Target-X: Accelerating the Uptake of 5G for Automotive

SNS ICE / GUIDE: Automotive, Transport & Logistics Solutions Webinar

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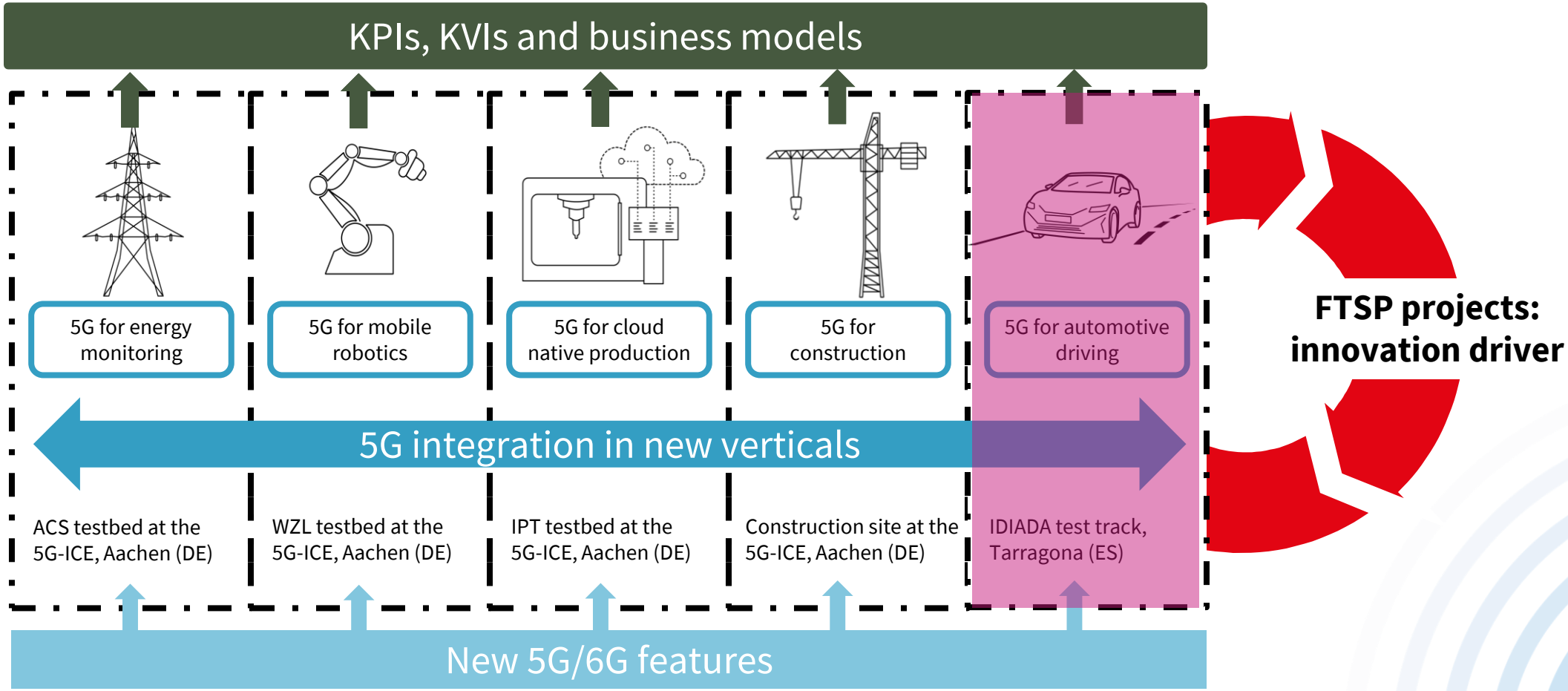
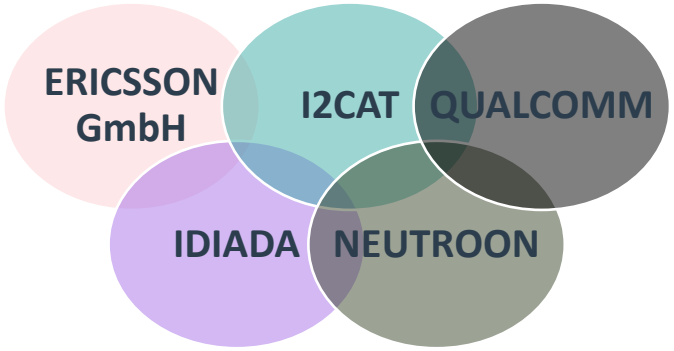
Agenda

