

12th ITS EUROPEAN CONGRESS
ITS BEYOND BORDERS
Strasbourg, France | 19-22 June 2017

EATA
European Automotive and Telecom Alliance

Organised by:

Hosted by:

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EATA members

Operational roll-out through companies: 38 members

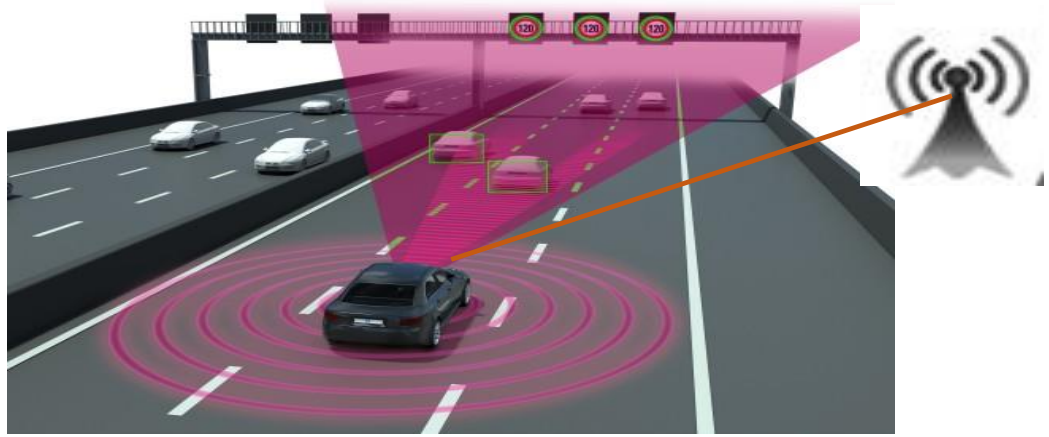
- **Telco network operators**: Deutsche Telekom, Eurofiber, KPN, Orange, Play, Post Luxembourg, Proximus, Vodafone, Telefonica, Telecom Italia, Telenor
- **Telco suppliers**: Nokia, Huawei, Ericsson
- **Automotive OEMs**: BMW, DAF, Daimler, Fiat Chrysler, Ford, Hyundai, Iveco, Jaguar Land Rover, Opel, PSA, Renault, Toyota, Volkswagen Group, Volvo Cars, and Volvo Group
- **Automotive suppliers**: Autoliv, Bosch, Continental, Denso, Delphi, Hella, Valeo
- Project management: ERTICO

EATA Objectives

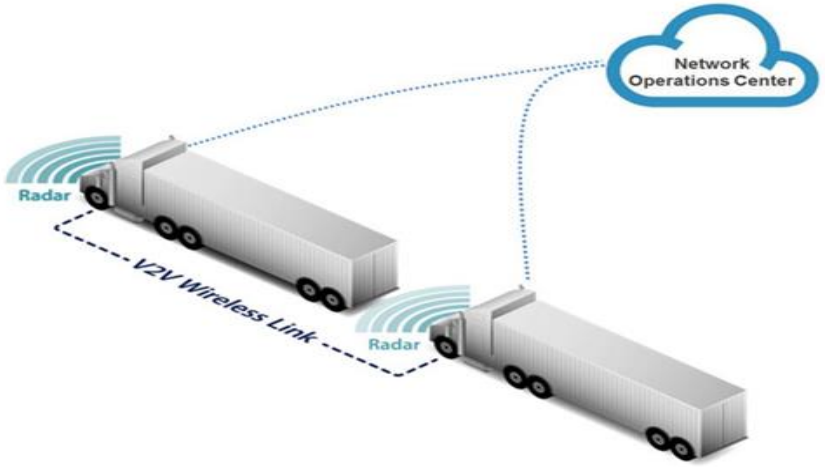
- Facilitate and accelerate the EU-wide deployment of connected and automated driving:
  - Remove potential roadblocks and highlight needed technical and regulatory measures
  - Identify the business models underlying connected and automated driving
  - Help make Europe a global leader in this field
  - Provide a platform for knowledge-sharing between the automotive and telecommunications sectors to develop a 'common language'
- Create societal benefits by improving road safety and traffic efficiency
- Promote the European digital economy

