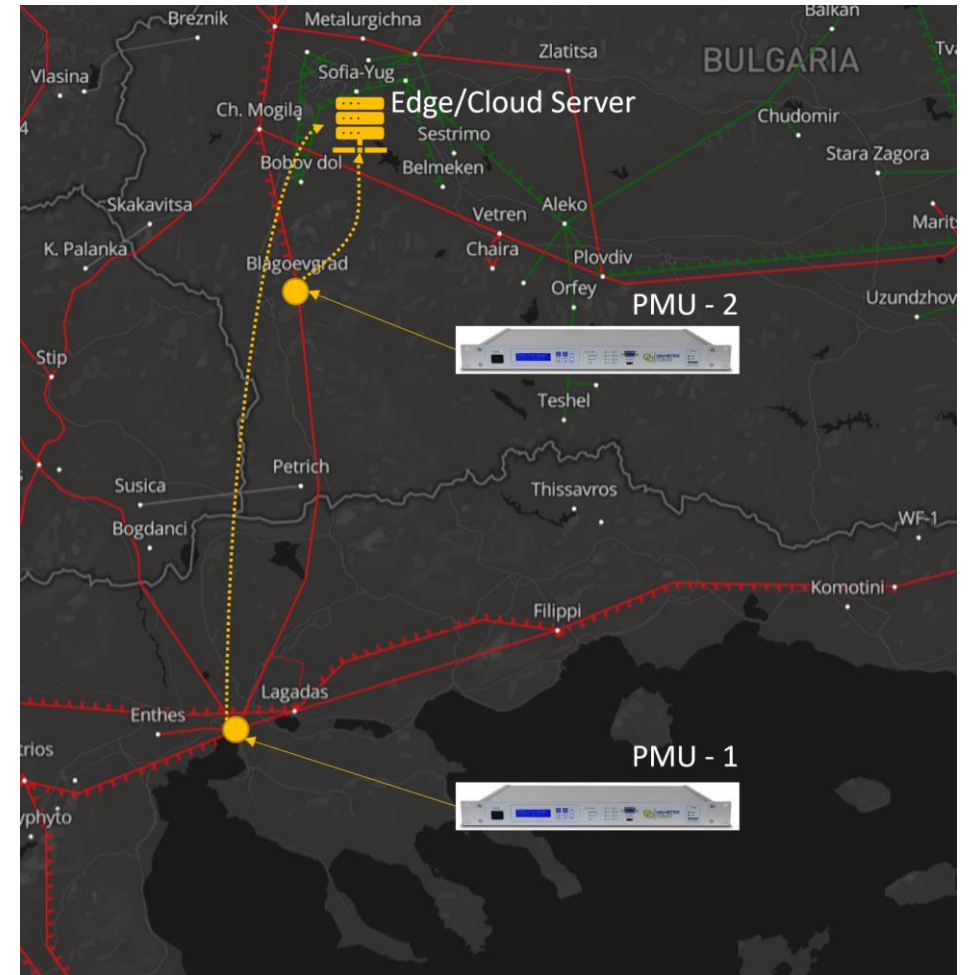
virtual Phasor Data Concentrator (vPDC)



