Collision Avoidance using Manoeuvre Coordination Service

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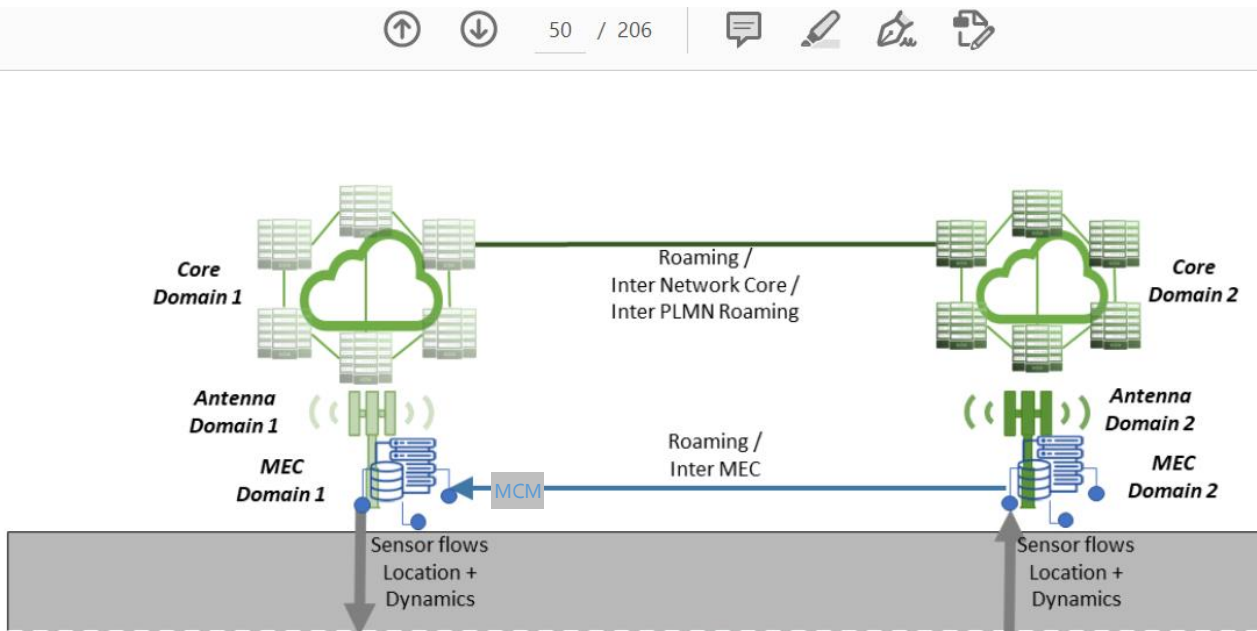
Content

- Cooperation Collision Avoidance
- Scenario
- Evaluation results
- Contribution to Spain-Portugal cross-border corridor

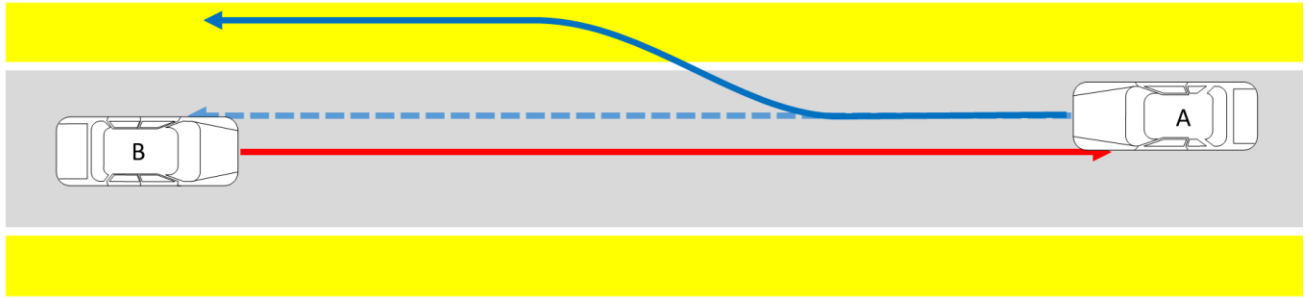
Cooperative Collision Avoidance (CoCA)

- Objective: use of 5G to exchange messages with low-latency to avoid collisions
  - Use of Manoeuvre Coordination Messages
- Two approaches
  1. Negotiation between vehicles using 5G network
  2. Advice from infrastructure
- 5G specific enablers used:
  - MEC (Multi-access edge computing) for low-latency communications
  - V2X broker for exchange of information between different domains