EATA Connected Automated Driving

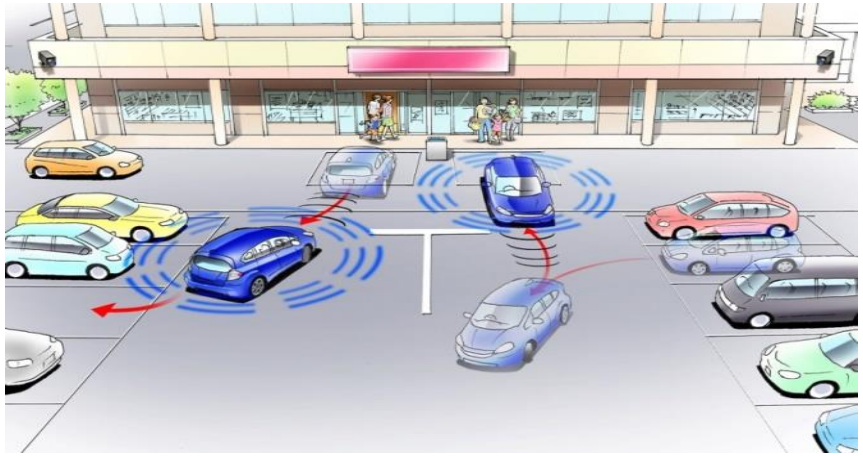
High way chauffeur L3 & L4



High Density truck platooning

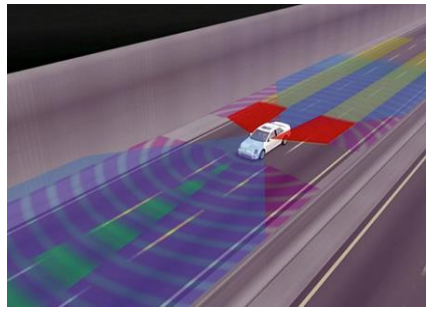


Automated Valet parking



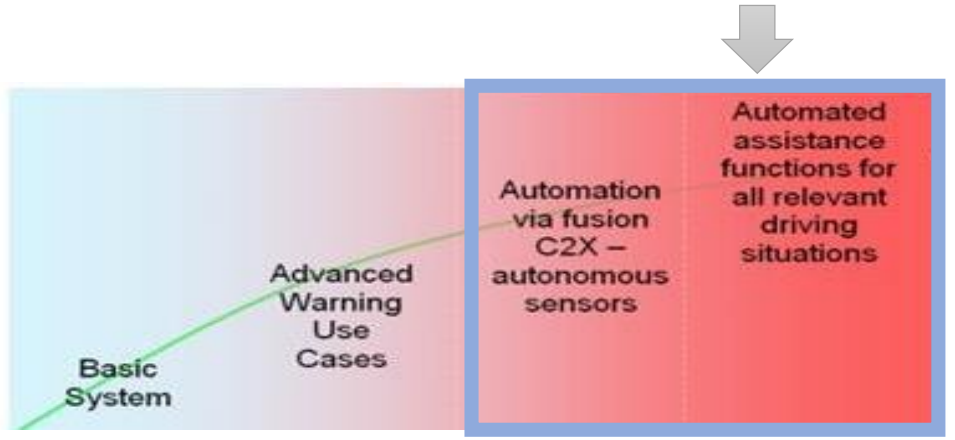
New challenges for automated driving

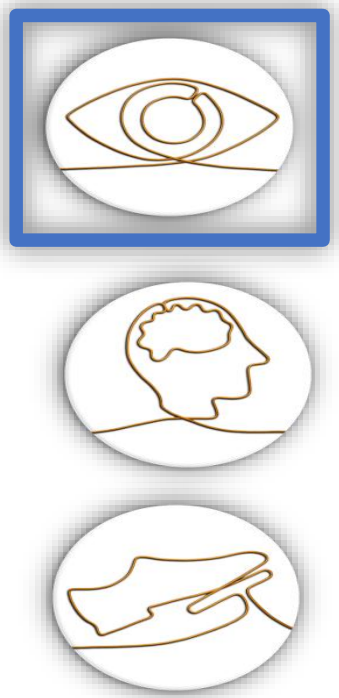
Car sensors



Connected data
(road sensors and cooperative car data)







SENSE

PLAN

ACT

The connected data as additional car sensor:

- New messages and attributes to messages
- Safety relevant applications need redundancy via the hybrid communication channels.
- Network slicing, priority for AD vital messages
- Application of certain safety rules on digital infrastructure
- More accurate and safety relevant localization : GNSS correction

3 step approach

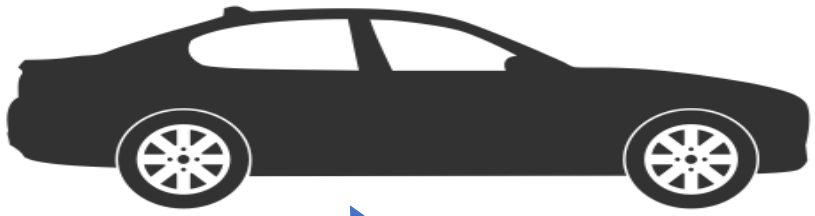
	Use case	Technologies	Sites
STEP1	Enabling services for - Highway chauffeur (L2/3) - High density truck platooning	<u>Pre Deployment:</u> - hybrid communication : LTE, ITS G5 + LTE V, Mobile Edge Computing applications - Network slicing - LTE Broad casting: GNSS offset, hazards and HD-map updates <u>Studies</u> : business models responsibilities, safety concepts, Quality of service, Security and data protection Regulation and standardization	20..40 km tracks DE, FR,NL, ES, BE 
STEP2	As step 1 + Valet parking	<u>Application above technologies and studies</u>	Cross border motorways networks 
STEP3	As step 2 Automated driving	Industrialization	Commercialisation on AD authorized motorways



Concorda system overview



Connected road sensors



V2V : 11p & &LTE V



LTE – 5G

MEC V2V

Geoservices and low latency applications
GNSS corrections

APP#1 APP#2 APP#m

MEC

Services
- Day 1
- Probe data
- Match making
- Etc.

RSU 11p

RSU 11p

RSU LTE V

RSU LTE V

V2x 5,9GHz channel
- Channel A : LTE V
- Channel B : space holder
- Channel C : 11p

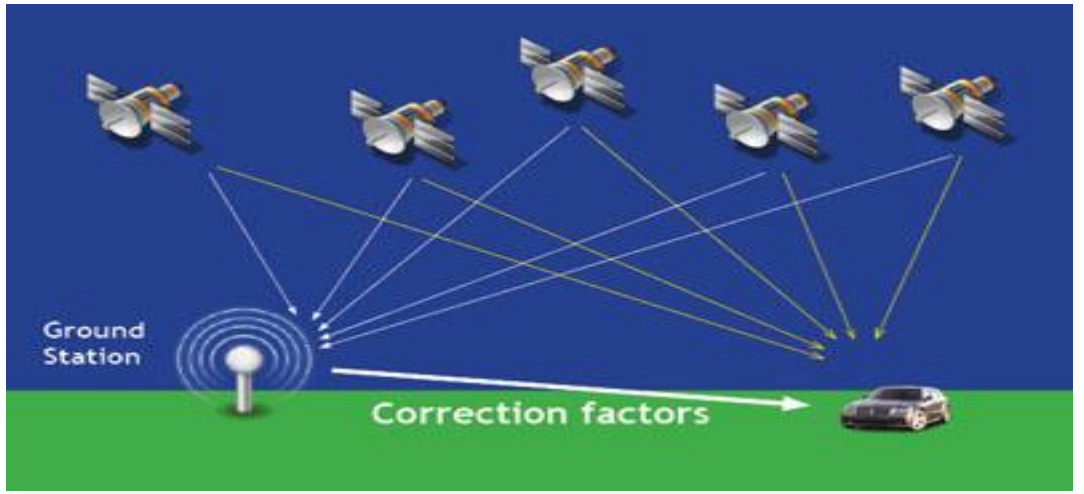
LTE V
- M4 OTA configurable
- M3 multi OEM to be tested on A9