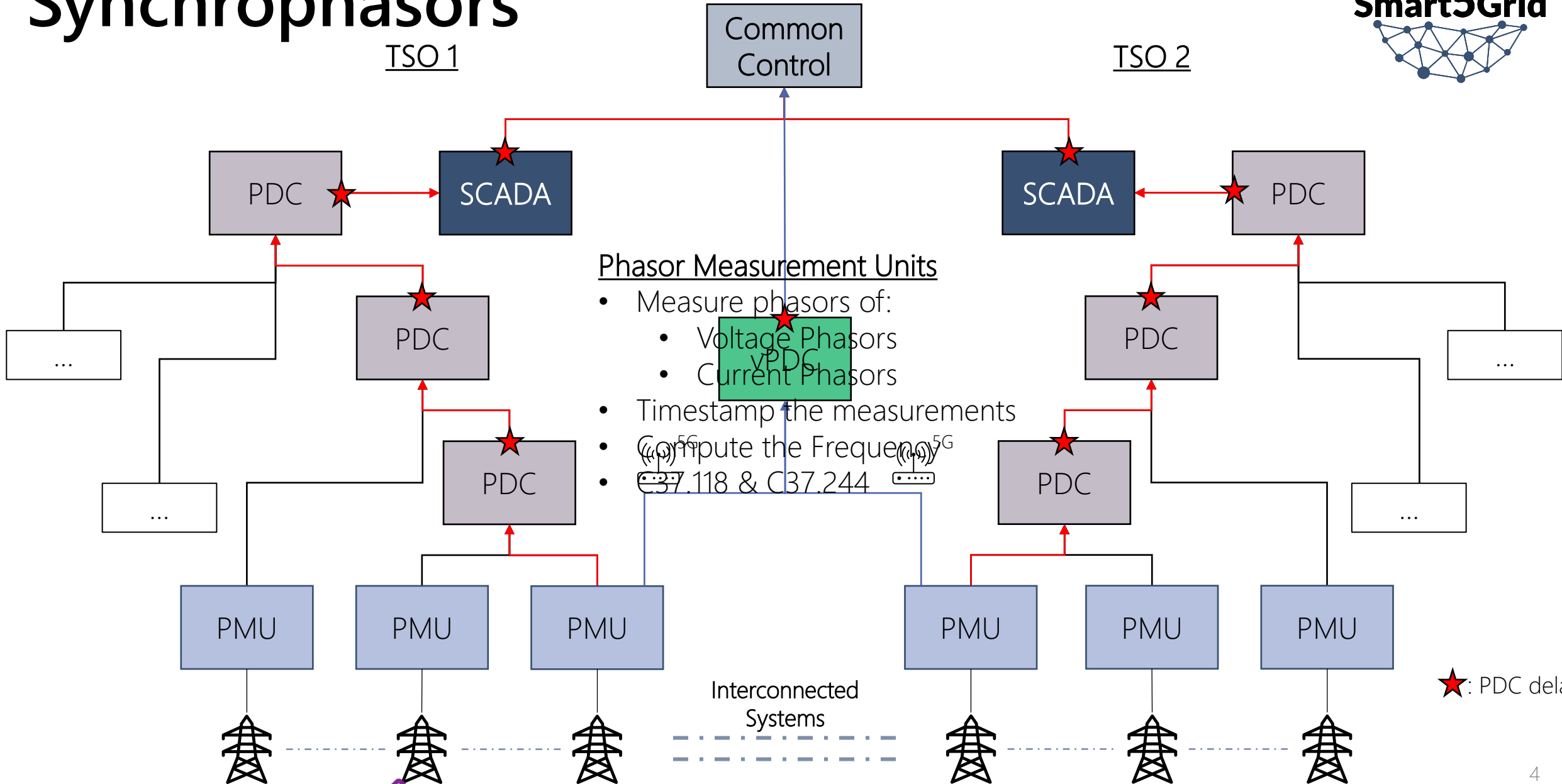
Phasor Measurement Units (PMUs)