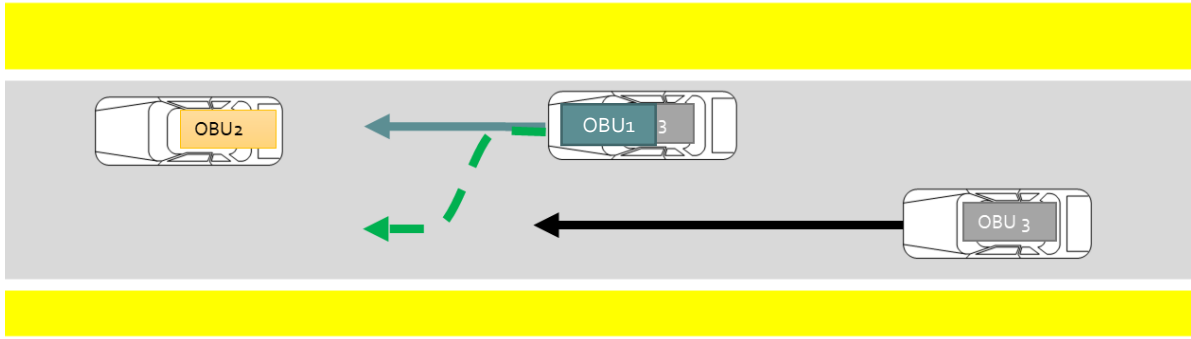


CoCa-Scenario

- In NL trial site:
  - Vehicles drive towards each other
  - 2 OBUs connected to different SA networks
  - 1 automated vehicle, 1 connected vehicle



- In ES-PT CBC:
  - Overtaking scenario
  - OBUs installed in connected vehicles, Communication in NSA cross-border scenario tested



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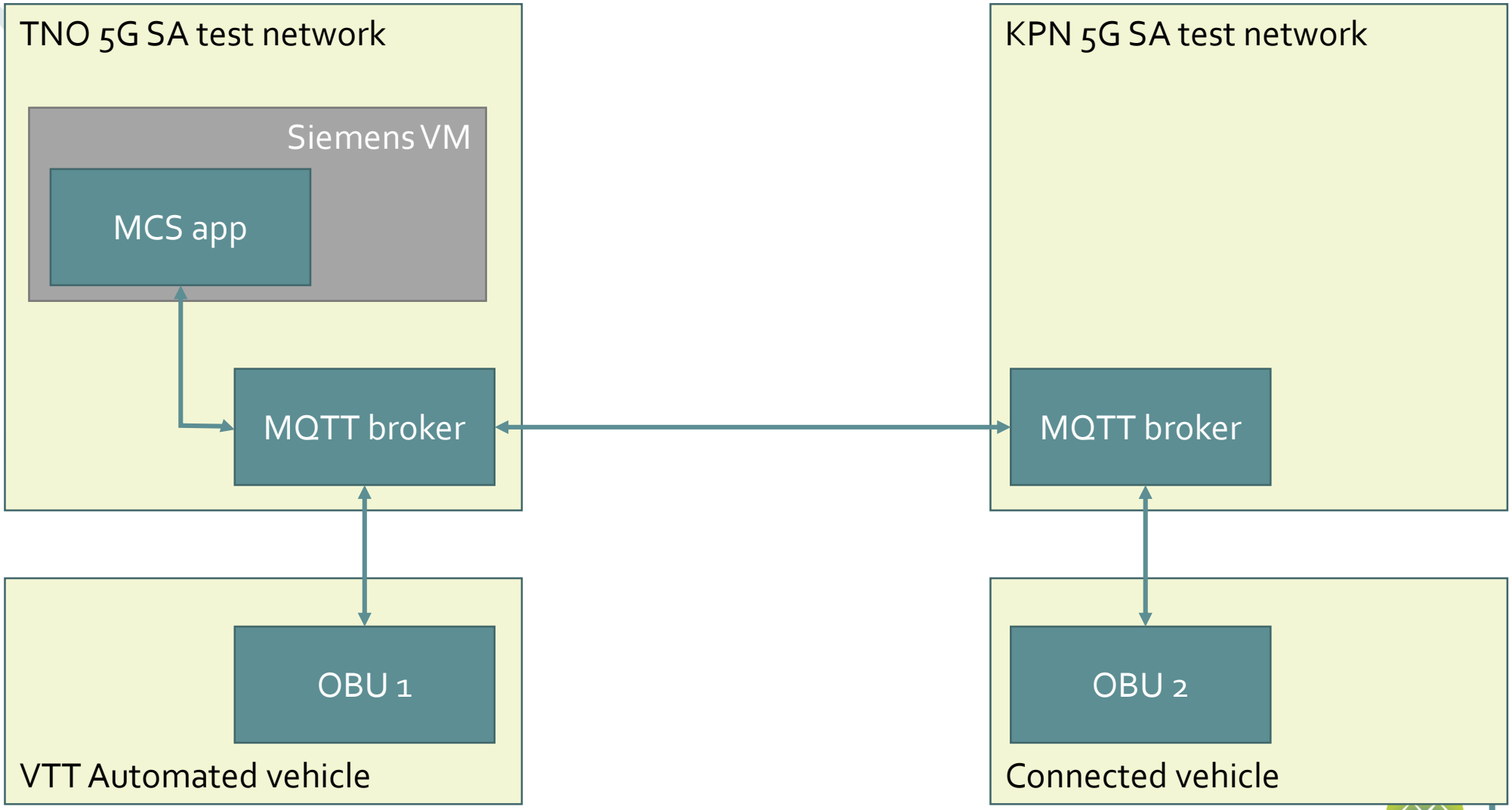
CoCa-Architecture



