



# The C's in C-ITS and CCAM is the same technology

# UN Sustainable Development Goals

Economy

Society

Biosphere



# Connected , Cooperative & Automated Mobility

9 INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



3 GOOD HEALTH  
AND WELL-BEING



11 SUSTAINABLE CITIES  
AND COMMUNITIES



13 CLIMATE  
ACTION



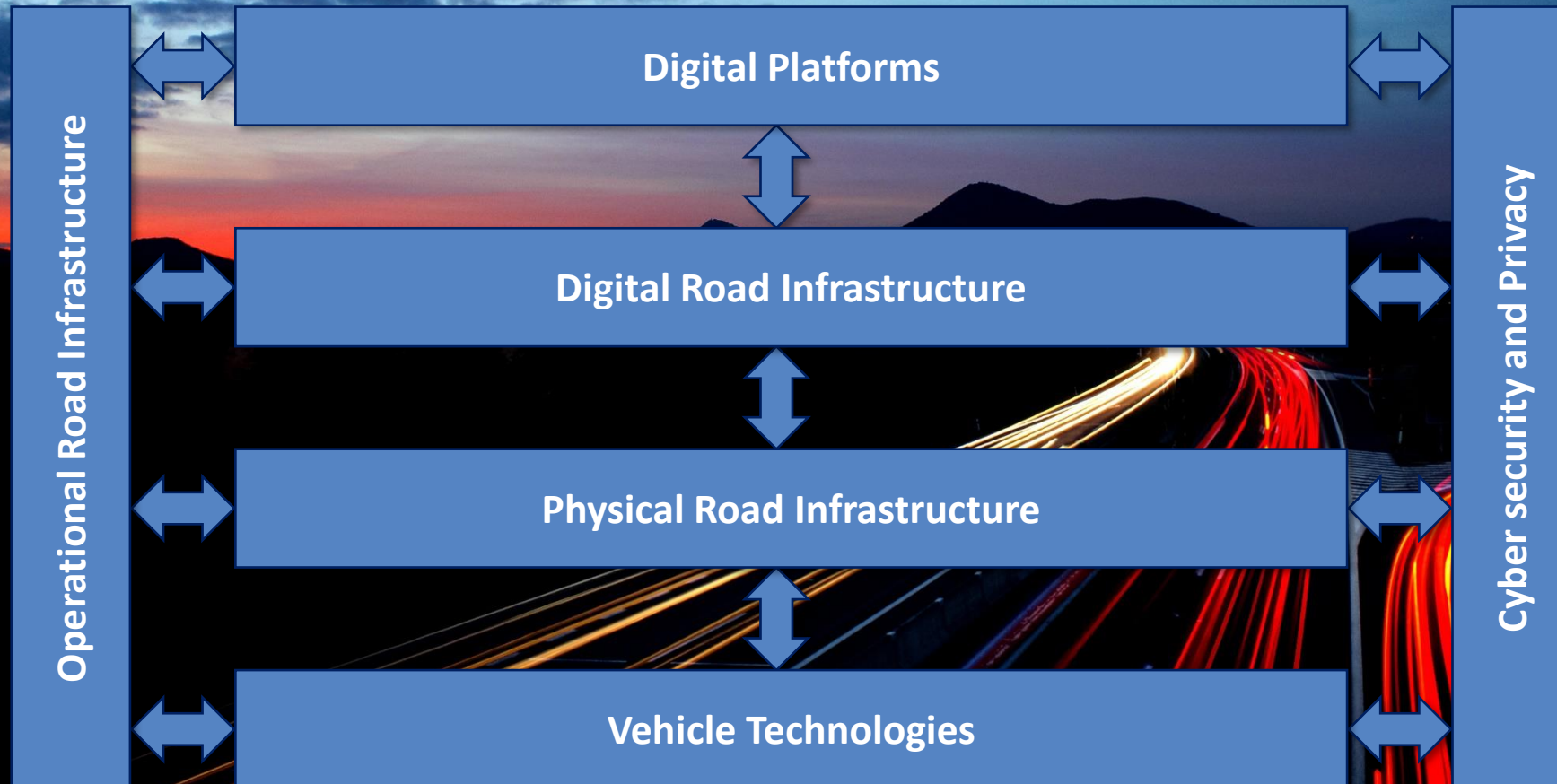
Proposed European Partnership under Horizon Europe