5G communication network



# Synchrophasors

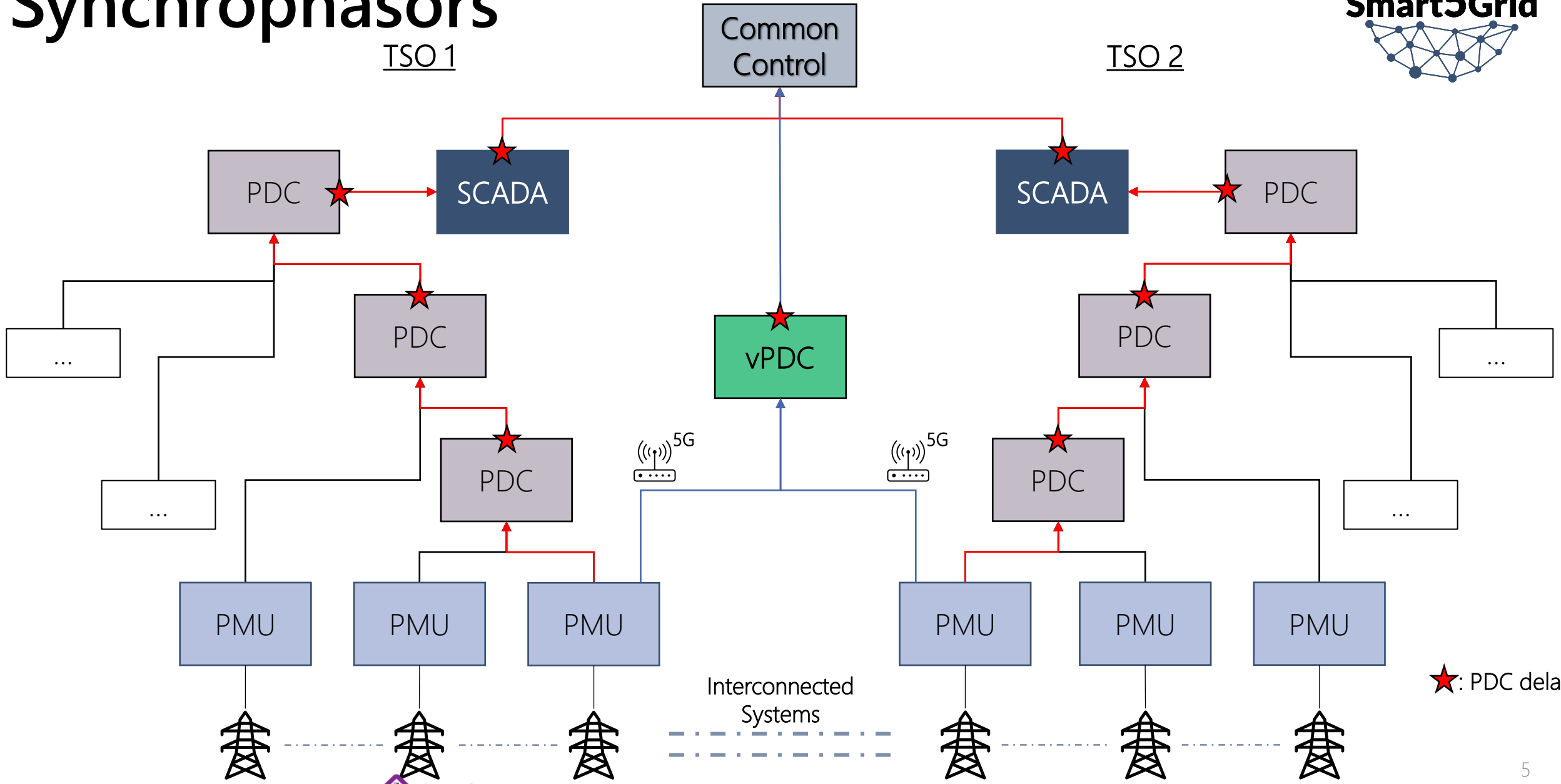


### Phasor Measurement Units

- Measure phasors of:
  - Voltage Phasors
  - Current Phasors