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CoCa-Vehicles used

VTT vehicle "Martti"
Connected and Automated Vehicle

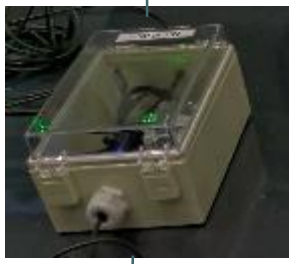
CoCa-On-Board Unit

GNSS antenna

5G antenna

Netgear 5G modem

uBlox



Hub

USB-C

USB-C

CoCa-Trial location

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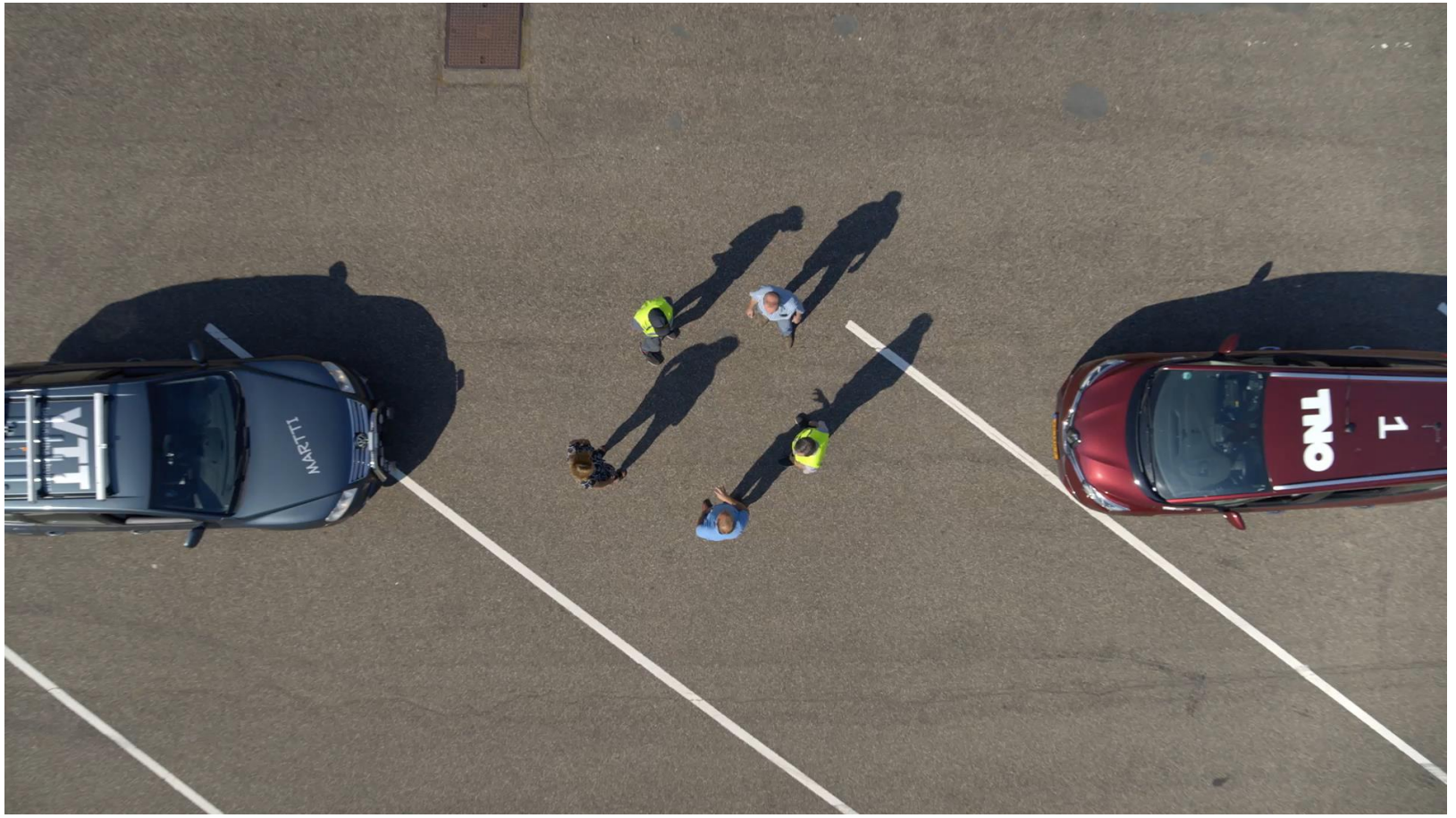
CoCa-Video