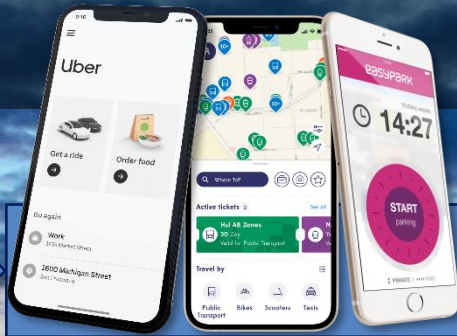
## CCAM

CONNECTED, COOPERATIVE  
& AUTOMATED MOBILITY

# CCAM



# CCAM



Digital Platforms



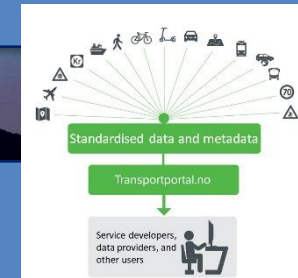
Operational Road Infrastructure

DATEX II

Digital Road Infrastructure



Physical Road Infrastructure



European Commission | EU CCMS

European Commission > EU Science Hub > C-ITS Point of Contact > ECTL

C-ITS Point of Contact

ECTL TLM Certificates Documentation

**ECTL - European Certificate Trust List**

Below the European Certificate Trust List (ECTL) of different TLM environments is available for download versions as well as historical versions