- Timestamp the measurements
- Compute the Frequency
- C37.118 & C37.244

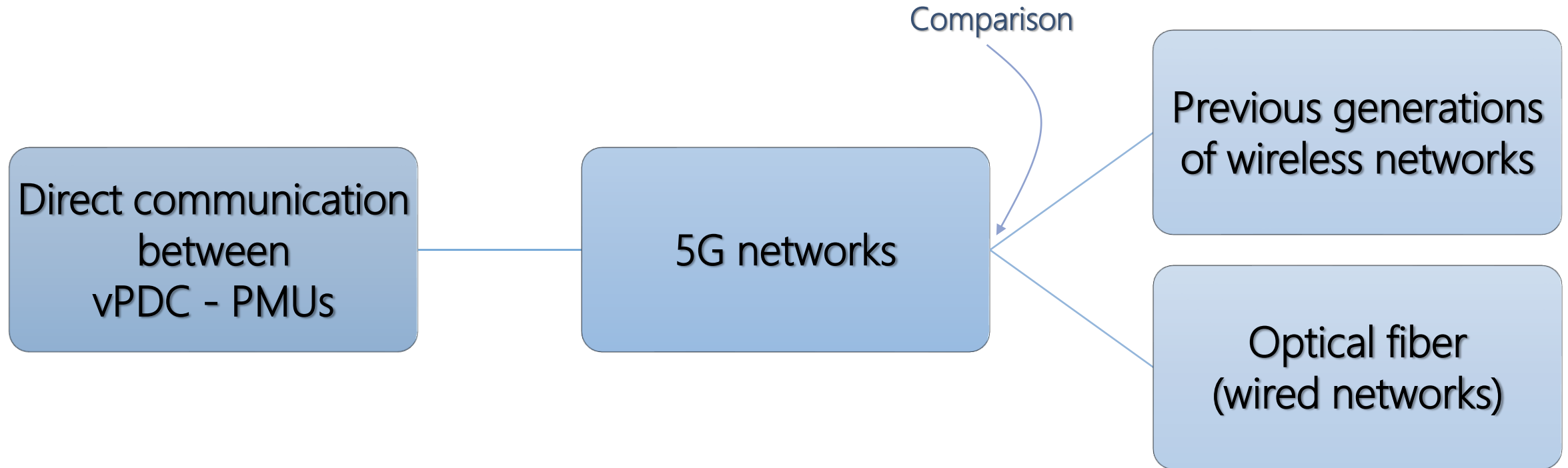
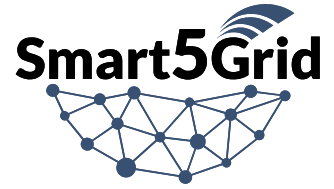
★: PDC delay

