



# Introducing 5GMEC4EU

## A European Commission Perspective

***Christian Micas***

*Future Connectivity Systems*

*European Commission, DG CONNECT*

*5G Corridors Workshop, 16 October 2024*



# The 5G-Edge “continuum”

Large-scale 5G deployments

< Edge-Cloud infrastructure >

Local 5G systems

Major transport paths



Smart Cities



Rural areas



**Geographical continuum:**

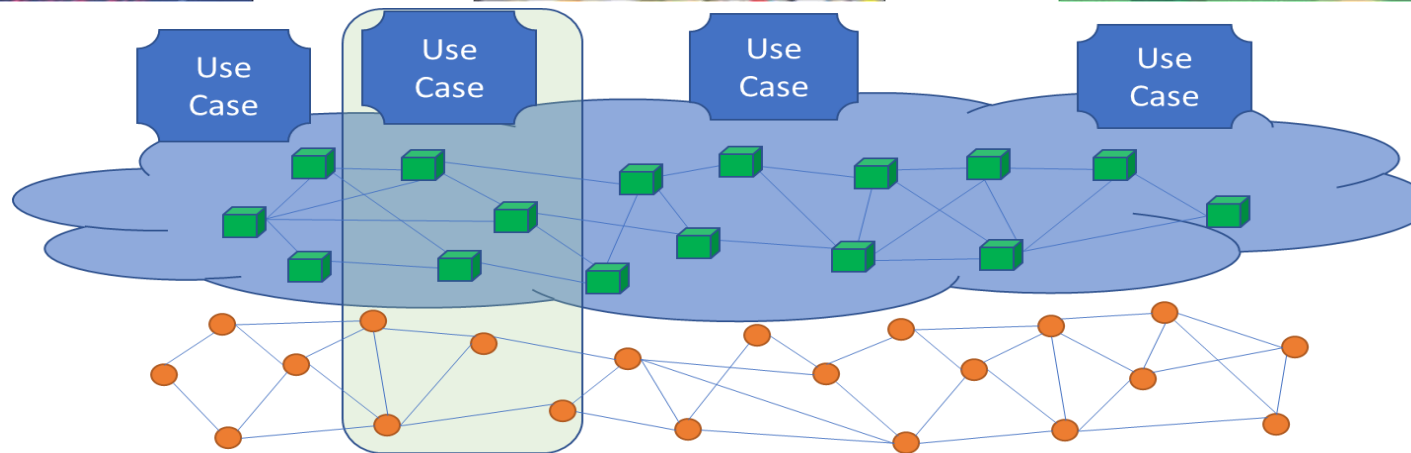
From main corridors and cities to local communities and villages

**Technology Continuum:**

Application-driven vertical integration, stimulus to EU digital supply chain

Edge-Cloud infrastructure

Connected objects and devices (IoT)



**Creating the Connected Collaborative Computing Network (3C Network)**

# Connected Collaborative Computing Network

## White Paper on Europe's Digital Infrastructure Needs, Pilar 1

- Telco Edge Cloud integrated and secure infrastructure and platforms spurring innovation in different vertical domains
- Scale-up across border for testing and piloting new technologies and applications such as connected and automated mobility (CAM), transport and logistics
- Computing at the edge to enable AI-powered algorithms for CAM and smart communities pilots

## 3C Network under the 2<sup>nd</sup> CEF Digital Work Programme 2024-2027

- Alignment with the “3C network” narrative of the White Paper
- Deployment and take-up of standalone 5G systems as part of Large-Scale Pilots
- Integration of devices, network, cloud and edge computing, and communication capabilities
- Demonstrate the benefits, in concrete use cases, of the evolution towards virtualised and cloud-native network functions and distributed telco edge cloud





# Many thanks for your attention !

<https://digital-strategy.ec.europa.eu/en/policies/cross-border-corridors>



# 5GMEC4EU

GUIDE Workshop

October 16<sup>th</sup>

**A Pan-European Collaborative Approach towards Federated Edge  
Cloud Integration**

# 5GMEC4EU: Who are we?



Dimitri Jungblut



Edgar Tamaliunas



Daniel Henkel



Ksenia Manasov



Kasom Preißendörfer



Christian Maasem



Wolfgang Knospe



Stefan Schnitter



## 5GMEC4EU in a Nutshell

Project Duration: **30 Months**

Project Start: **January 2024**

Consortium: **Monotch & Detecon**

Funding: **CEF Digital**

Managed by: **HaDEA**

Type: **Coordination & Support Action (CSA)**

Main Stakeholders: **5G Smart Communities & 5G Corridors**

The **5GMEC4EU** project supports the establishment of a “**Connected Collaborative Computing**” – “**3C Network**” to align 5G infrastructure and share knowledge across stakeholders. It supports **5G Smart Communities** and **5G Corridors** in implementing **edge computing** through their 5G projects, enhancing Europe's edge capabilities and fostering profitable **business models**.



Paul Potters



Menno Malta



Nicolas Mercier



Funded by  
the European Union



# 5GMEC4EU coordinates and supports the implementation of edge cloud technologies in 5G Corridor and 5G Smart Community deployment projects.

## GUIDE CSA: 5G Corridors

The GUIDE project aims to coordinate and support 5G Corridors in Europe by capturing and sharing best practices from CEF 5G Corridors projects.