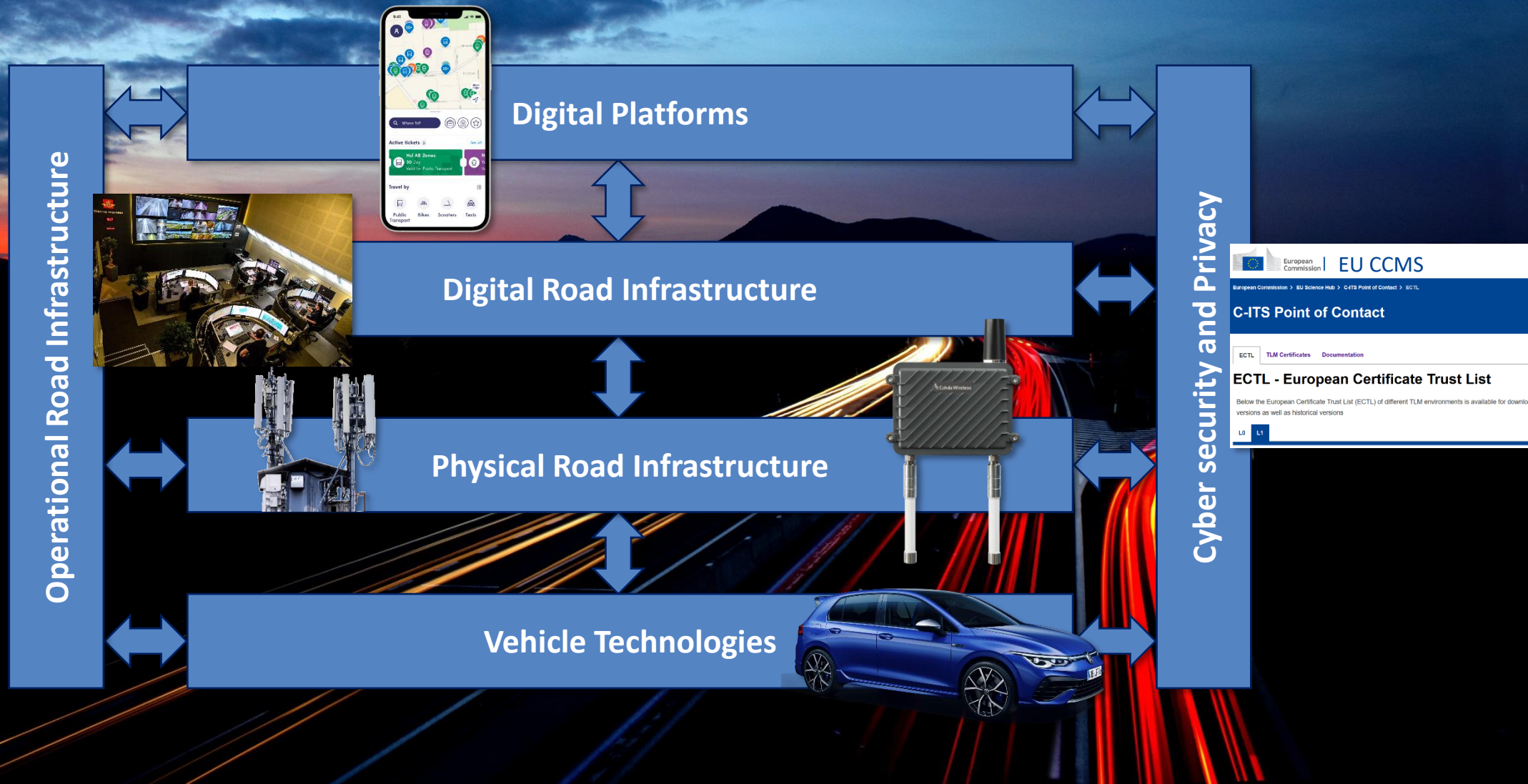
L0 L1

Cyber security and Privacy

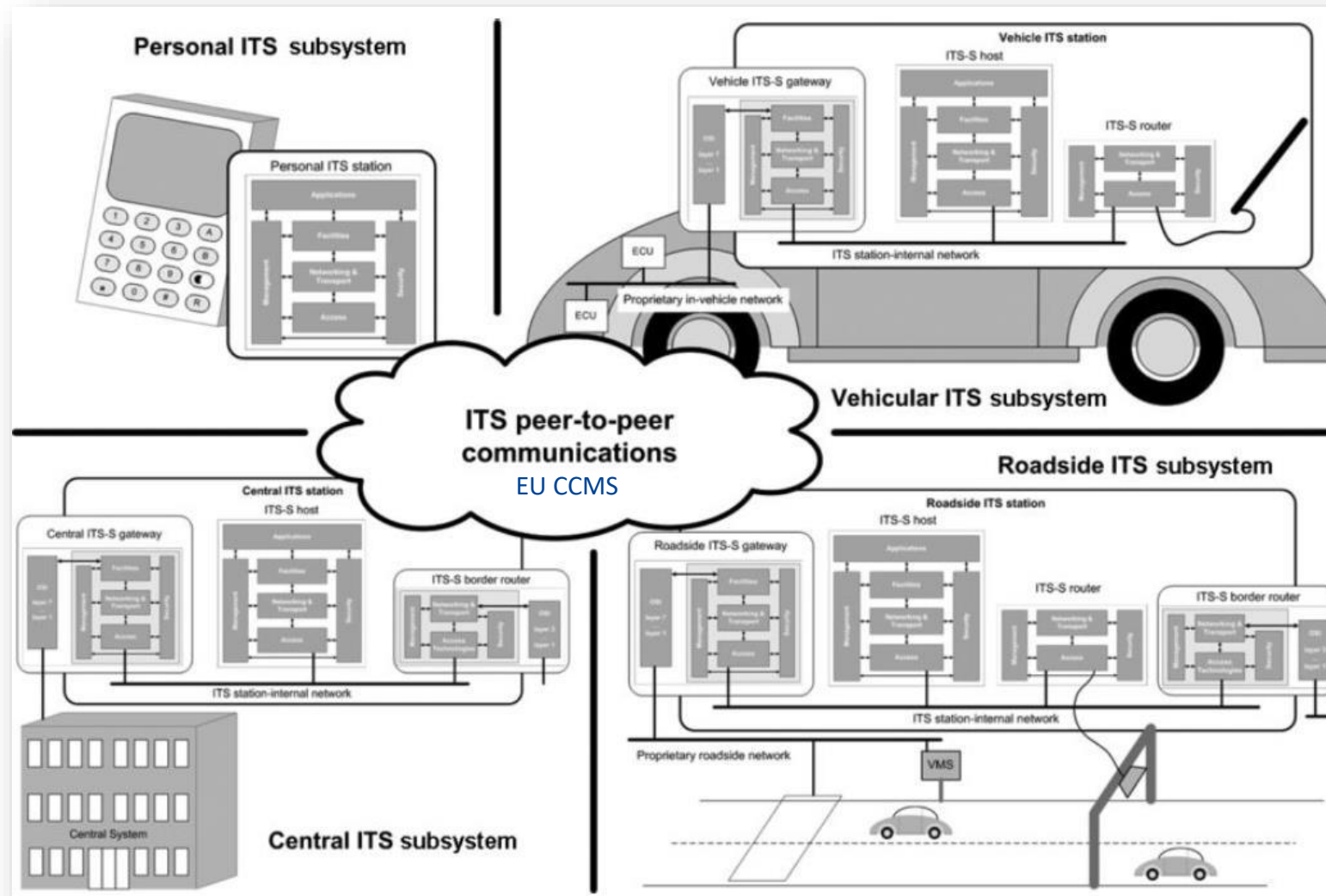