# Synchrophasors



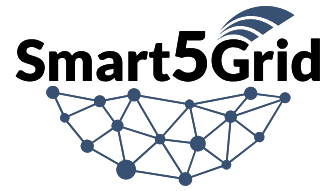
# Advantage vs. Legacy Solutions

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# Impacted 5G-PPP KPIs

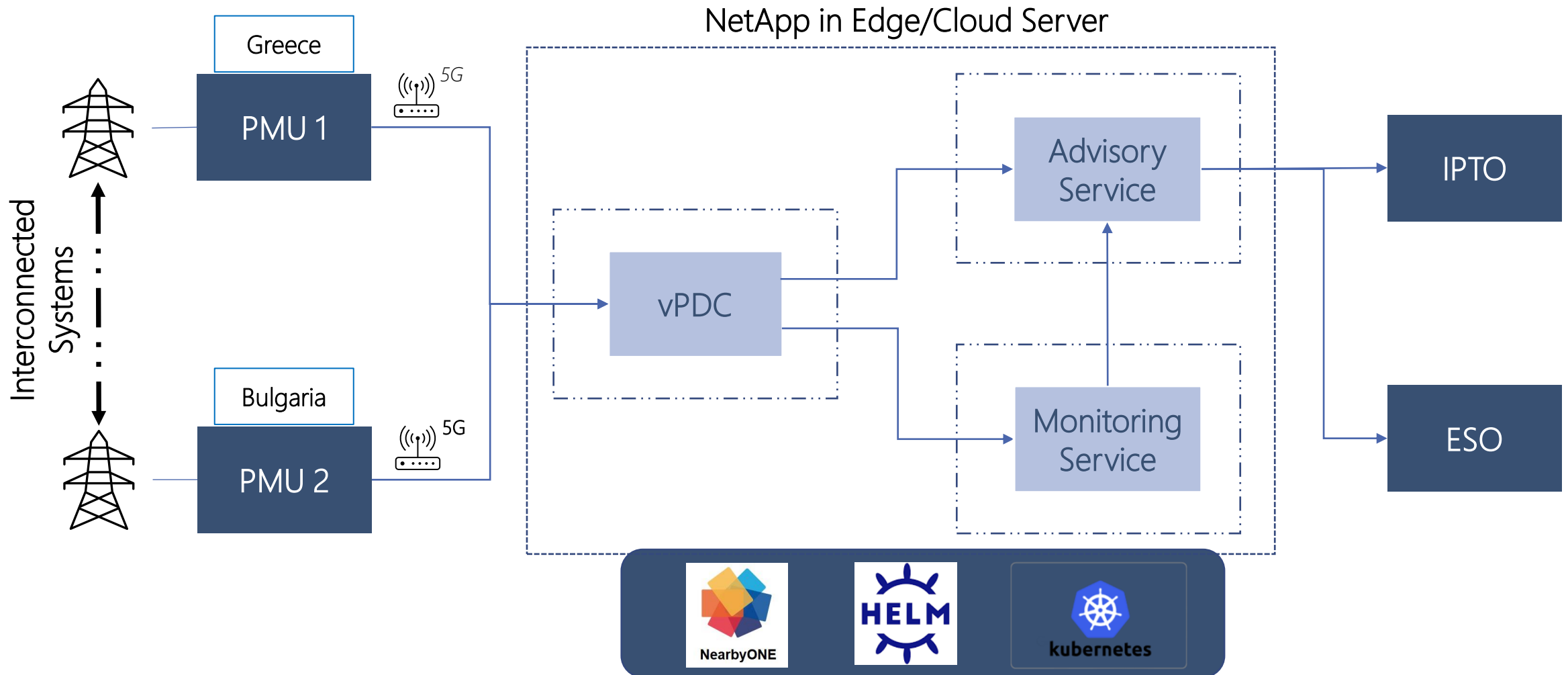
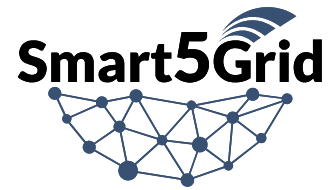
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KPIs – Requirements	Values
Reliability	99.999 %
Availability	99.999 %
E2E Latency	40ms-160ms
vPDC absolute wait time	40ms
Bandwidth	699-1500 kbps/node
Security	High

