Towards Trust-Aware Automotive Task Offloading

CONNECT EU Project

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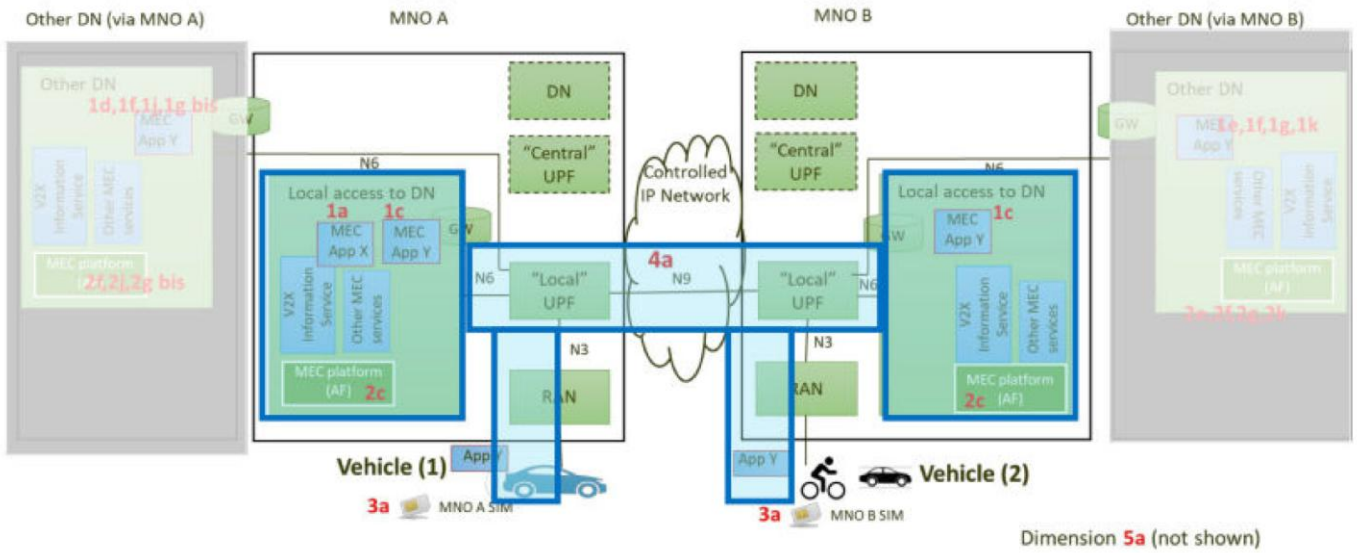
Mutual Trust establishment in MEC

The environment becomes much more complex considering multiple trust domains that are involved, e.g. Mutual trust between MEC Applications and MEC platforms.



5GAA Technical Report, "Cybersecurity for Edge Computing" March 2023, https://5gaa.org/cybersecurity-for-edge-computing/

CONNECT

CCAM TRUST & RESILIENCE

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1. Technikon Forschungs- und Planungsgesellschaft mbH, Austria
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4. Institute of Communication and Computer Systems, I-SENSE Research Group, Greece
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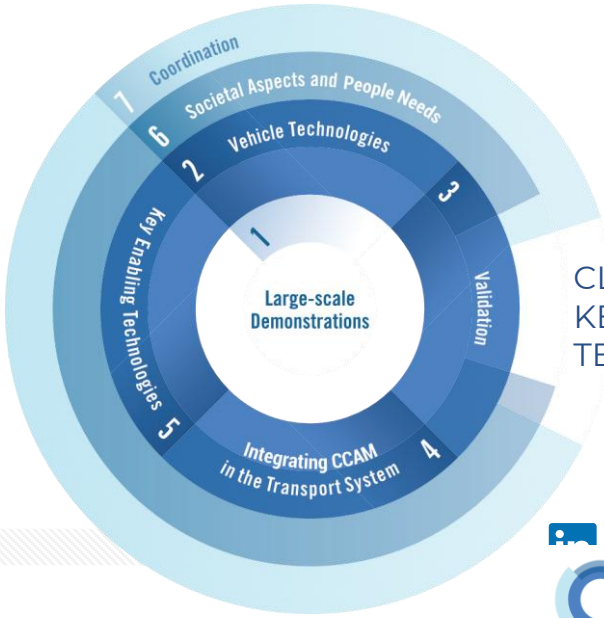

CLUSTER 5
KEY ENABLING TECHNOLOGIES

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Task Offloading in CONNECT for Vehicle Applications: Between Vehicle (UE) and MEC system

1. **Concept**: **Slow-Moving Traffic Detection (SMTD)** scenario:

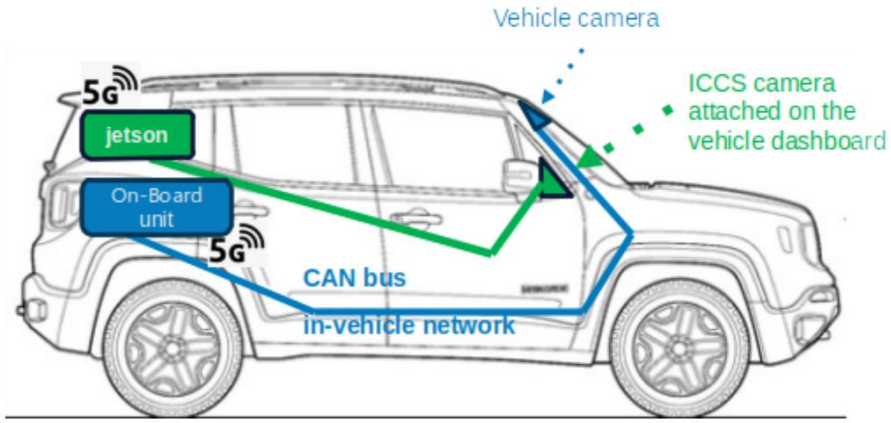
- Ego vehicle collects road video footage from camera.
- Pre-processes the data locally using its computing unit.
- Transmits the data securely to MEC for **Machine Learning (ML)-based inference**.
- MEC analyzes traffic and identifies a slow-moving vehicles ahead.
- Actionable insights are sent back to the vehicle to enhance decision-making.

2. **Relevance of MEC**:

- **Low Latency**: MEC reduces the delay between task execution and response, enabling real-time vehicular decisions.
- **Enhanced Efficiency**: By offloading ML tasks to MEC, vehicles preserve onboard computational resources for critical operations.

3. **Importance for Automotive Applications**:

- Demonstrates MEC's role in achieving seamless, low-latency service continuity in dynamic environments.



Task Offloading – System Description

- Install a second camera on vehicle dashboard
- Camera connected to a small-form-factor computer, a NUC, equipped with cellular connectivity
- NUC initiates task offloading process when necessary

Trust Framework in Task Offloading

1. **Trust Challenges**:

- Vehicle can send information to the MEC for securely shifting computing tasks to the MEC
- Integrity of the offloaded tasks, ensuring they are securely executed without manipulation
- Dynamic trust establishment in high-mobility environments.

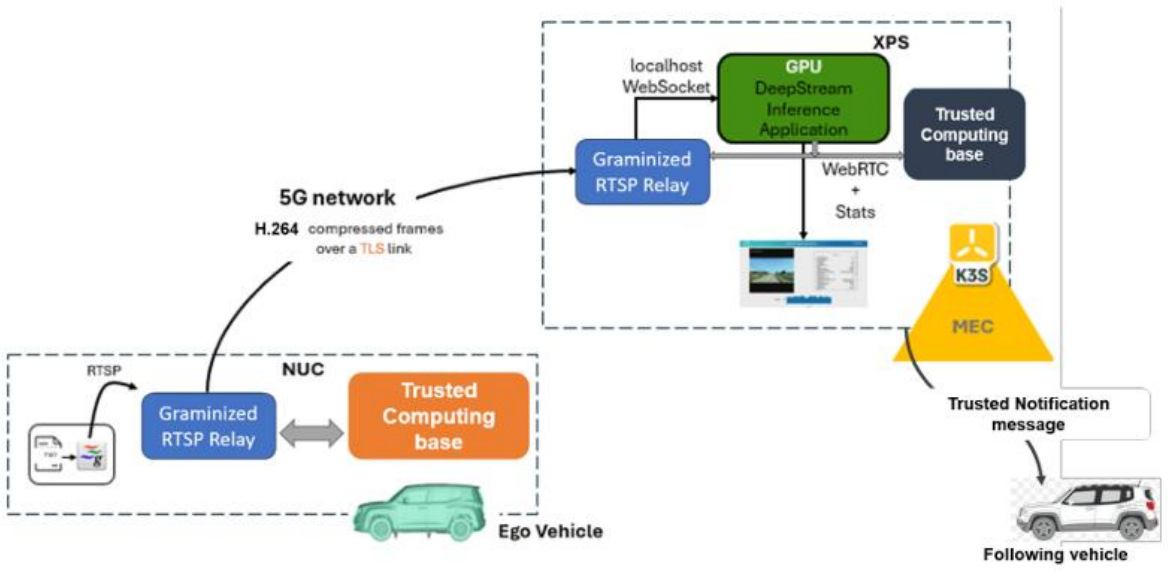
2. **CONNECT's Trust Framework**:

- Operates at both the vehicle and MEC node levels.
- Uses evidence-based trust claims for evaluating the trustworthiness of entities before offloading tasks.
- Dynamically adapts to evolving trust contexts.

3. **Security Measures**:

- **Trusted Execution Environments (TEEs)**: prevent unauthorized access or modification of applications and data
- **Encrypted Communication**: Video frames are compressed and transmitted to MEC node over TLS-encrypted channel and using a Graminized Real-Time Streaming Protocol (use of TEE for secure handling of the RTSP relay.

Application vs. Trust Management Offloading – Design & Architecture



- Ensures safe, reliable, and efficient task offloading in automotive MEC scenarios, critical for applications like SMTD and beyond

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If you need further information, please contact the coordinator:

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