VTT Collision Avoidance



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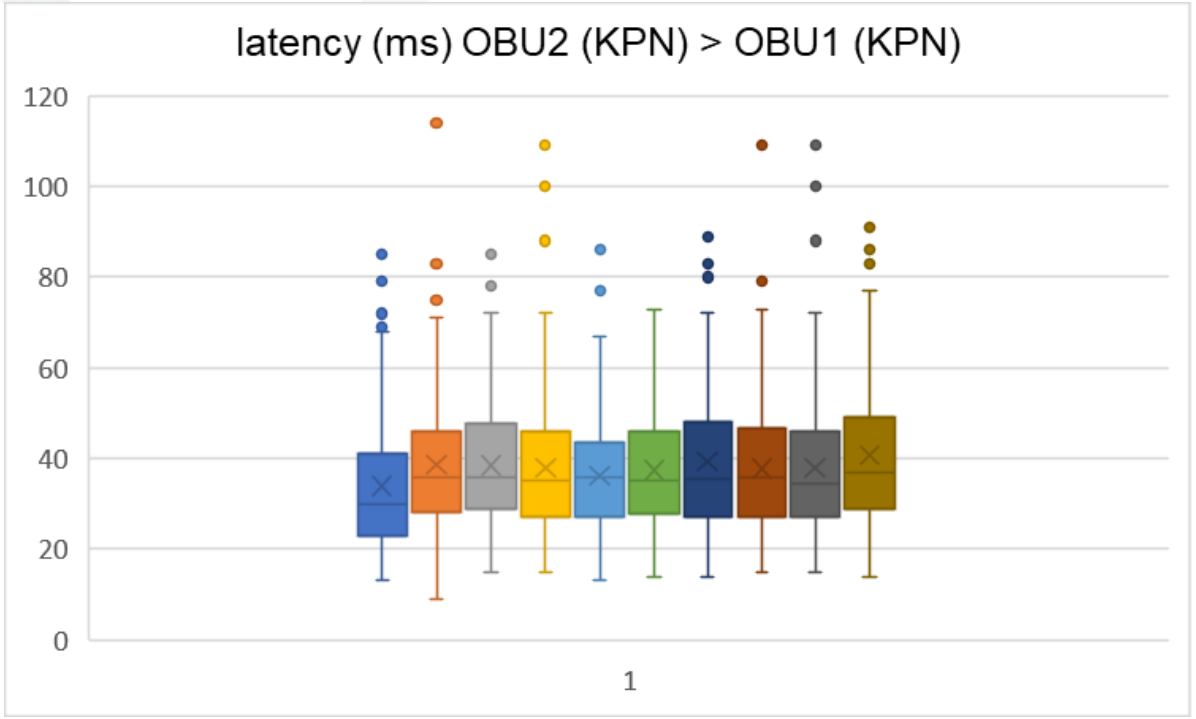
CoCa-Evaluation results September 2021