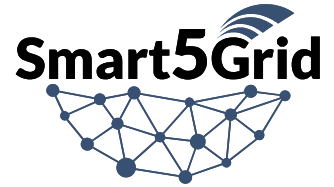
# High-level Architecture

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# UC NetApps



## vPDC

vPDC is responsible for aggregation and synchronization of the data provided by the PMUs placed in the surrounding area between Greece and Bulgaria. The C37.244 protocol describing the functionalities of PDCs will be followed.

## Monitoring Service

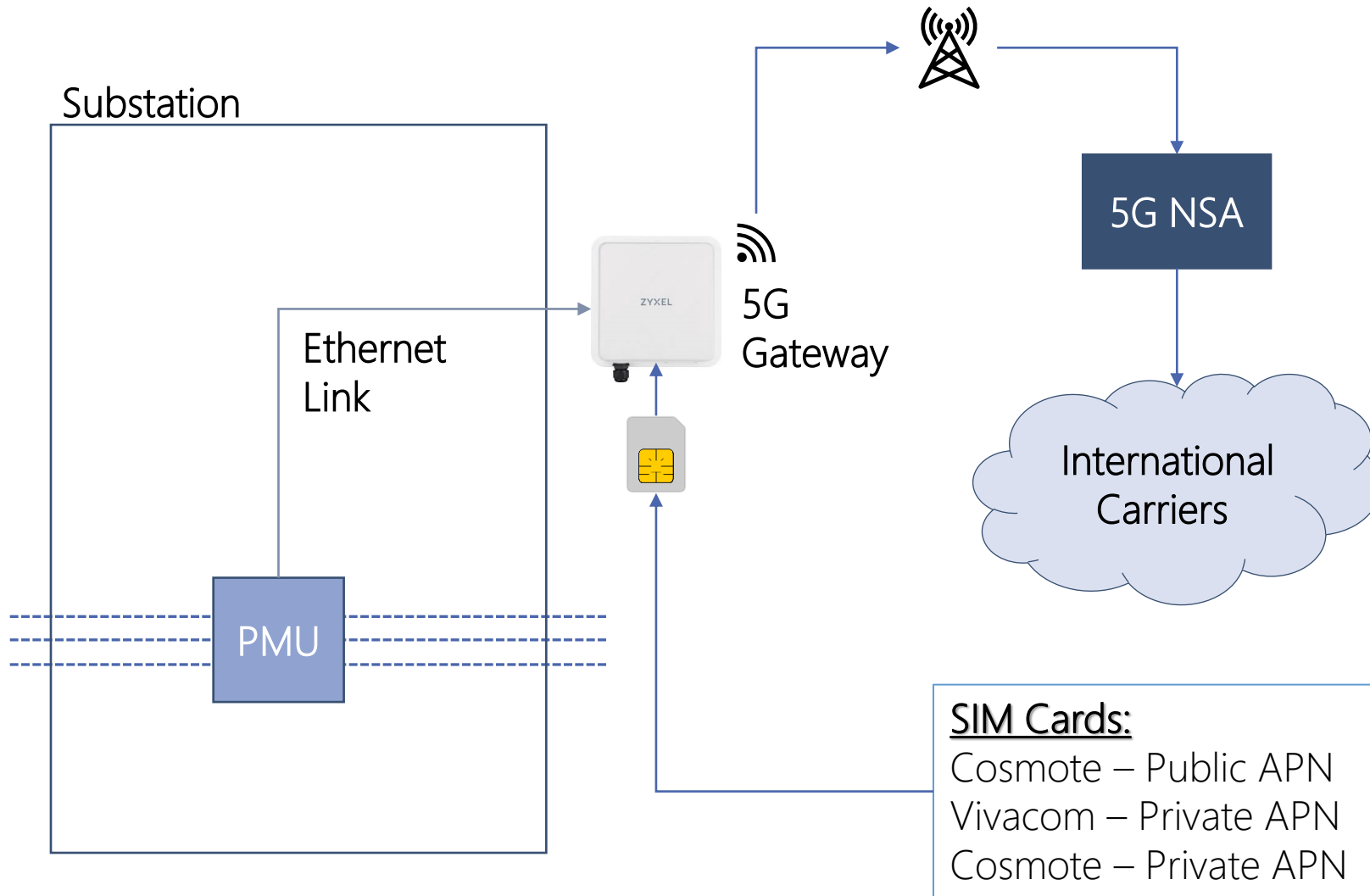
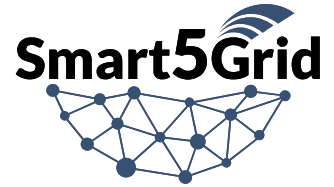
Monitoring service is responsible to present several status indicators and visualization features of the PMUs such as nominal grid frequency [Hz] , measurements reporting speed [fps] or phase diagram of voltage and current vectors.