### The project objectives:

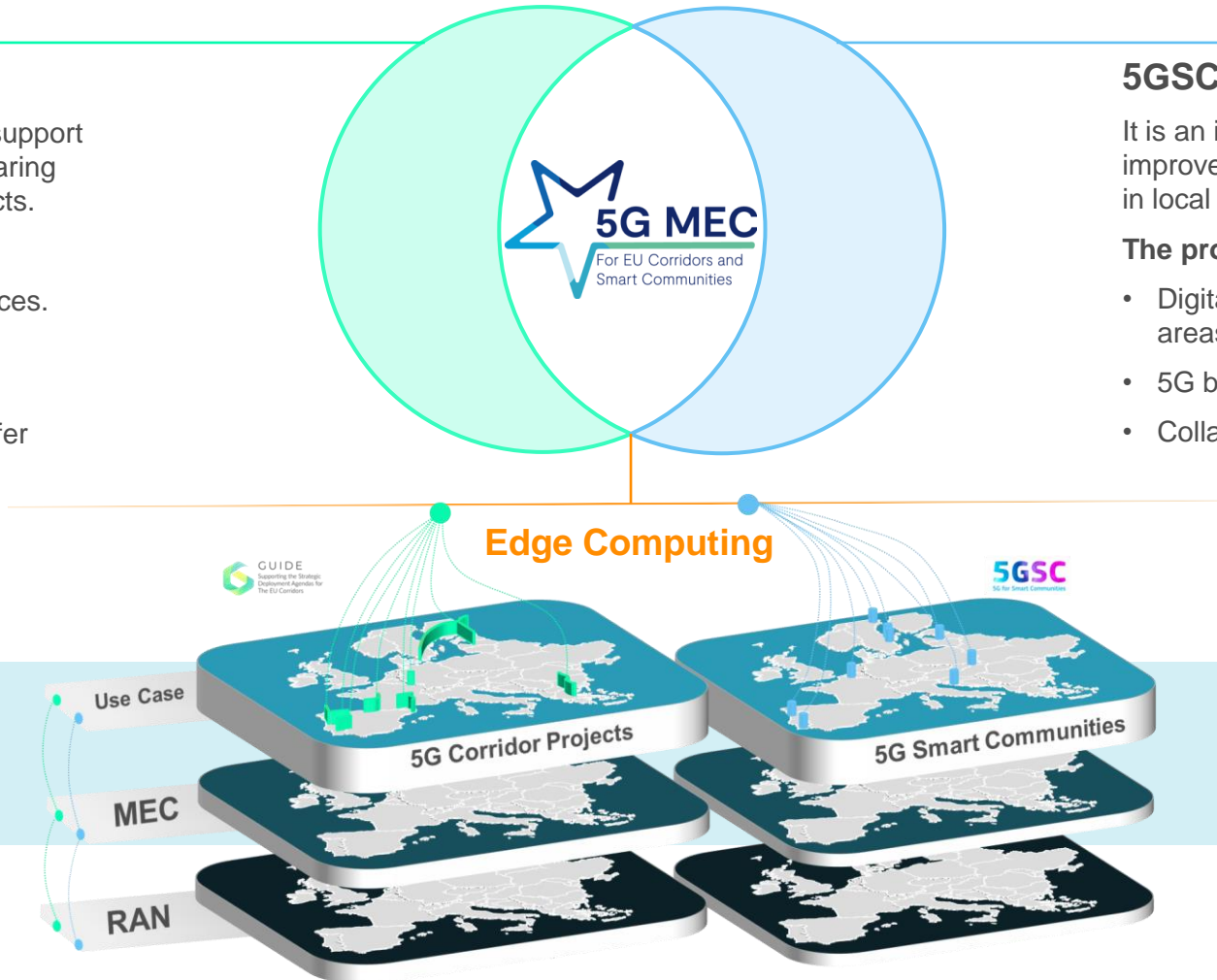
- Analyze CEF 5G Corridors for best practices.
- Develop guidelines for EU 5G Corridors deployment.
- Coordinate projects, monitor progress, offer feedback.

## 5GSC CSA: 5G Smart Communities

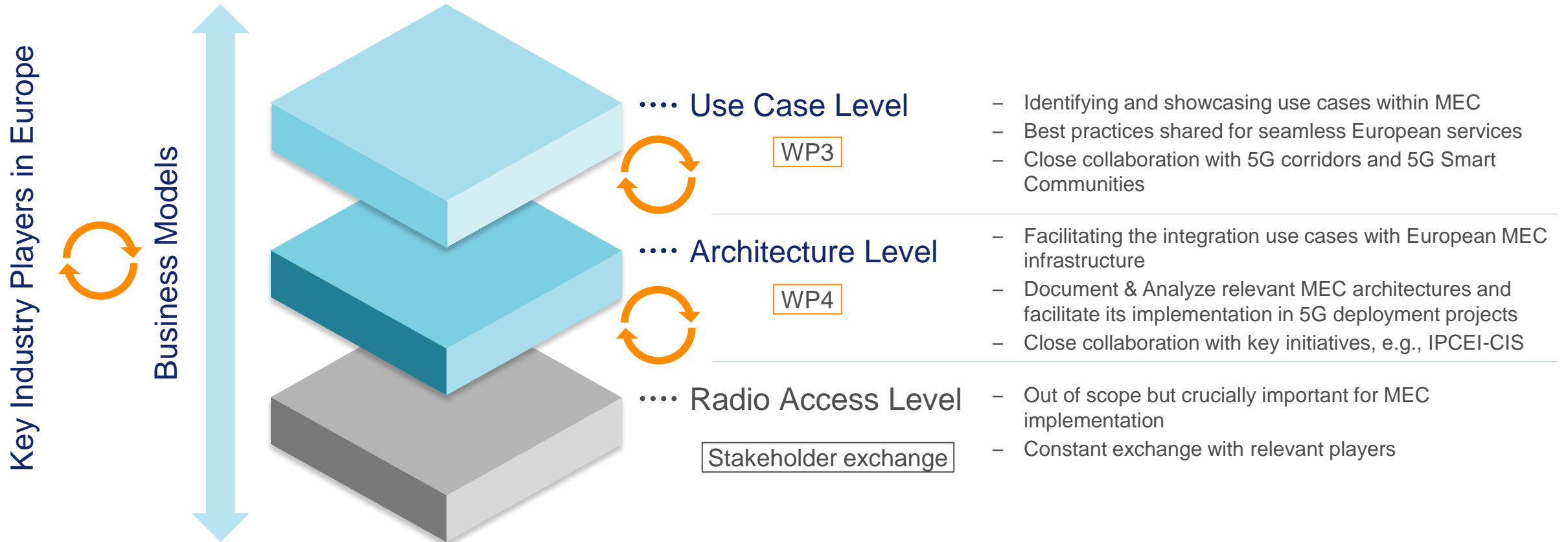
It is an initiative to deploy and use 5G networks to improve public services and socio-economic drivers in local communities.