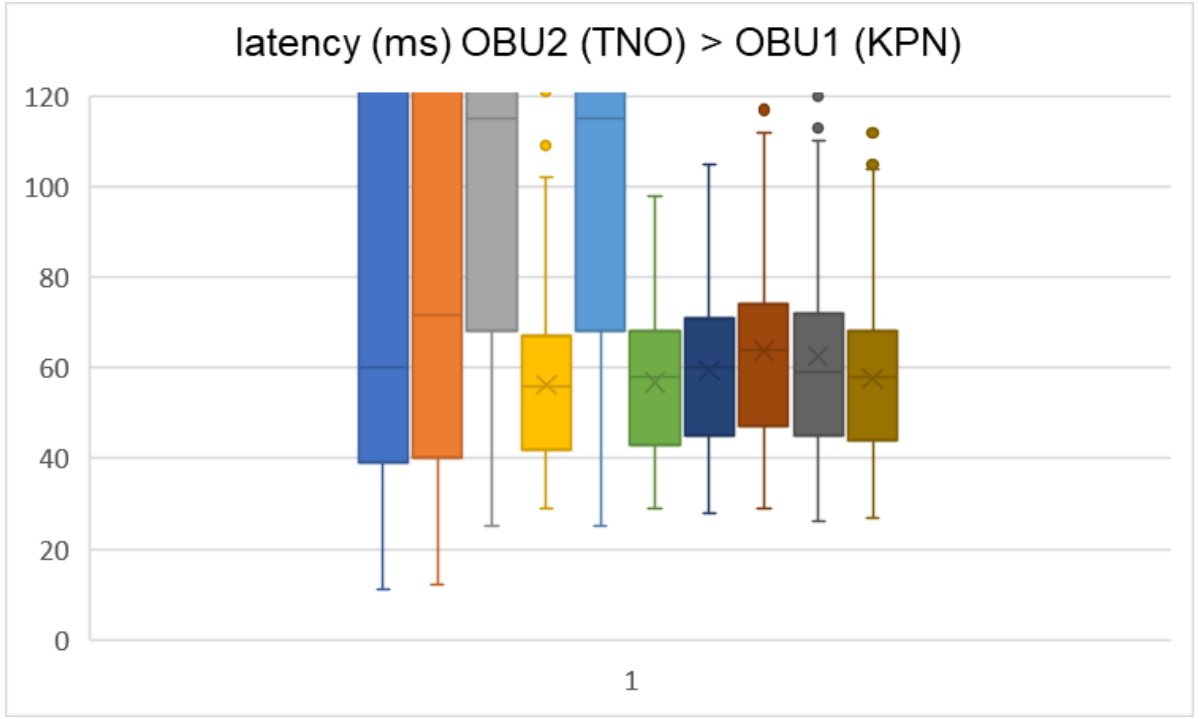
OBUs connected to same network

OBUs connected to different network

NLOS affects to latency

Leaves affect latency





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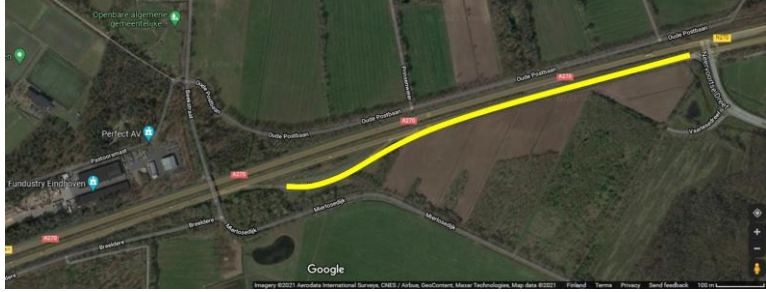
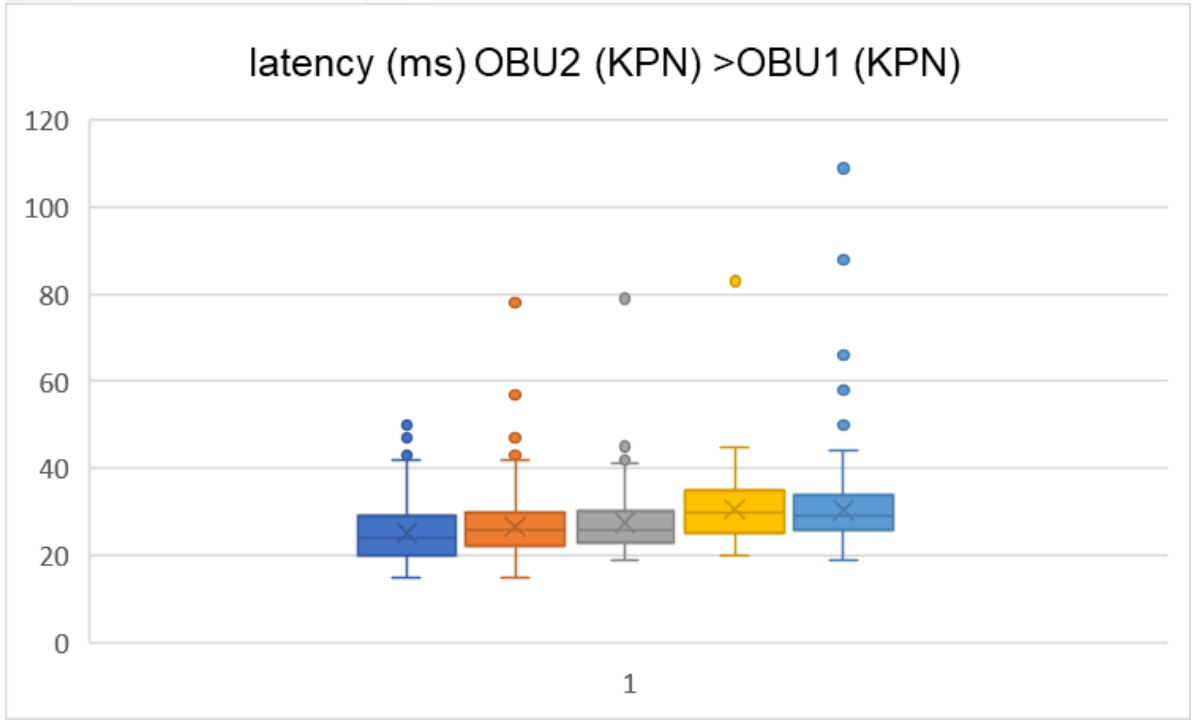
CoCa-Evaluation April 2022