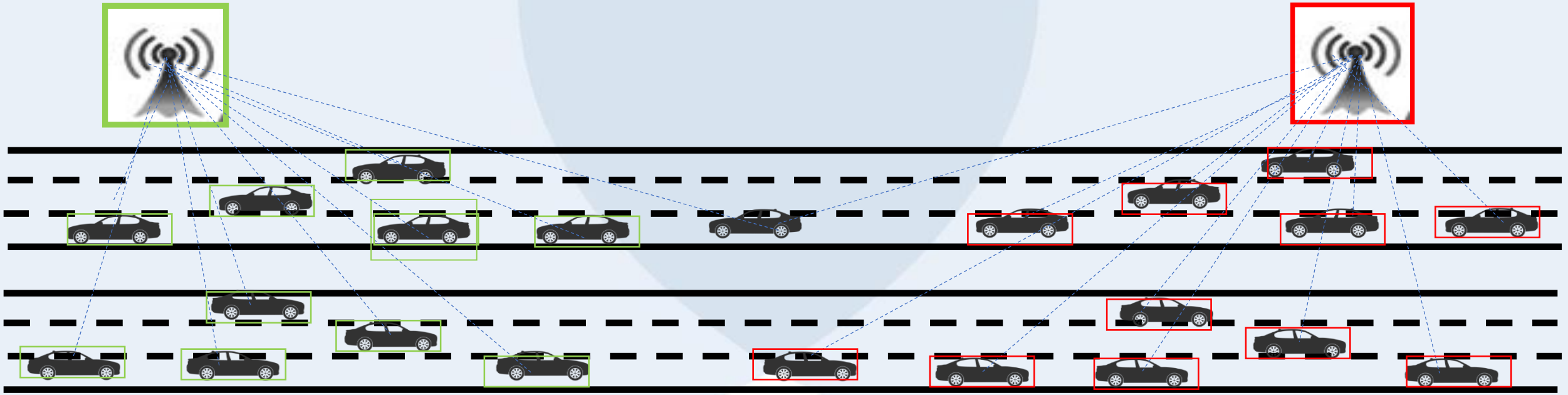
Truck platooning : Discussion ongoing for licenced spectrums with well defined SLA

GNSS correction factor broadcasting

Objective: increase the GNSS localization accuracy

- Satellite state space representation
- Broadcasting range 20…70km
- Broadcasting frequency = 1 sec.
- Cross MNO





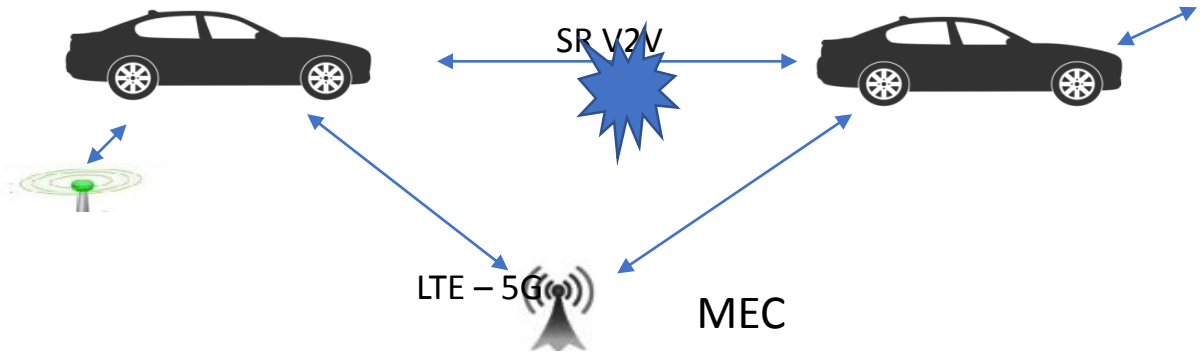
MEC as back-up for CAM, DENM

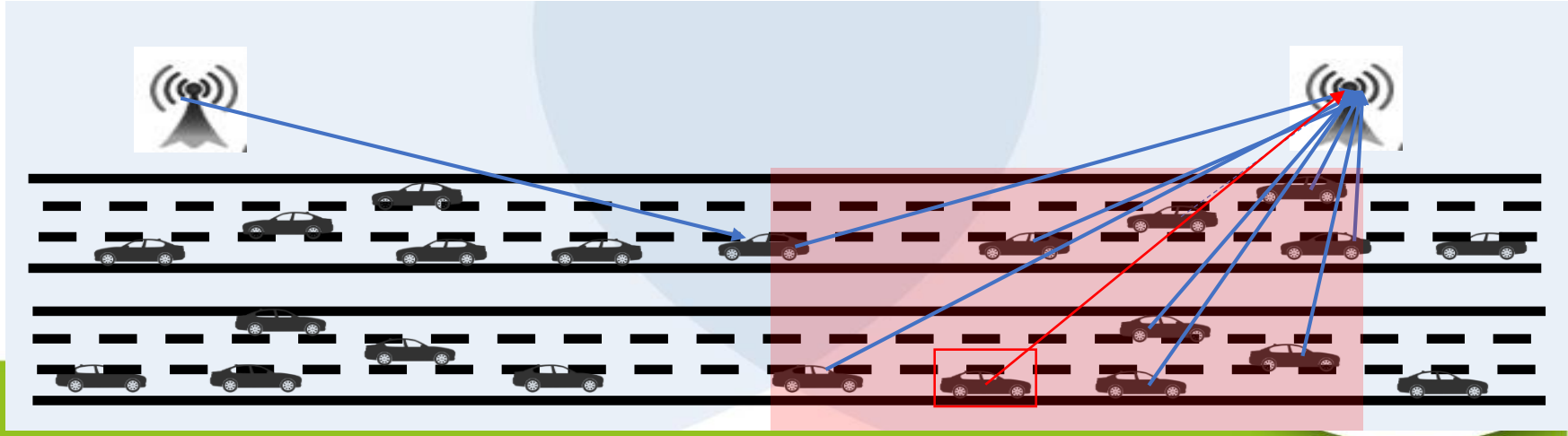
Measures to increase the reliability /availability of the short range communication:

-> Message repetition : (already in place)

-> Redundant communication path:

- e.g. 2 availabilities of 95% gives 99,75% in total
- LTE station antenna are high positioned and thus better reachable



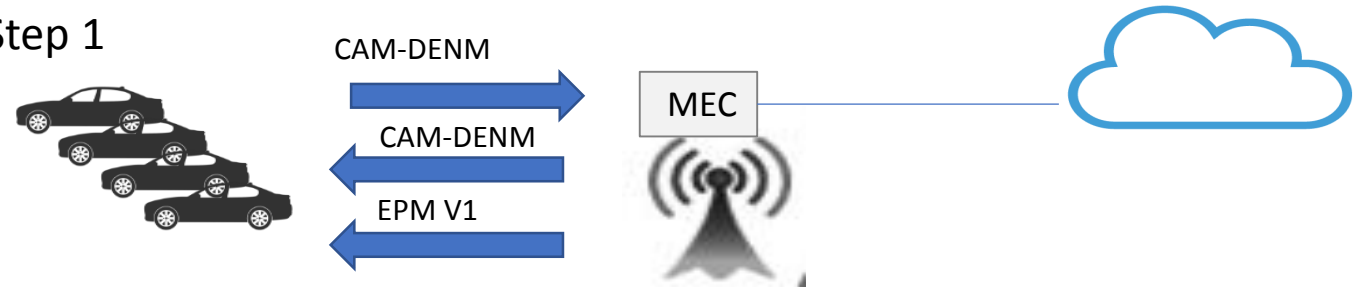


MEC : Mobile edge computing
CAM : cooperative awareness message
DENM : decentralised environmental notification message

MEC application evolutions

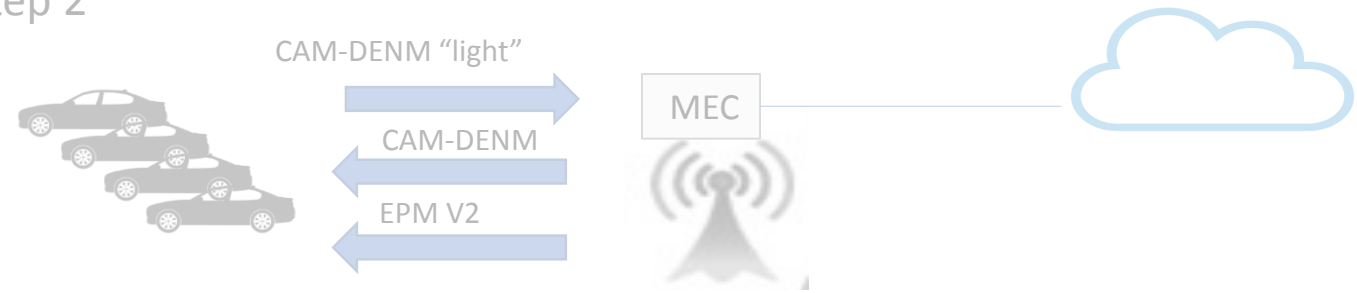
Under discussion

Step 1



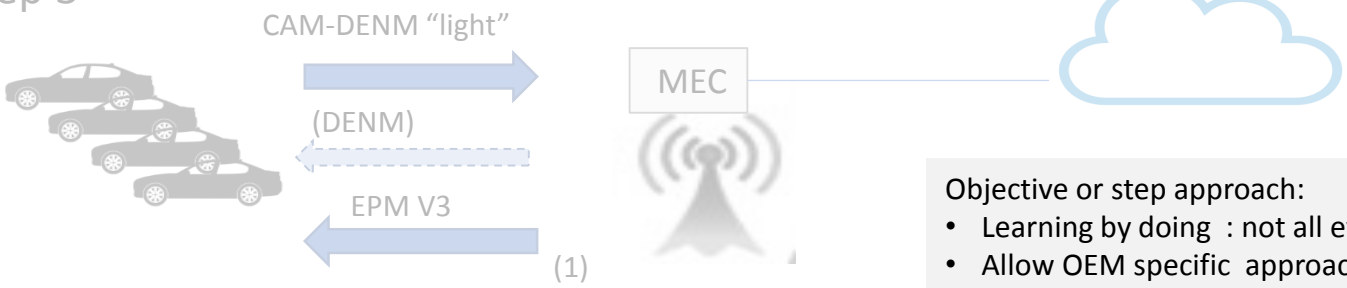
CAM-DENM are receive and transmitted by MEC
Transmission according geogrids in single cast
EPMs are generated, available on request

Step 2



CAM-DENM “light” received by MEC
CAM-DENM “Transmission according geogrids in single cast
EPM V2 are generated, available on request

Step 3



CAM-DENM “light” received by MEC
EPM V2 are generated, available on request and in single cast according driving events

Objective or step approach:

- Learning by doing : not all events and possibilities are known at project start
- Allow OEM specific approaches

MEC EPM (Environment Perception Model) : 360-degree awareness of nearby vehicles.

Under discussion

Inputs :

- Car CAMs and DEMNs, road sensors, 3 party services,
- HD (life) map.