### The project objectives:

- Digital transformation and recovery of local areas
- 5G benefits in various sectors
- Collaboration and knowledge exchange

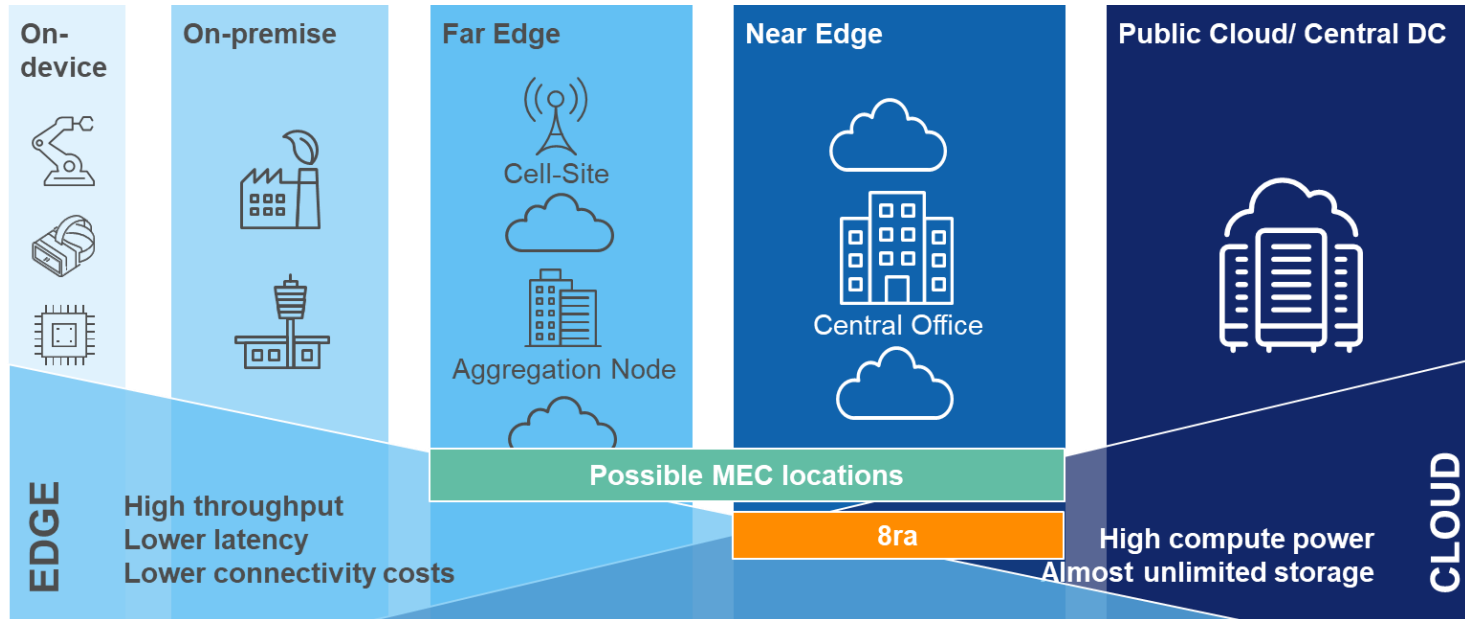


# Supporting the integration of MEC, 5GMEC4EU focuses on use cases and architecture, with RAN as the foundation and business models as the outcome





# MEC & Edge Computing in a Nutshell.



## Indoor/ Small scale

- Industrial UCs
- Smart Home/ Hospital
- Limited-area deployments

## Outdoor / Large-scale

- Mobility Use Cases
- National and multi-national deployments
- Smart agriculture, smart logistics, etc.

## Other

- All other UCs



## EU Edge Landscape

MNOs in EU see the **raising interest** to Edge Computing & MEC and have developed their first offerings around edge computing.



Multiple EU-funded **projects** aimed to proof the **value of MEC** infrastructure by deploying **use cases** enabled by **edge computing technology**.