Vehicle Technologies



# Cooperative Intelligent Transport Systems



# C-ITS



# C-ITS

Personal ITS Station



Vehicle ITS Station



Cellular 4G/5G



EU CCMS

Central ITS Station

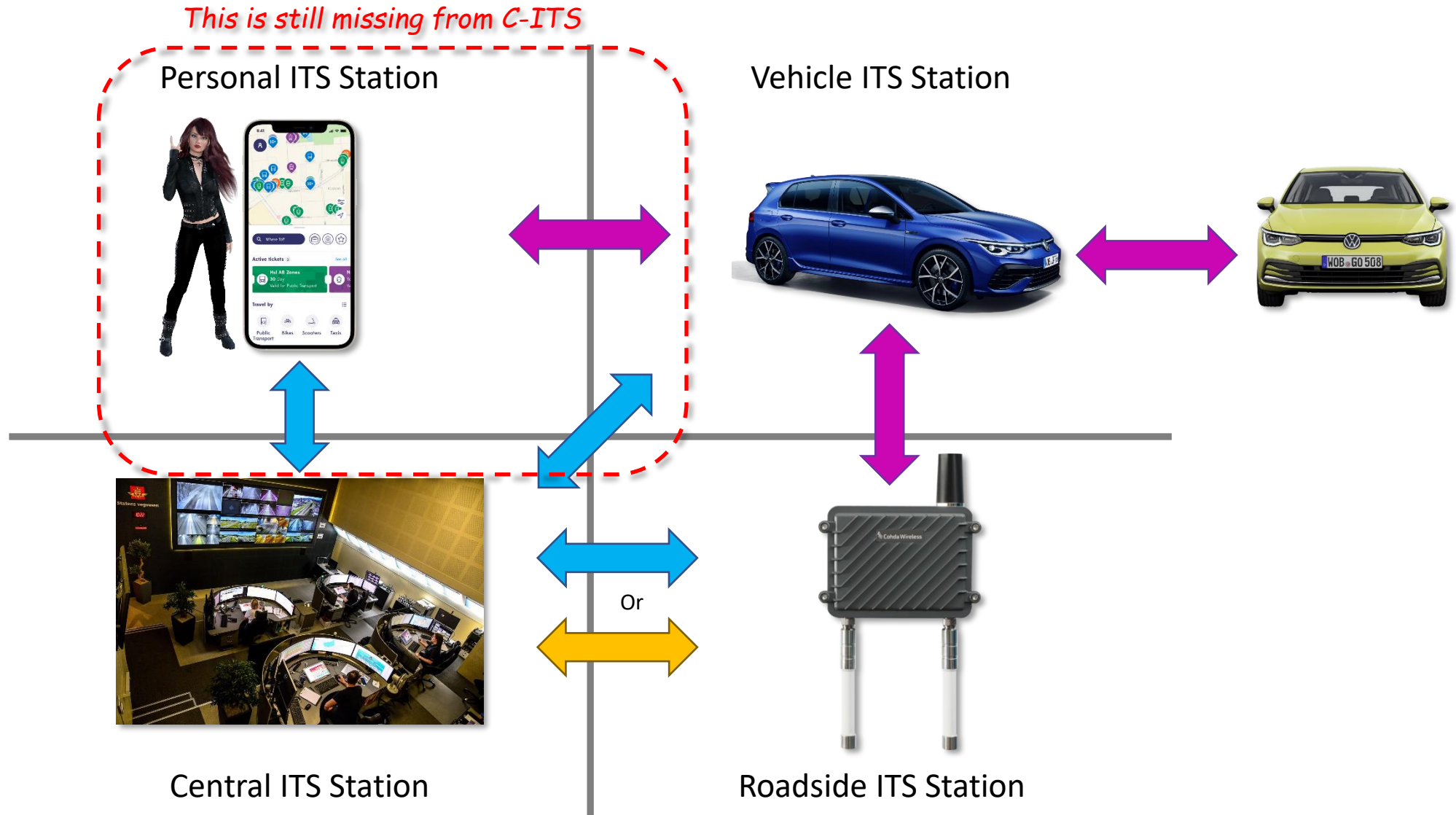





Roadside ITS Station