2 vehicles following each other exchanging MCMs

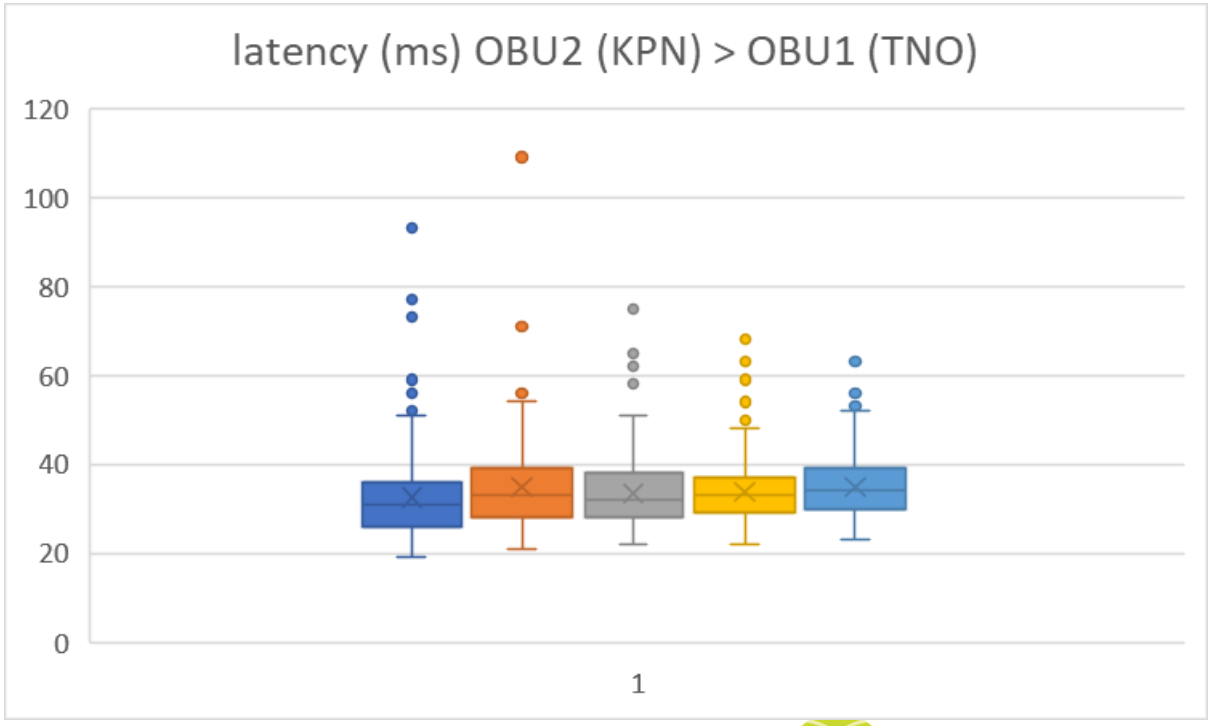


Both OBUs connected to KPN



OBUs connected to different networks

Slight increase of latency due to network interconnect



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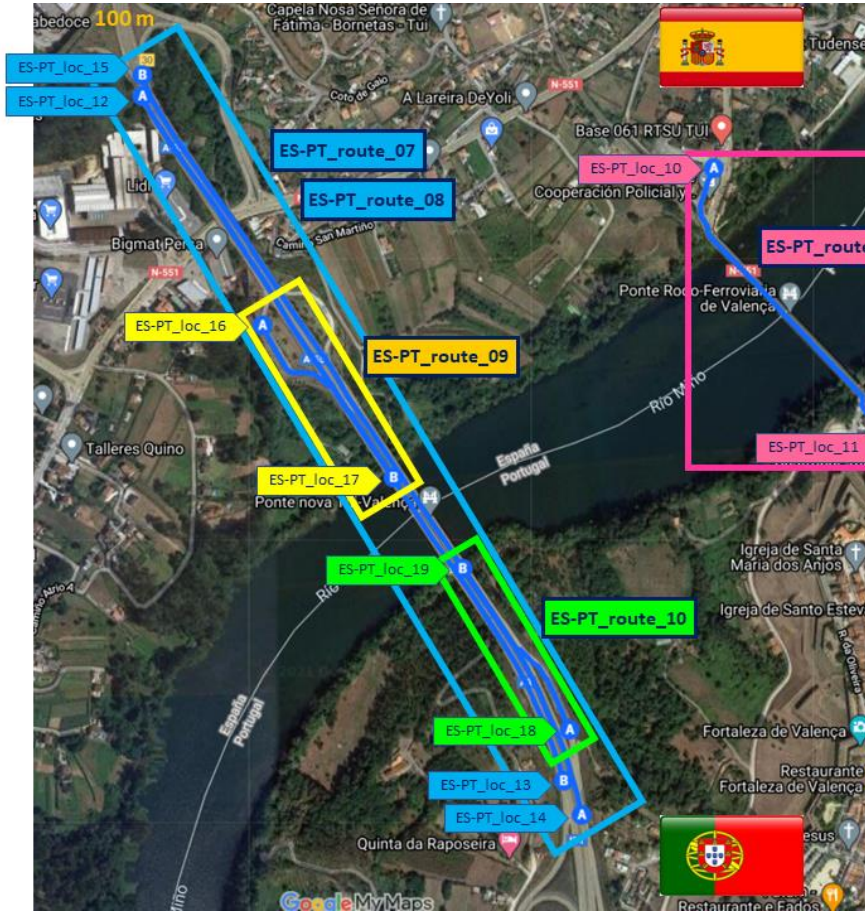
CoCa-Contribution to 5G ES-PT Cross-border corridor

- Manoeuvre: overtaking on highway (Tui (ES) –Valenca (PT)
- Network configuration:
  - Spain: 5G NSA network from Telefonica; MEC
  - Portugal: 5G NSA network from Nokia
  - Handover: home routing
- Contribution:
  - OBUs, installed in vehicles of 5G-MOBIX partners
  - CoCA MEC application at Spanish MEC
- Objective:
  - Comparison between Spanish approach (based on CAM) and MCM approach
  - Service continuity during handover
  - NSA versus SA



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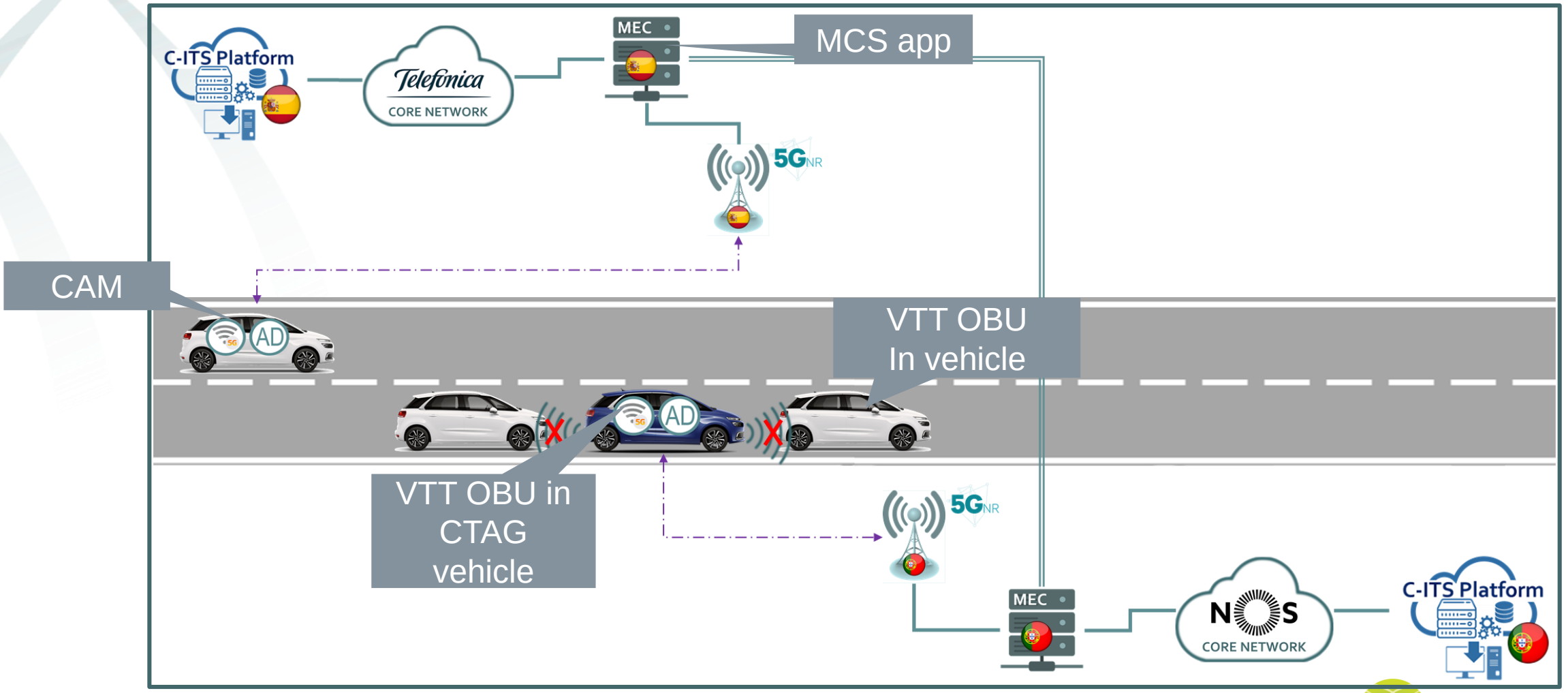
CoCa-Scenario in ES-PT CBC