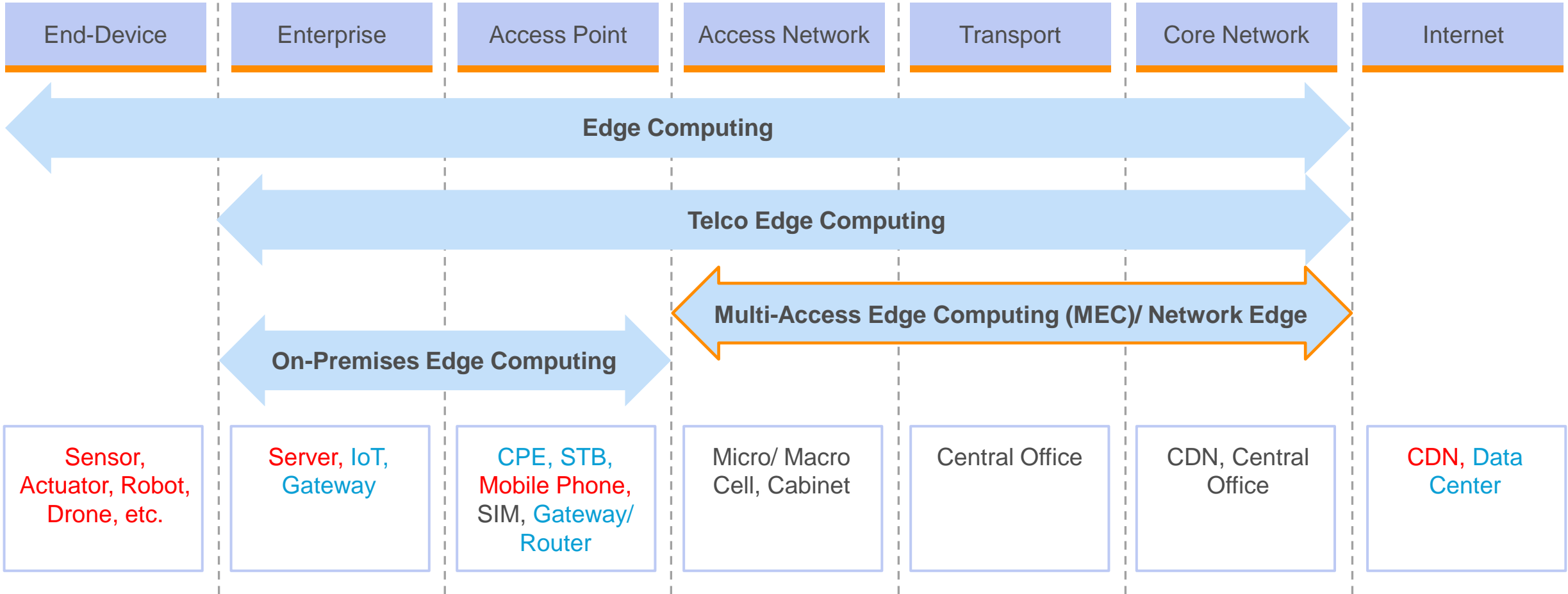
To enable a **pan-European** edge capabilities, **IPCEI CIS** project was launched and aims to build **Edge Cloud** technology across **Europe**.

**IPCEI CIS/ 8ra**



**Funded by  
the European Union**





# The Edge Continuum spans between devices and hyperscale cloud



Source: STL Partners

Key: Telco-owned, May not be Telco-owned, Not Telco-owned

# Edge Continuum and Taxonomy

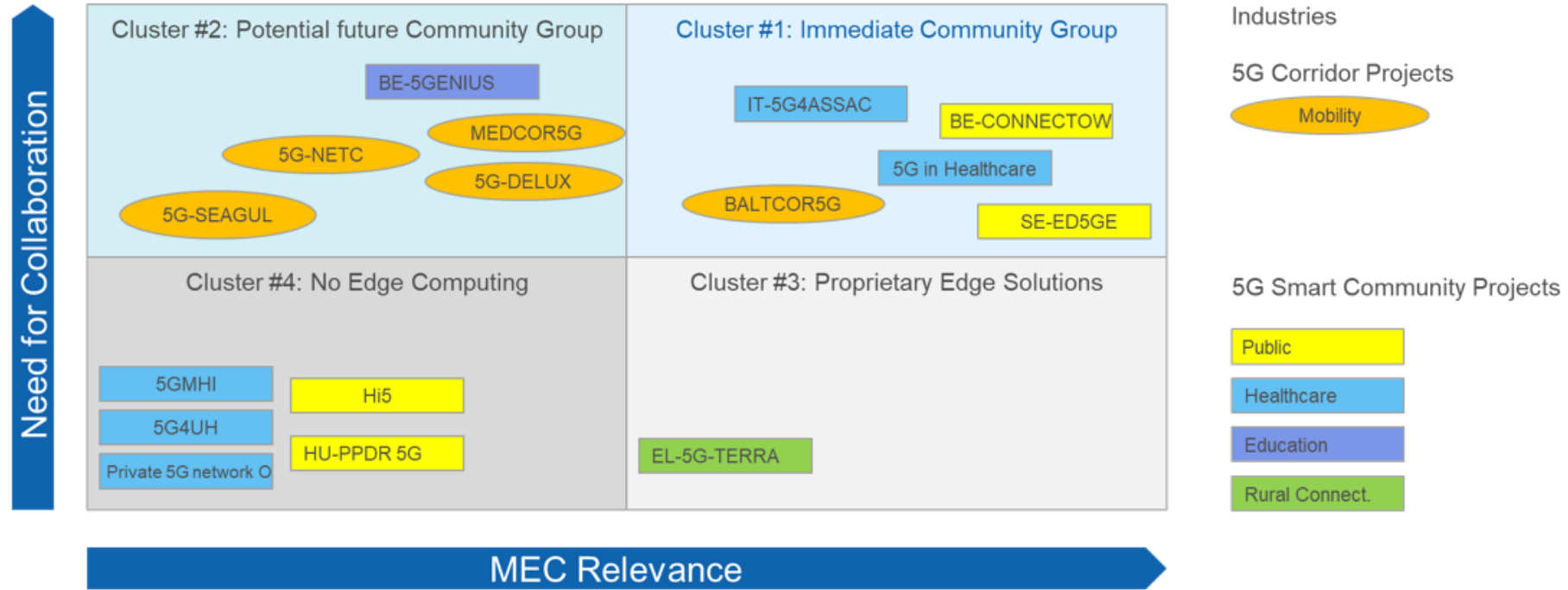
		On-device	On-premise	Cell Site/ Agg. Site	CO*/ Mini DC	In-Country DC
	MEC Host	Enterprise Edge	Enterprise Edge	Telco Edge	Telco Edge	--
	Edge Node	Constrained/ Smart Device Edge	On-Prem DC Edge	Access Edge	Regional Edge	Centralized Data Centers
<i>Edge Observatory</i>	Edge Node	Device Edge/ on-device	Micro Edge (small-/ micro-scale)	Far Edge (Medium Edge)	Near Edge (Medium Edge)	Metro Edge
	Edge Node	Thing/ device	System/ Networked System	Far Edge	Near Edge	Fog / Cloud
	Edge Node	Micro Edge, Deep Edge	Meta Edge	MEC	Far Edge	Cloud
<i>IPCEI CIS**</i>	Edge Node	On-device	On-premise	Far Edge	Near Edge	Regional Edge