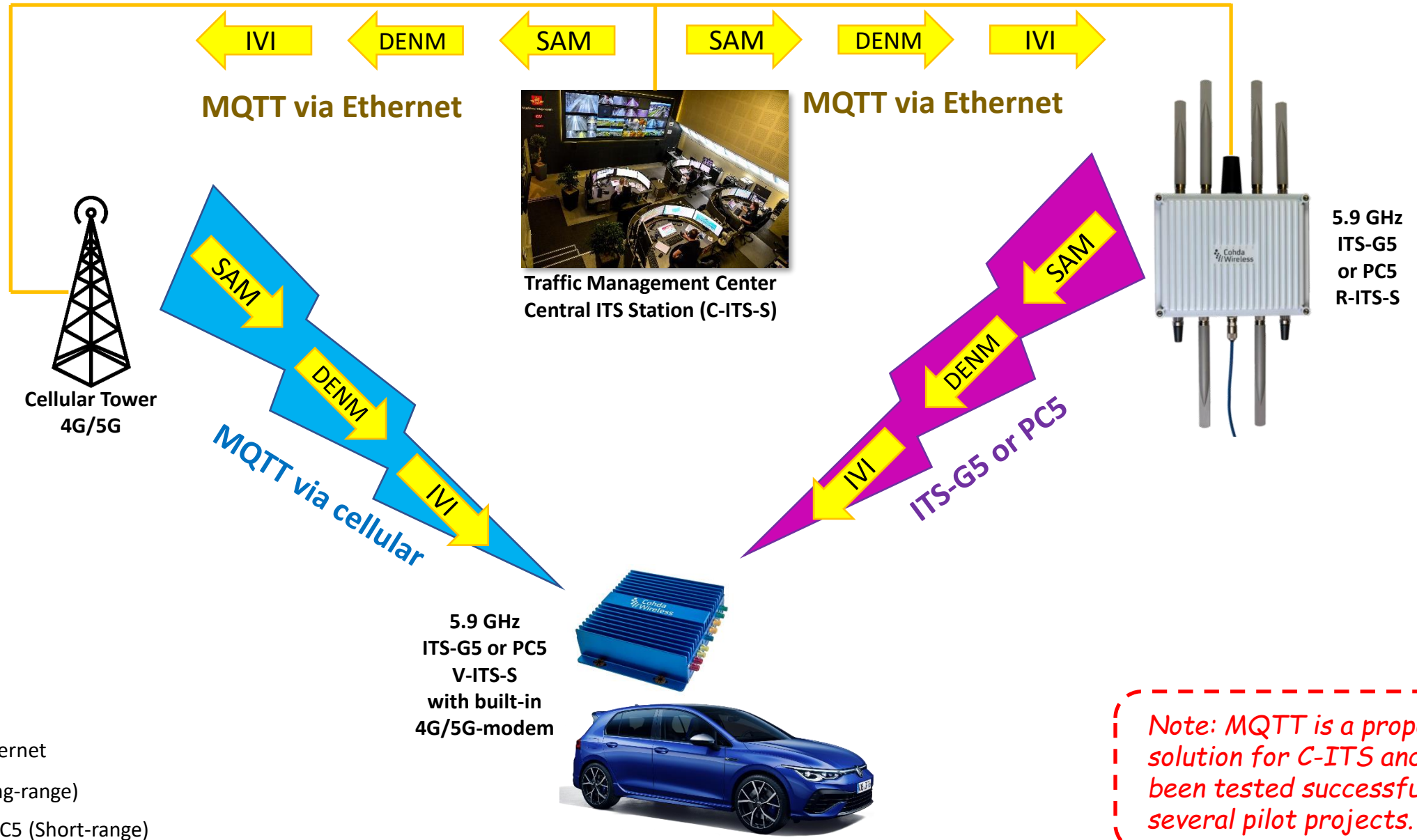
5.9 GHz ITS-G5 or PC5

# C-ITS long-range and short-range communication