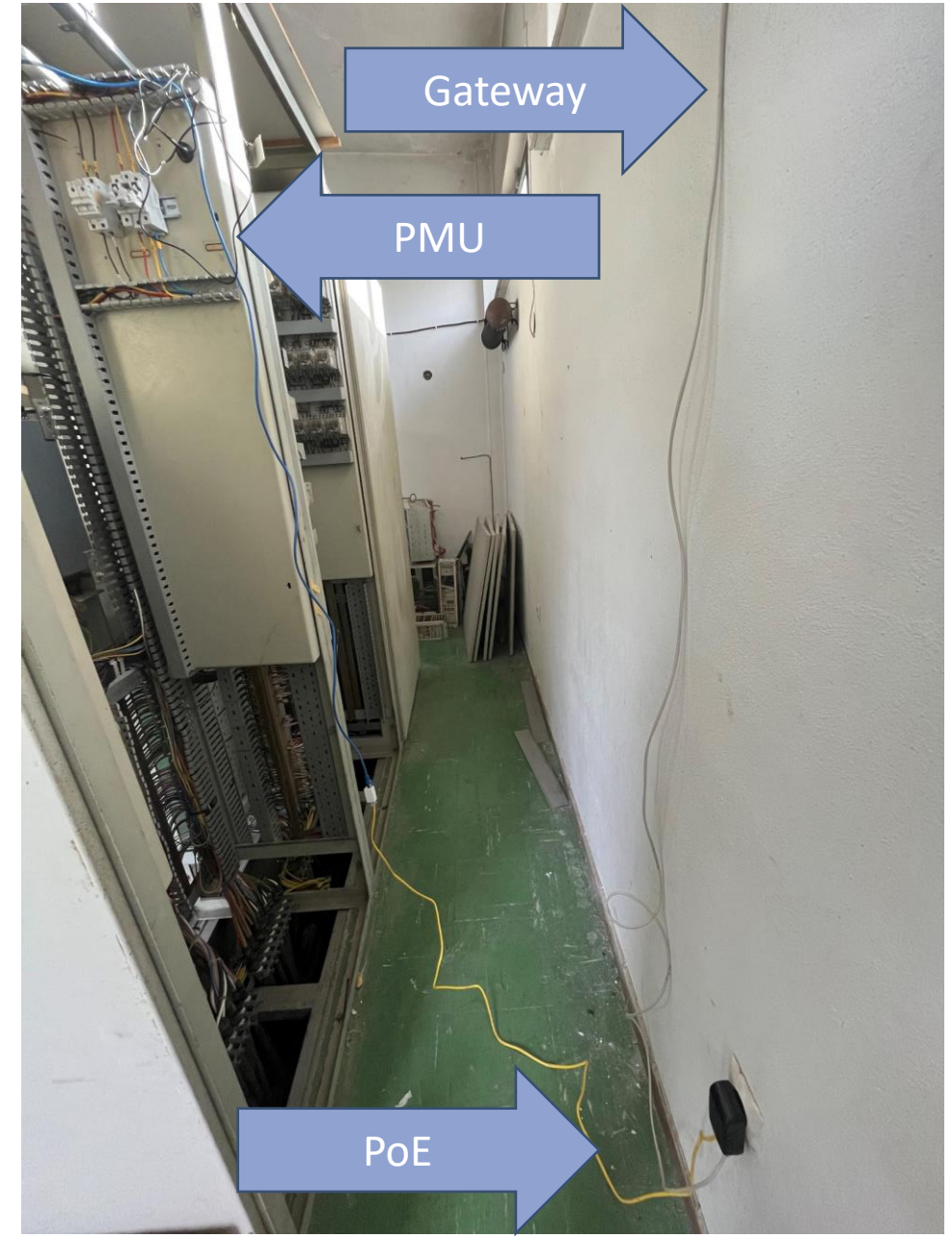
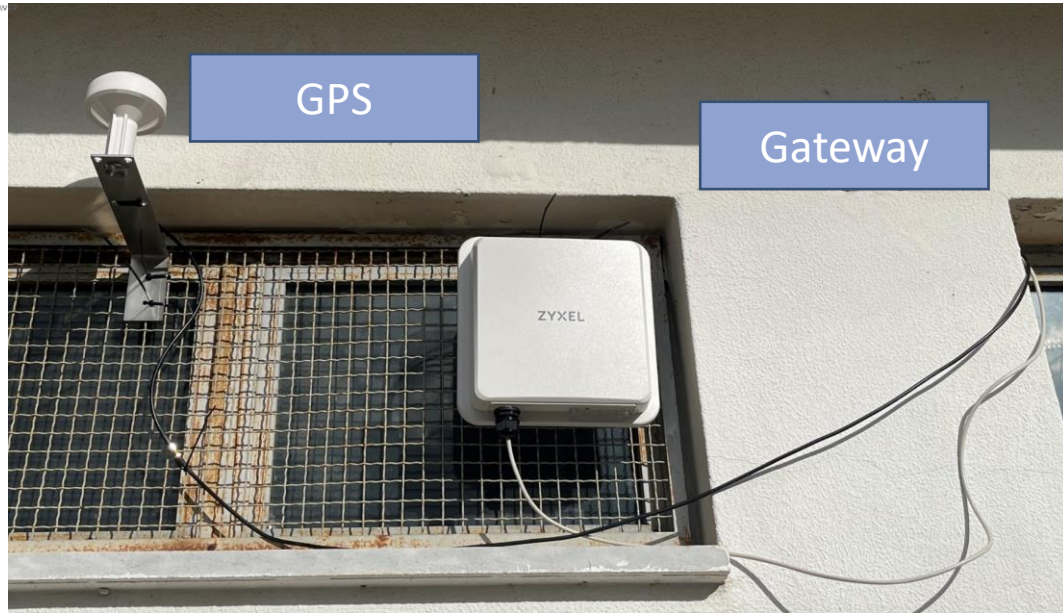
## Advisory Service

Advisory service will propose remedial actions for the real-time operation at both TSOs and ex-post analysis provision in case of a severe event occurrences in the grid.

# Network Setup

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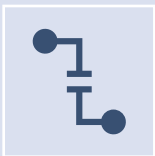


# Target markets & opportunities

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Target market: The proposed solution is strongly correlated with the energy market due to the use of PMUs. So, the customers that this solution applies to are TSOs, DSOs and Regional Security Coordinators.



Opportunity: The opportunity lays on the provision of a framework that enables fast fault detection at the edge, ensuring grid's stability and ceaseless operation.

# Thank you!

Questions?