\*IoT – Internet of Things, CO – Central Office  
 \*\*No official taxonomy has been released yet



# Evaluation of CEF projects regarding need for collaboration and MEC relevance



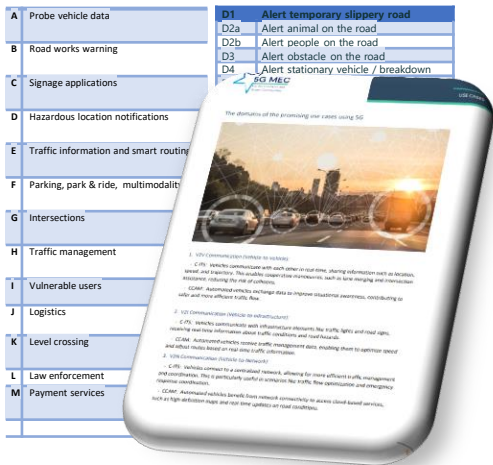
## Challenges:

- Long timing for deployment and high costs due to security constraints
- The gap between industry-driven use cases and the underlying architectures
- Need for local breakout in 5G network design
- Lack of end customers and clear business value



# We have made some updates to our core elements of the WP2

Relevant Deliverable: **Analysis Use Cases 5G CCAM** (Published soon)



155 use cases are identified and described, from various regional implementations, EU projects, studies, etc.

Strategic outreach via diverse communication channels



[www.5gmec4.eu](http://www.5gmec4.eu)

Feedback loops and constant review of the outreach KPIs



**The target is to create a strong network of 5G Corridors, 5G Smart Communities other Smart City stakeholders, disseminating project knowledge, and hosting events to share relevant information.**

# Let's talk about Edge!



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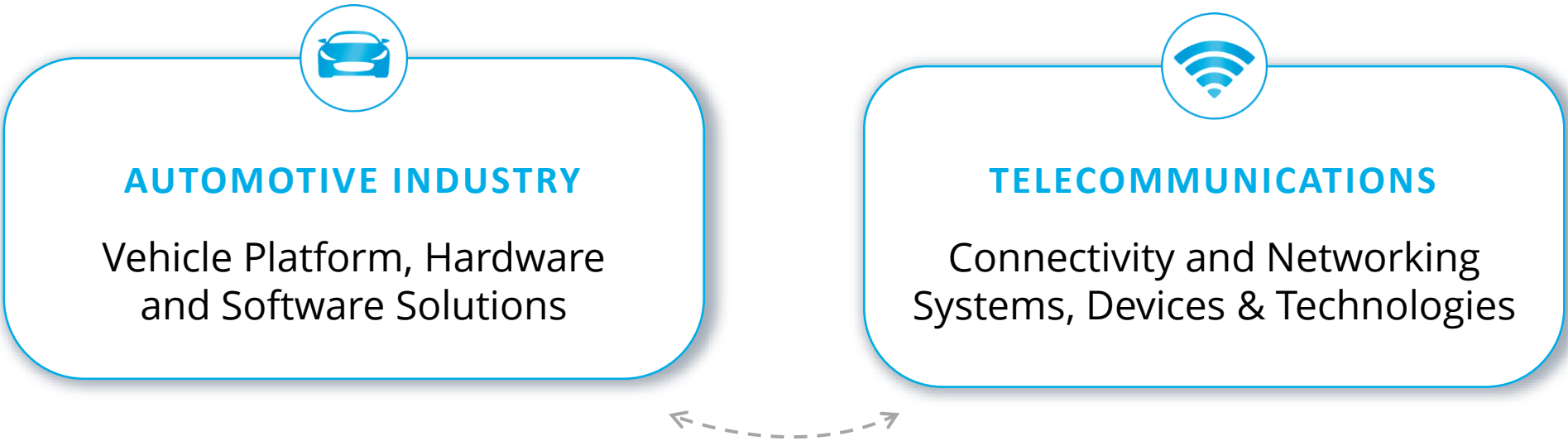
# Multi-Access Edge Computing in Automotive

Johannes Springer, Director General  
*GUIDE workshop, October 2024, Brussels*



# Connected mobility for people, vehicles and transport infrastructure

5GAA bridges the automotive and telecommunication industries in order to address society's connected mobility needs bringing inclusive access to smarter, safer and environmentally sustainable services and solutions, integrated into intelligent road transportation and traffic management.





# 5GAA: A Global Cross Industry Association

13 of the top 15 OEMs

9 of the top 10 MNOs

3 top smartphone vendors



Today, 5GAA unites **110+ members** from around the world working together on all aspects of C-V2X

In September 2016, **8 companies** teamed to create the 5G Automotive Association (5GAA) to help develop, test, and promote 5G standards



SEPT  
2016

2024

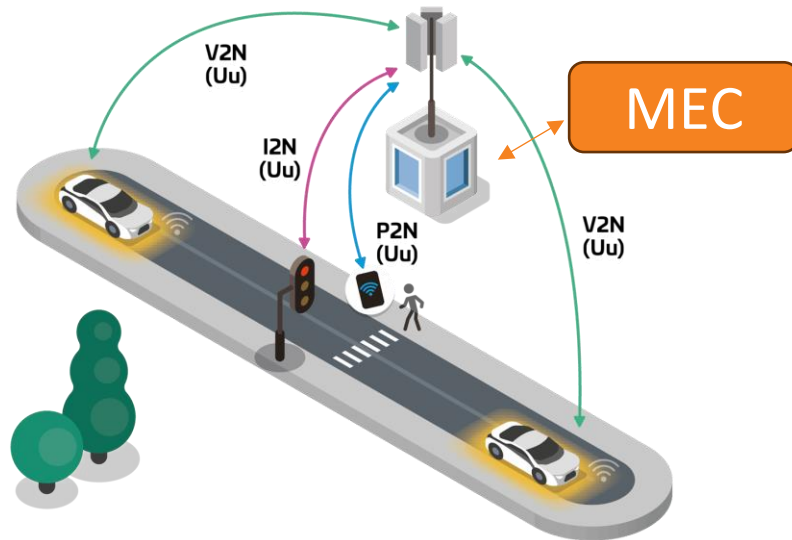


# C-V2X has two complementary communication modes

## C-V2X Mobile Network Communications (Uu)

V2N/I2N/P2N in licensed spectrum bands designated for mobile network communication