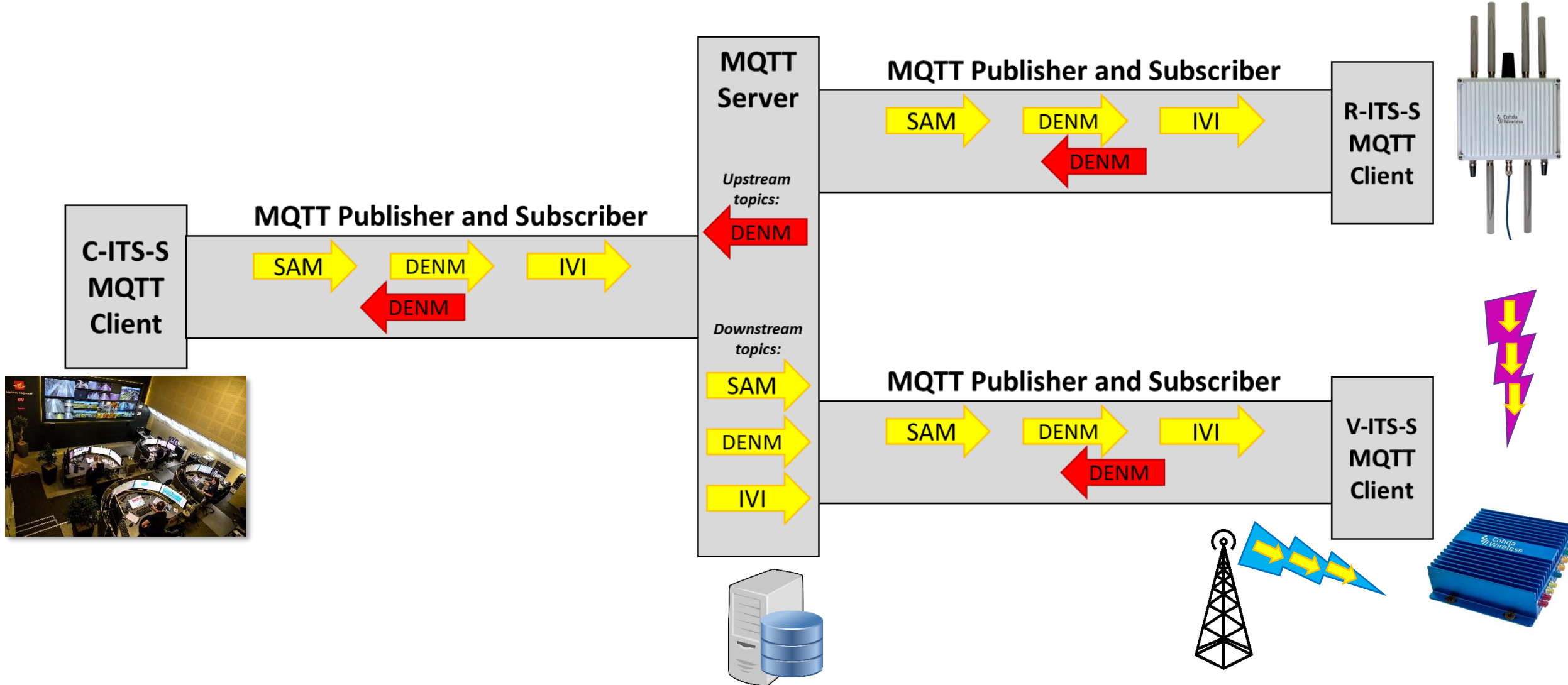


-  Fiber or copper Ethernet
-  Cellular 4G/5G (Long-range)
-  5.9 GHz ITS-G5 or PC5 (Short-range)