Output :

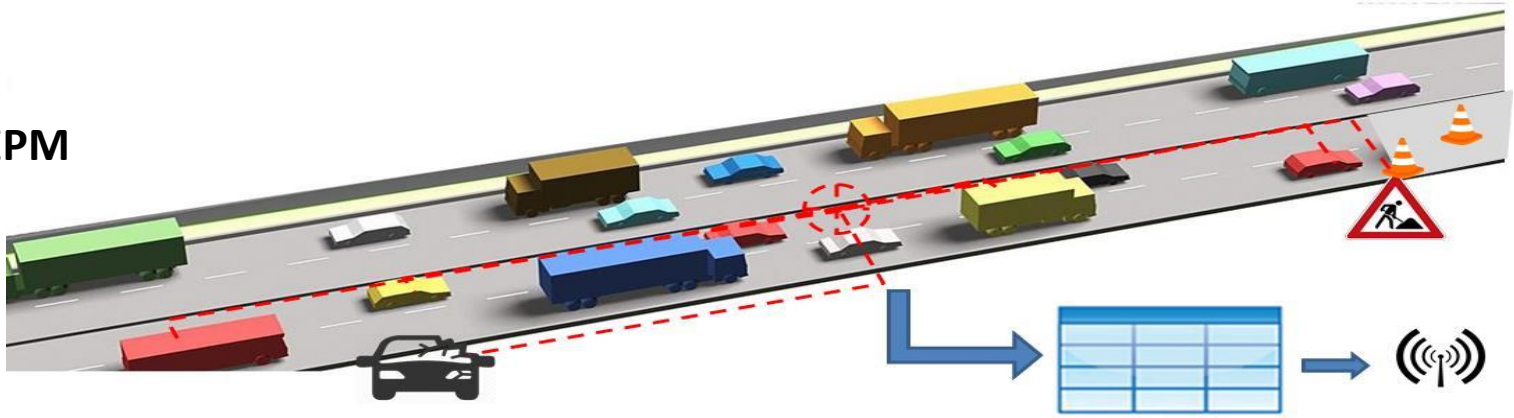
tables with **anonymized** Vehicles, Hazards, Roadworks Etc.
Format to be optimized

- type of objects / vehicles, relative positions, time stamps
- Traffic speed vs. range. (only relevant cars)
- Road and traffic situation

Applications:

- **Cooperative lane changing**
- **Cooperative insertion**
- **Decision making sudden hazards**
- **Etc.**

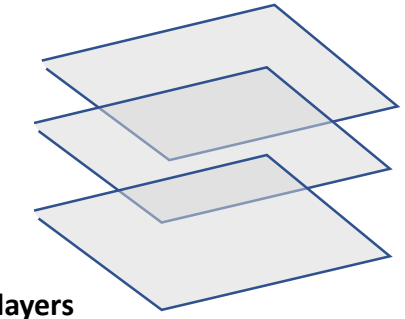
EPM

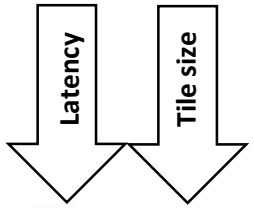




Challenges :

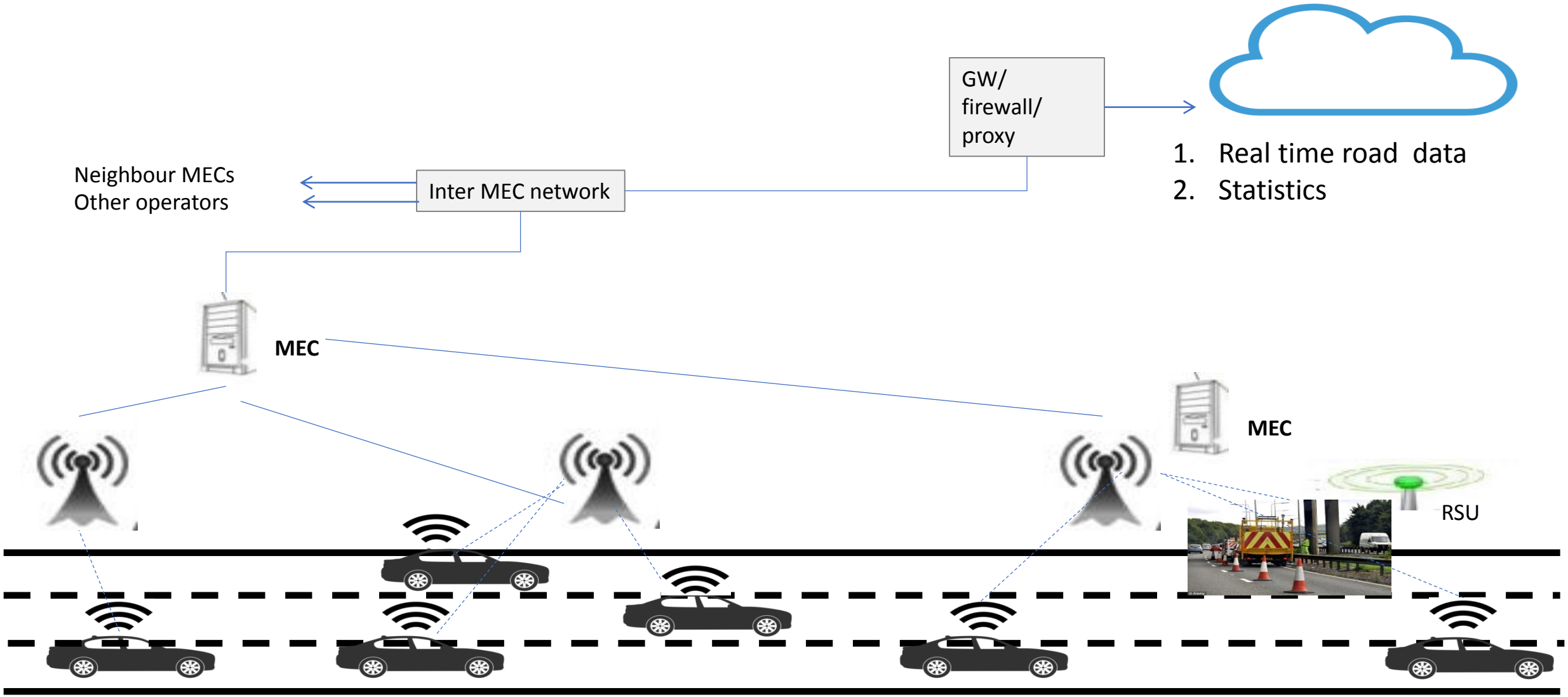
- Lowest data volumes
- Lowest latency <100ms