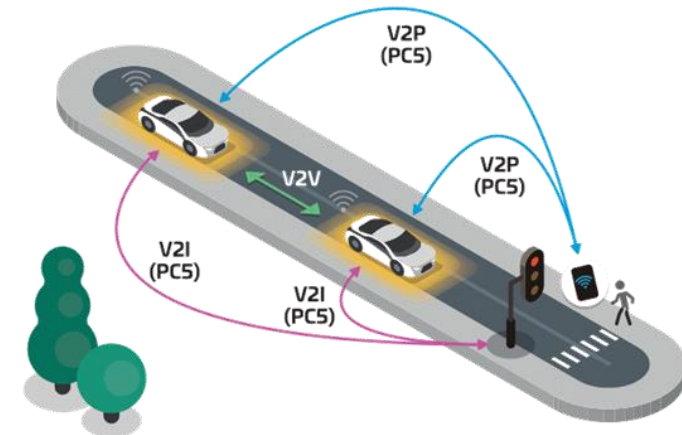
- ✓ Long range (>1 kilometer)
- ✓ Implemented over "Uu interface"



## C-V2X Direct Communications (PC5)

V2V, V2I, and V2P operating in ITS bands (e.g. 5.9 GHz) independent of cellular network

- ✓ Short range (<1 kilometer)
- ✓ Implemented over "PC5 interface"



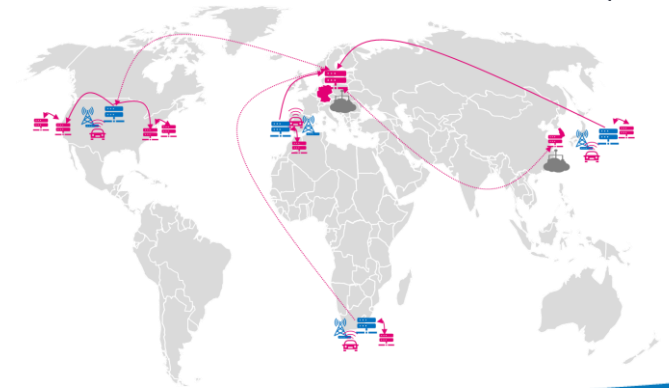
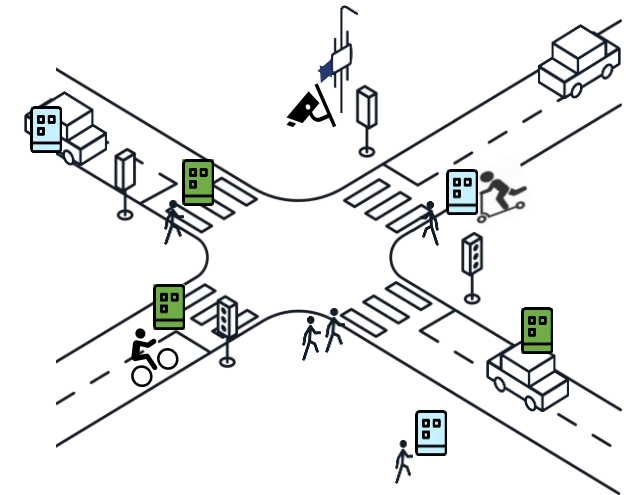
# 5GAA MEC workshop, Feb. 2018 (!!!), Munich approx. 150 participants from automotive and telecommunications



# Birth of MEC4Auto work item (aka project) series

Basic requirements from Automotive regards MEC operation:

- (1) Interworking between Mobile Network Operators in the same area
- (2) Global operational availability