# C-ITS hybrid communication using MQTT



# C-ITS MQTT server and clients



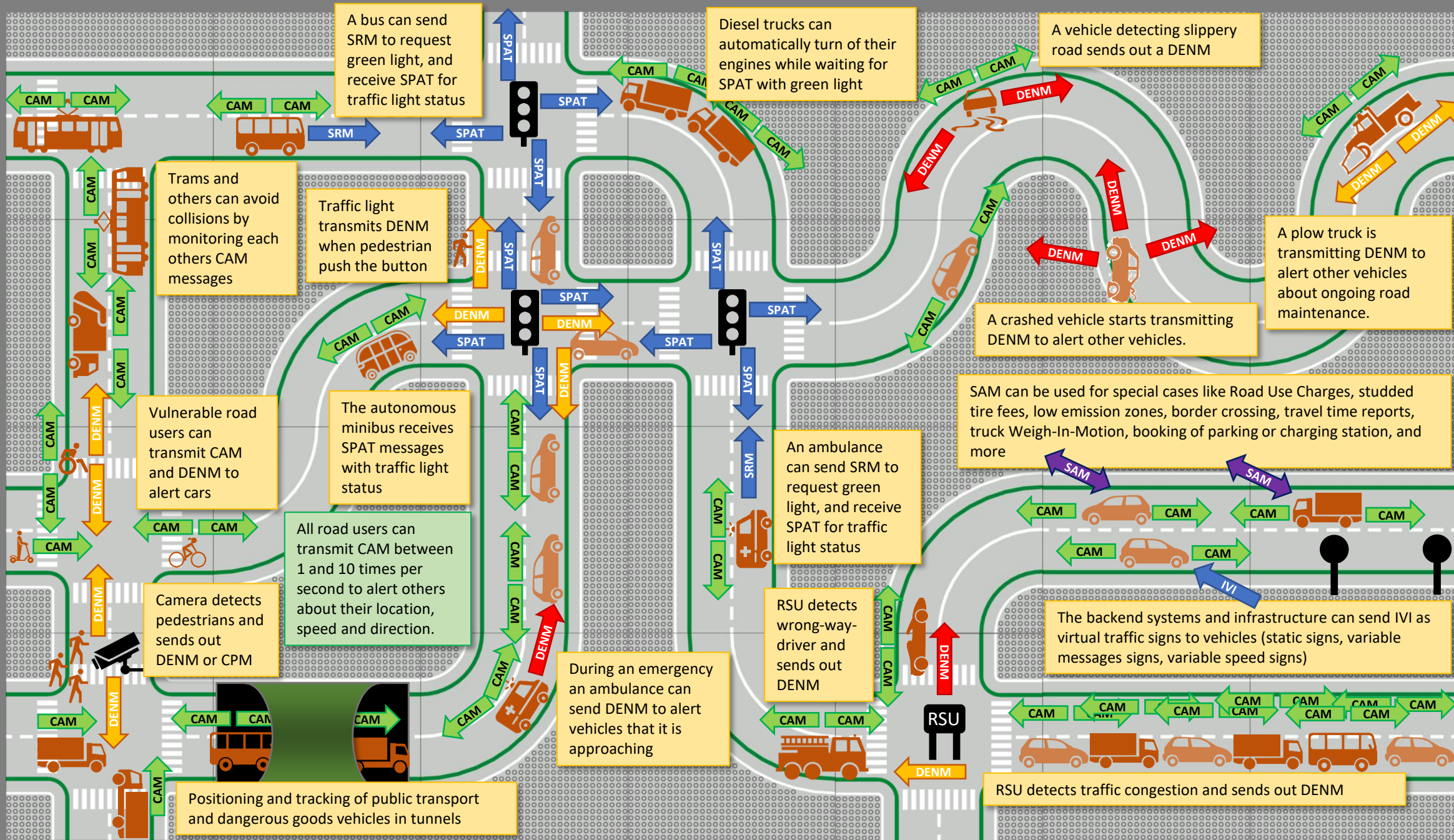
# Some standardized C-ITS messages

The image displays four overlapping Wireshark 2.2.2 windows, each showing a different C-ITS message. Each window has a colored label in the top-left corner: SPaT (Traffic light) in blue, MAP (Map) in yellow, IVI (Traffic sign) in grey, DENM (Traffic alert) in red, and CAM (Position) in green.

- SPaT (Traffic light):** Shows an ETSI ITS (SPaT) message. The packet list shows a frame of 197 bytes. The packet details pane shows the ETSI ITS (SPaT) header and the SPaT header.
- MAP (Map):** Shows an ETSI ITS (MAP) message. The packet list shows a frame of 175 bytes. The packet details pane shows the ETSI ITS (MAP) header and the MAP header.
- IVI (Traffic sign):** Shows an ETSI ITS (IVI) message. The packet list shows a frame of 167 bytes. The packet details pane shows the ETSI ITS (IVI) header and the IVI header.
- DENM (Traffic alert):** Shows an ETSI ITS (DENM) message. The packet list shows a frame of 223 bytes. The packet details pane shows the ETSI ITS (DENM) header and the DENM header.
- CAM (Position):** Shows an ETSI ITS (CAM) message. The packet list shows a frame of 118 bytes. The packet details pane shows the ETSI ITS (CAM) header and the CAM header.

Each window also shows the packet bytes pane at the bottom, displaying the raw data in hexadecimal and ASCII.

# A few C-ITS use cases



# The two C's in CCAM

- **Connected:** Wireless connectivity
  - Long range internet communication via the cellular network (4G/5G)
  - Short range automotive communication via the 5.9 GHz frequency band (ITS-G5 or PC5)
- **Cooperative:** Trusted data exchange
  - Long range
    - V2N: Vehicle-to-network: e.g. real-time traffic information, HD-maps, OTA software updates, eCall
  - Short range
    - V2V: Vehicle-to-vehicle: e.g. onboard collision avoidance safety systems
    - V2I: Vehicle-to-infrastructure: e.g. traffic signal timing and priority, wrong-way-driver warning
    - V2P: Vehicle-to-pedestrian: e.g. safety alerts between vehicles and pedestrians/bikes
    - Collective Perception: e.g. intersection traffic camera sharing information with vehicles
    - Cooperative Maneuvers: e.g. Automatic metering and merging onto freeways
    - **Note:** Need very accurate positioning in form of GNSS, RTK, RTLS, and other methods (see ETSI/ISO POTI)
- **Automated Mobility:** Self driving cars (SAE Level-4)

# That's all folks



**Best regards:**

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