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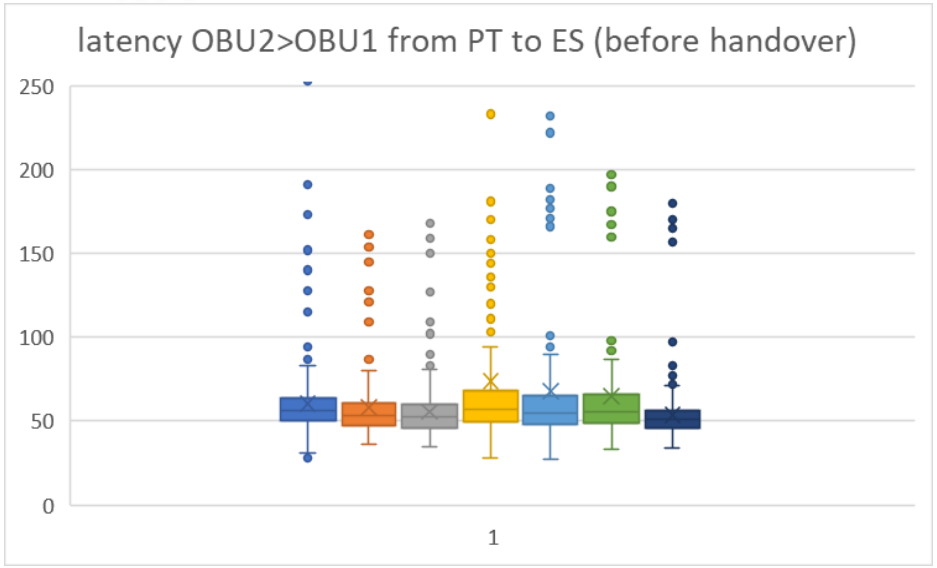
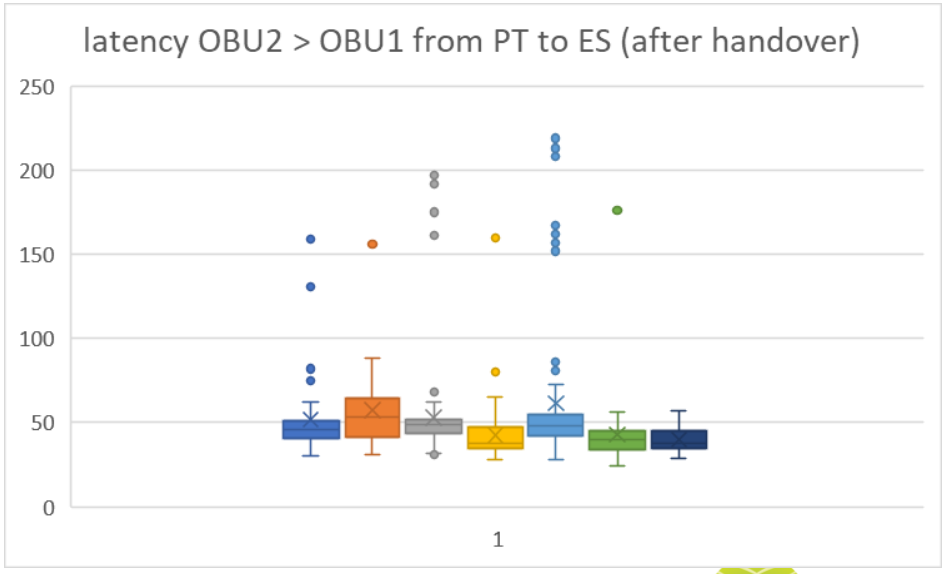
CoCa-Results of CBC tests

- Modem performance differs between sites
  - Xiaomi phone used as modem in ES-PT CBC
- In roaming conditions only slightly higher latency than in home network





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