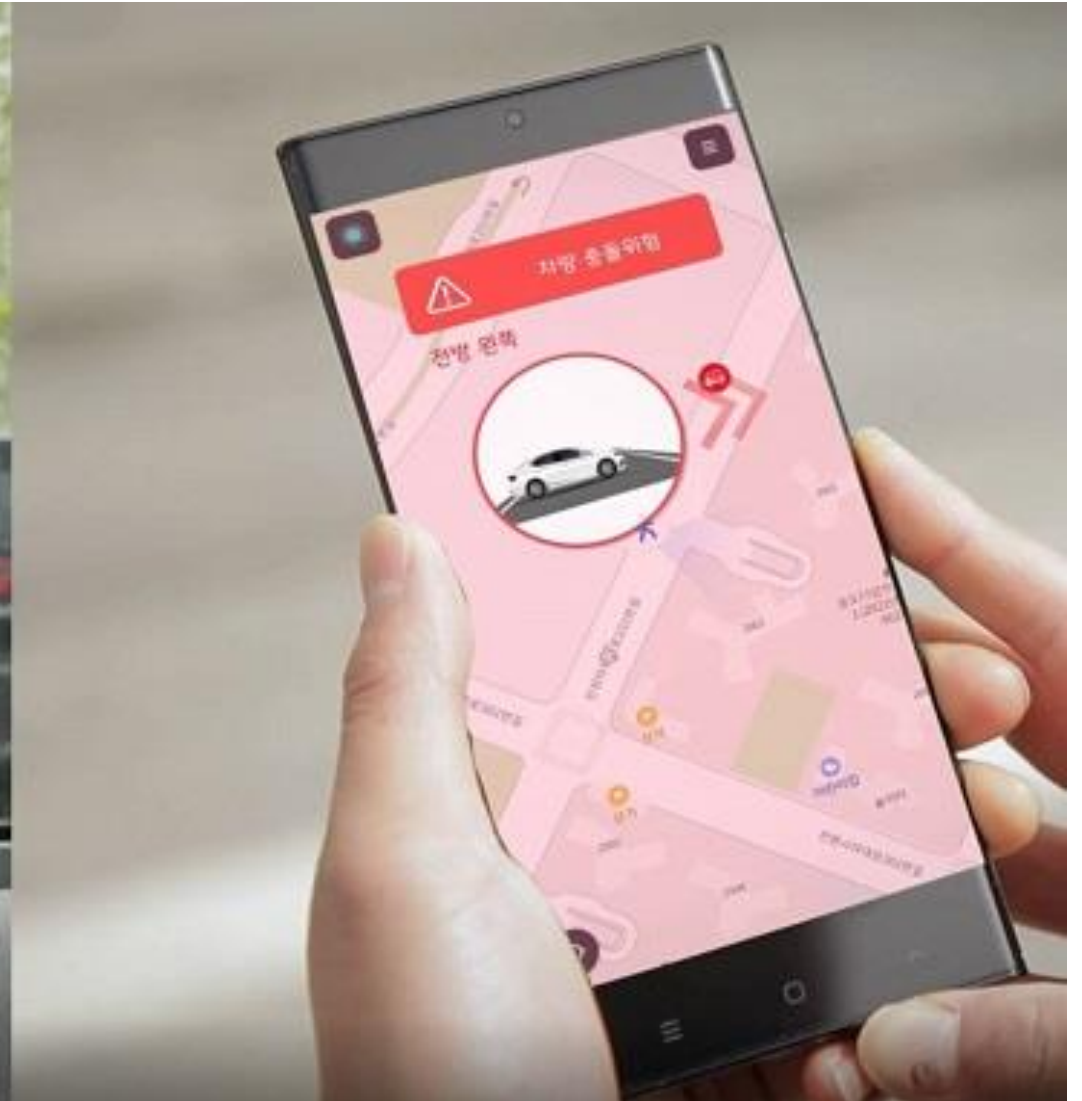
# Evaluation criteria of vehicle related use cases to be appropriate for MEC

Evaluation Criteria (examples):

- (1) CPU demand in the vehicle
- (2) Central Cloud operation capacities (incl. CPU demand), pre-processing possibilities in the MEC, incl. reduction of data transmission costs in backhaul
- (3) Demand for Data Transmission between vehicle and MEC, consumption of radio resources
- (4) Maintenance of the software function
- (5) Function is using data sources from various User Equipment / devices on the spot  
→ e.g. ITS (Intelligent Transportation Services)
- (6) Availability of the function
- (7) Data privacy, processing of personal data locally
- (8) .....