- TARGET-X | Overall concept
- TARGET-X | 5G for automotive
- Automotive Trial Platform
- Automotive Use Cases
- Conclusions and Challenges

TARGET-X | Overall concept



TARGET-X | 5G for automotive



Demonstrate and evaluate how the challenges in automotive vertical can be overcome using 5G technologies

Mobility

Safety

Developing and evaluating novel approaches for a radio-aware use cases

Collection of data from vehicles to enable cooperative perception

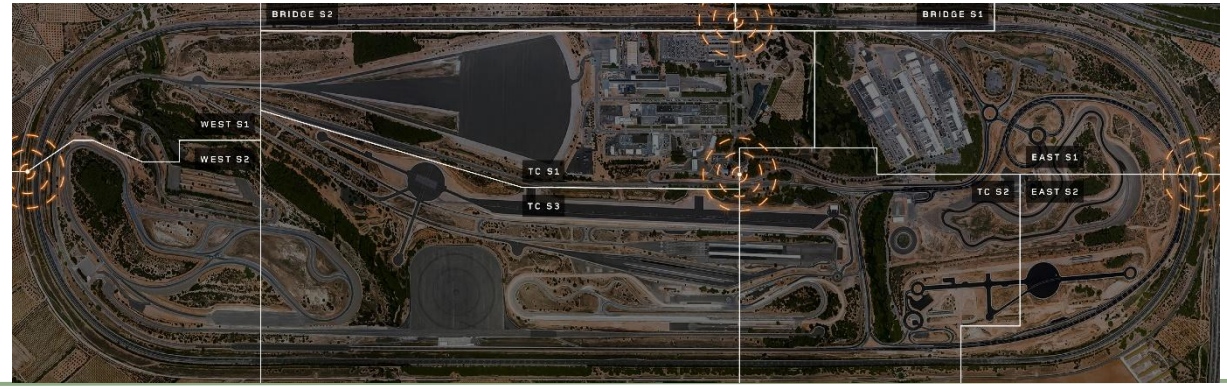
Creation of digital twins

Toolsets to deploy and evaluate the uses cases in IDIADA's 5G-enabled testbed

Extension of the compute continuum to vehicles

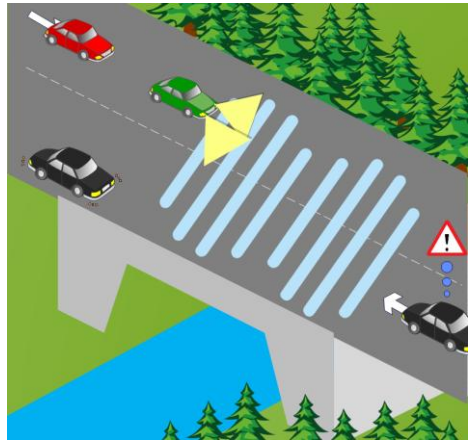
Automotive Trial Platform

IDIADA Connected Vehicle-Hub – CVH



- 14 tracks with a technical center
- Controlled and exclusive network with 2G, 3G, 4G and 5G NSA technologies is available
- 4 multi-standard radio base stations
- Full indoor and outdoor coverage
- Edge server connected to the network

Automotive Use Cases | Cooperative Perception



Challenges:

- **Requirements in terms of KPIs**
- **Measuring KPIs in a passive way**

Collision Warning Service (CWS)

- Road Stationary Vehicle
- Zero Visibility Intersection

CAM, DENM, CPM messages to be deployed

Requirements	
CAM Success RX Rate	99.80% (1 out of 500 messages lost)
CPM Success RX Rate	
DENM Success RX Rate	
Data transfer one way Latency	40 – 50 ms (car at intersection with 90 - 70 km/h speed and breaking distance of 26 m)

Automotive Use Cases | Digital twin

Map the information on IDIADA CLOUD PLATFORM

Based on the information previously received by vehicles and the network

Scenario recreated and displayed on screen for detailed analysis

Web Browser

Challenges:

- **Modifying some parameters (e.g., injecting a stopped vehicle) to get new outcomes before entering in the tracks for real test**

Automotive Use Cases | Predictive QoS for ToD (1/2)

- **Objective**
  - *Tele-operation can be used for complementing automated driving, bringing vehicle to customers, etc.*
  - *Demonstrate the importance of accessing network performance information through 5G features to avoid sudden breaking in the case of tele-operated driving*

Requirements	
Command one way Latency	100 ms for speed of 40 km/h
Command Reliability	99 %
Data transfer Reliability	95%