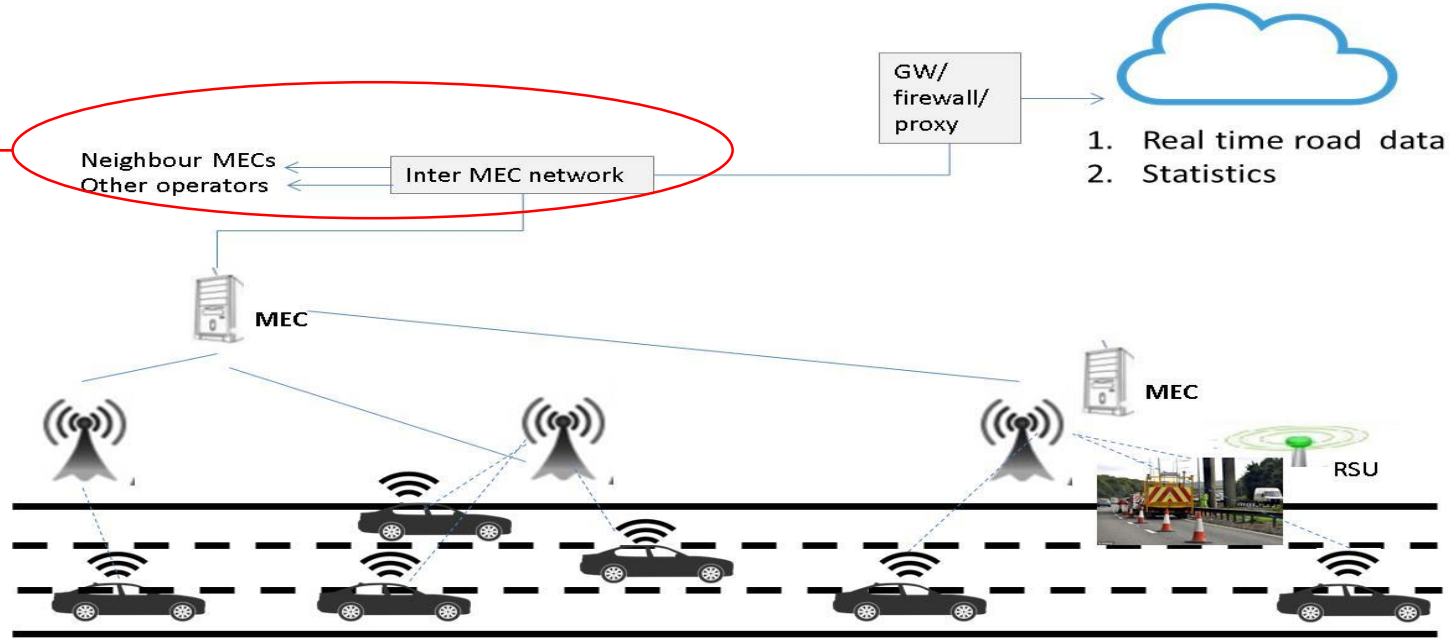


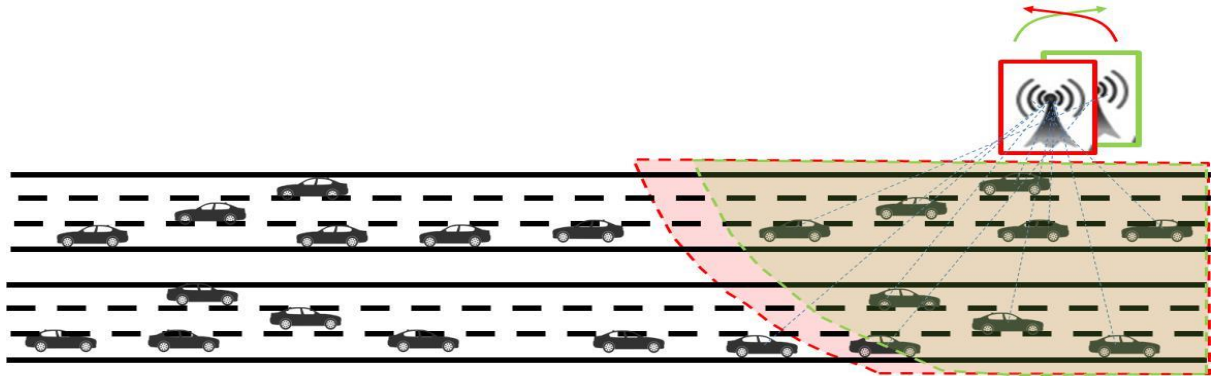
HD map layers

MEC architecture

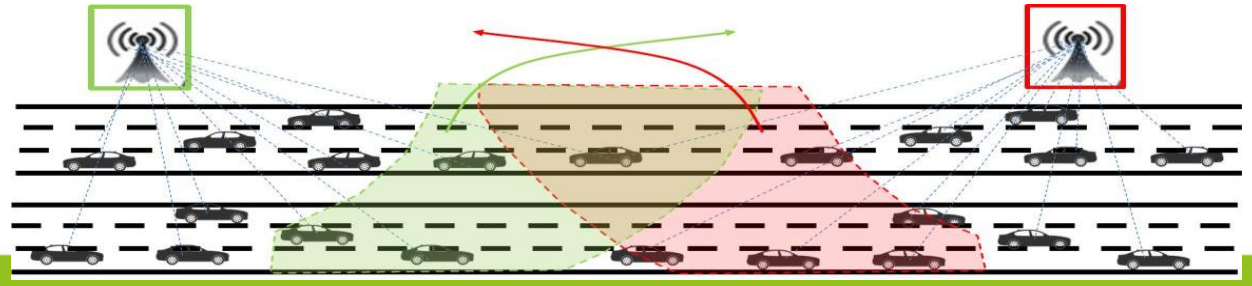


MEC architecture





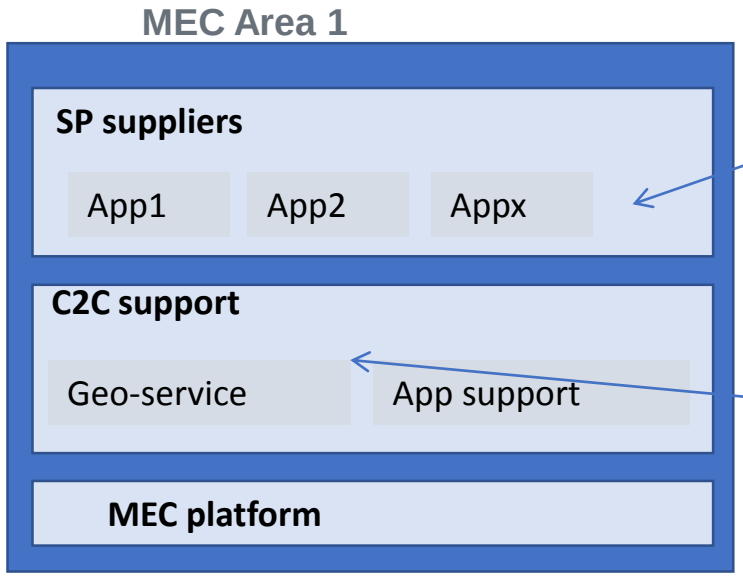
CAM/DEMNs between MNOs



CAM/DEMNs from overlapping and adjacent zones

STEP 1 : MEC architecture

Under discussion

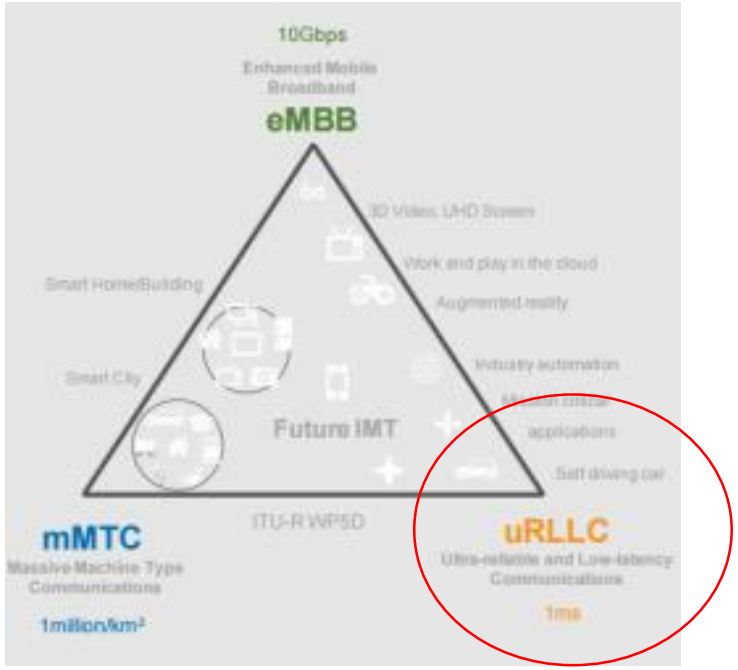


Apps:

- **Generating (virtual) DENMs**
- **GNSS corrections**
- **Environmental perception models (EPM)**
- **Data aggregation for upper laying cloud structures**
- **Logging for evaluations**

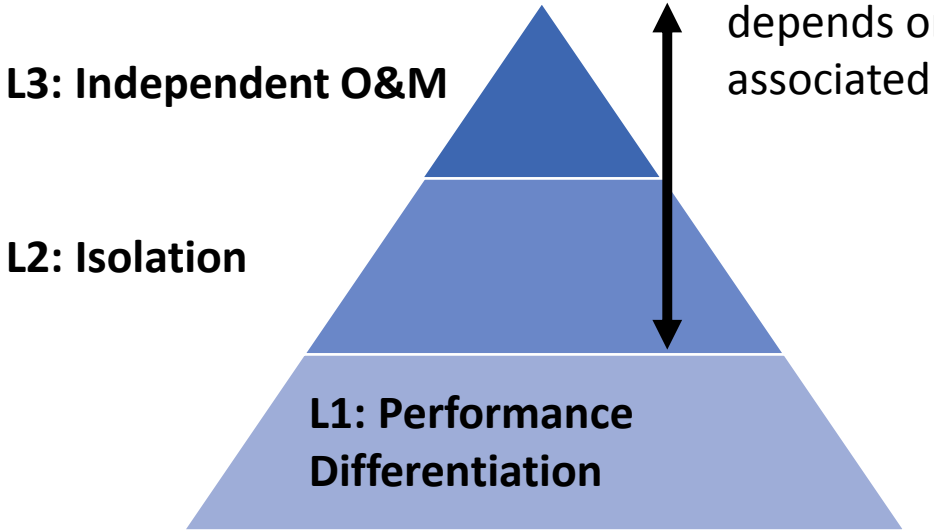
Geo-localized Transfer CAMs, DENMs

Network-slicing



It is planned to deploy the uRLLC (ultra-reliable low latency communication) for the MEC applications.:

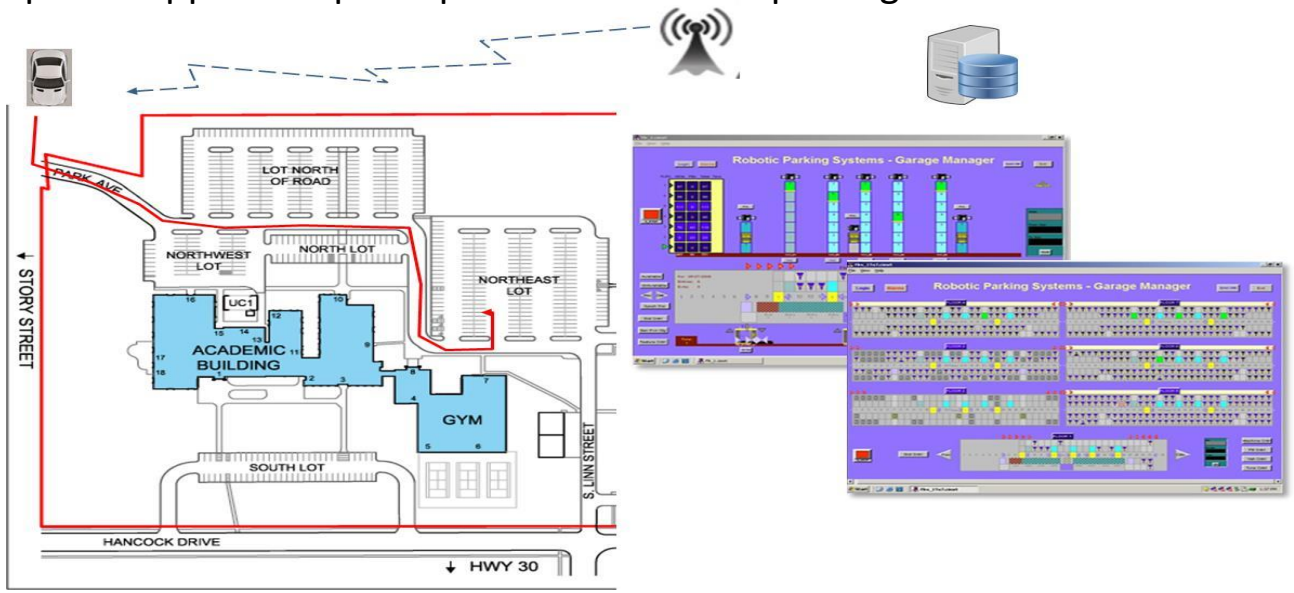
- Step 1 in Lab
- Step 2 in test network
- Step 3 in operational network by 2019

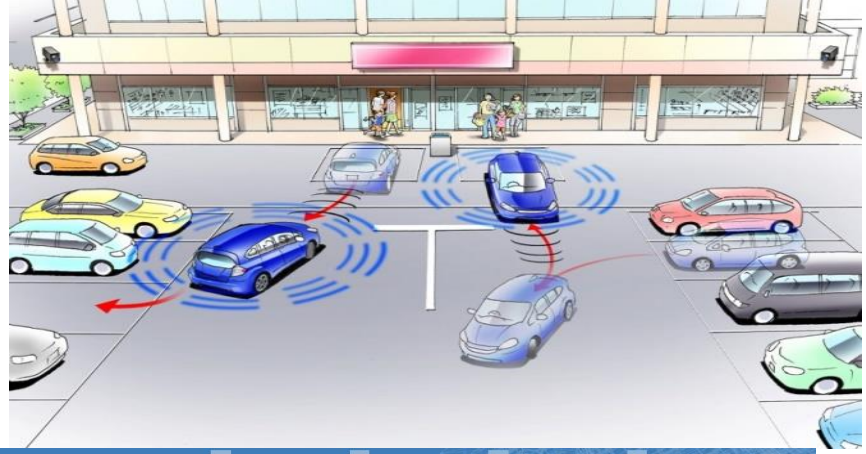


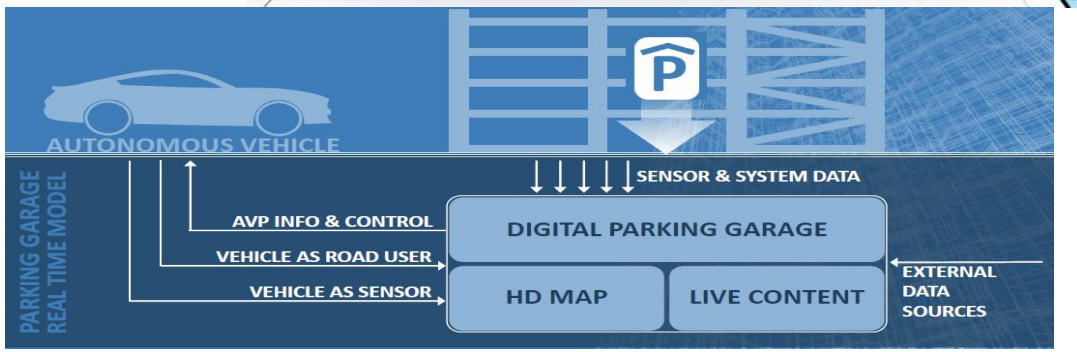
slicing level, min L2 , possible L3 depends on the business model and associated costs.

Valet parking proposal #1

Use case: leaving the car at drop off area and calling the car via phone app to the pick-up area + additional parking services







APV service (Automated Valet Parking)

- Check in/out vehicles
- Interface with users, e.g. via smartphone App, for above mentioned services
- Send the 3D-HD parking map to the incoming vehicles
- Aggregate data : swarm based parking lot detection (using car sensors), register leaving cars, historical patterns, P-slot sensors, Cameras
- Attribute places and send route to attributed places
- Manage additional services : washing services, fuelling, in-car delivery, EV charging , etc.
- Manage the parking access rights via car connectivity and via tokens in the car as off-line back up.
- Traffic management : e.g. automated cars in puffer zones to give priority to manual cars
- Incident management + security (collision avoidance, e.g. with pedestrians)

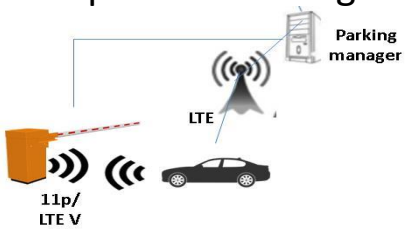
Valet parking proposal

Redundant communication with infra structure:

Redundancy :

The infrastructure will be connected to internet, controlled via the AVP by the car through LTE

Backup via short range communication and embedded user right management.







Communication slices:

- NB Iot for car wake up and batter driven parking sensor
- uRLLC for MEC applications and remote driving

MAP & localization:

- HD 3D maps optimized for relative localization. Graph maps (tbc)
- GNSS corrected localization
- Parking sensor based localization





Inter parking communication:

- Via datex II

Thank you for your attention



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