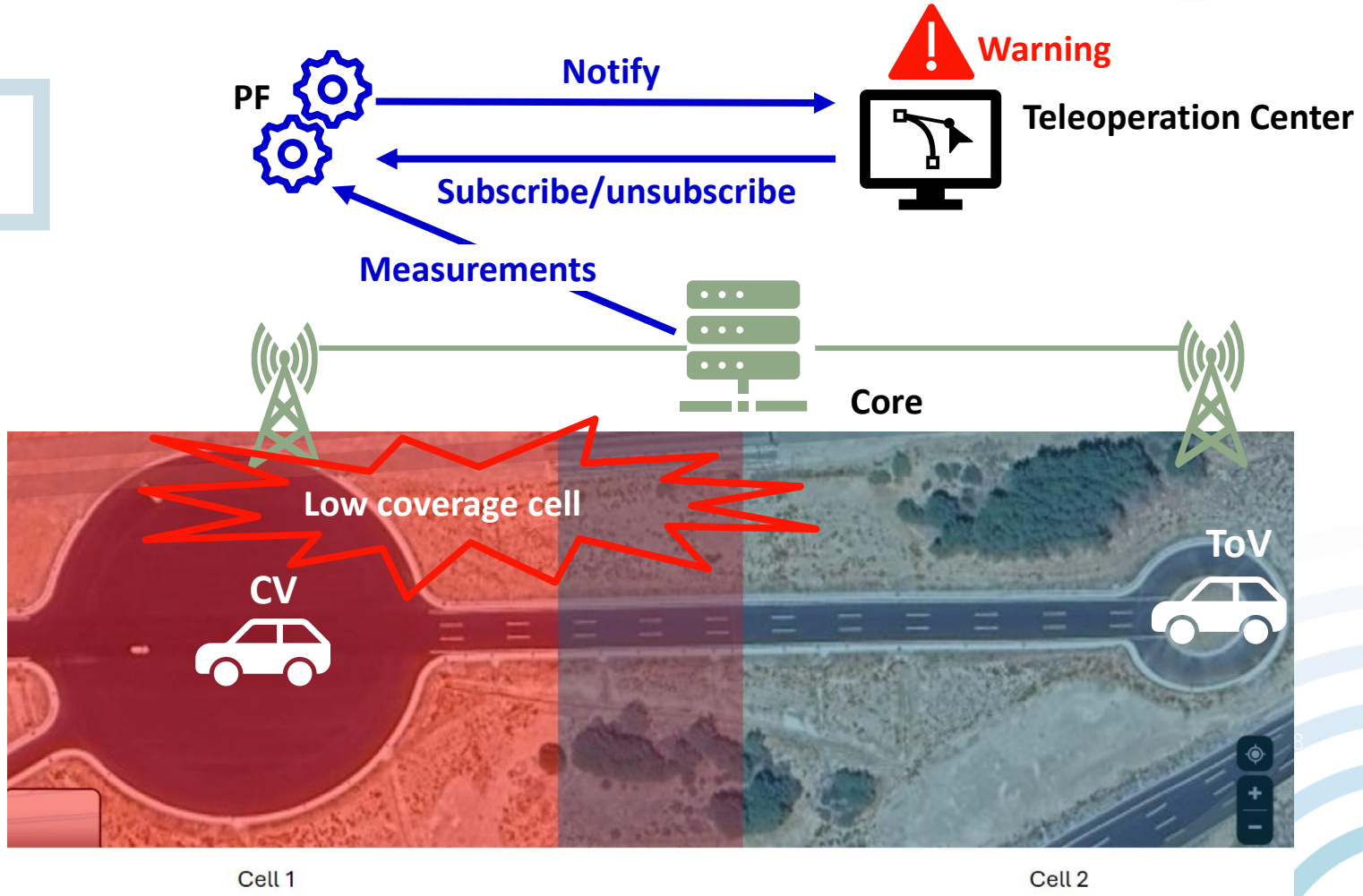
Automotive Use Cases | Predictive QoS for ToD (2/2)

Signal Quality and cell status reported

Cell/zone with low coverage detected

Emulating QoS sustainability service of NWDAF

- In theory: The V2X sets a threshold for signal quality in the NWDAF through the NEF
- In practice: The V2X sets a threshold in a developed server that communicates with the UE (NSA network without API to access data)



Conclusions and Challenges

First tests of the three use cases were successful

Need for road and network digital twins to realistically emulate mass deployment of V2X applications

The results of predictive QoS for ToD show clearly the need of data exchange between network and V2X applications

Need to deploy network functions able to expose analytics with lower granularity

Mapping between network KPIs and driving conditions from one side and service KPIs from other side

TARGET-X

Thank you for your attention!

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