Note: the evaluation need be executed use case by use case

# Example: pedestrian crosswalk





# Example: Automated Valet Parking / Automated Plant Marshalling





# Expected Timelines for mass deployment of C-V2X use cases

MEC Relevance

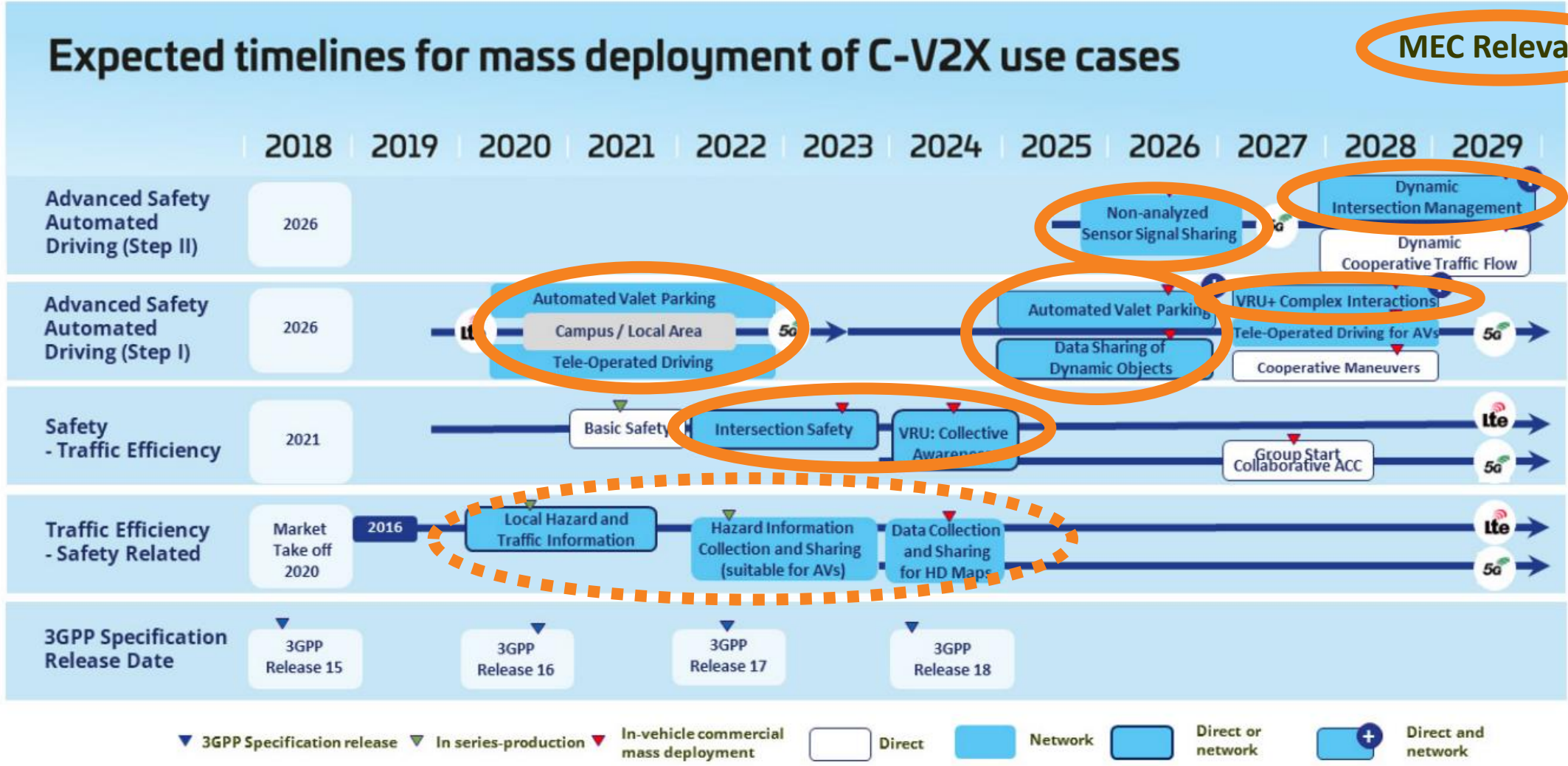


Figure 2: Expected timelines for mass deployment of C-V2X use cases

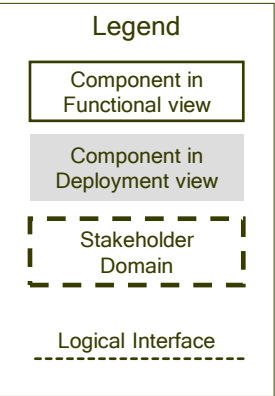
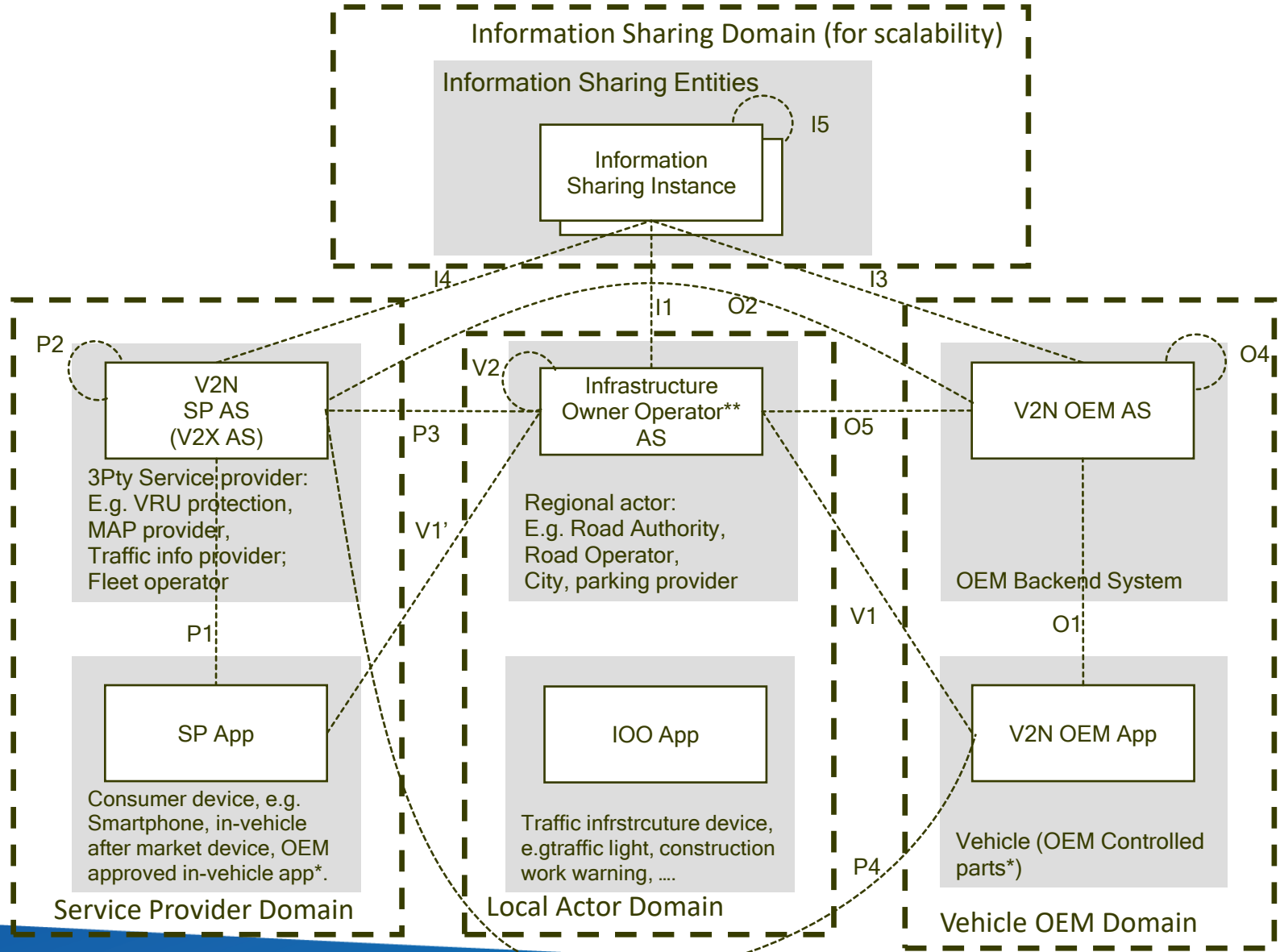


# Applied application architecture for V2N2X

Interfaces in this figure are all logical interfaces. The implementation details of each interface depends on the deployment options.

\* Details of “in-vehicle” implementation of services will be elaborated in the TR text.

\*\*Infrastructure Owner Operator (IOO) could for example be a city, a road authority, a road operator, or a parking provider





# MEC4Auto complexities: Interworking between mobile networks

## Inter-operability topic: Required Inter-OEM (V2N2V) MEC service

Config 3:  
 Only MNO A provides MEC App.  
 MNO B has inter-connect to MNO A.

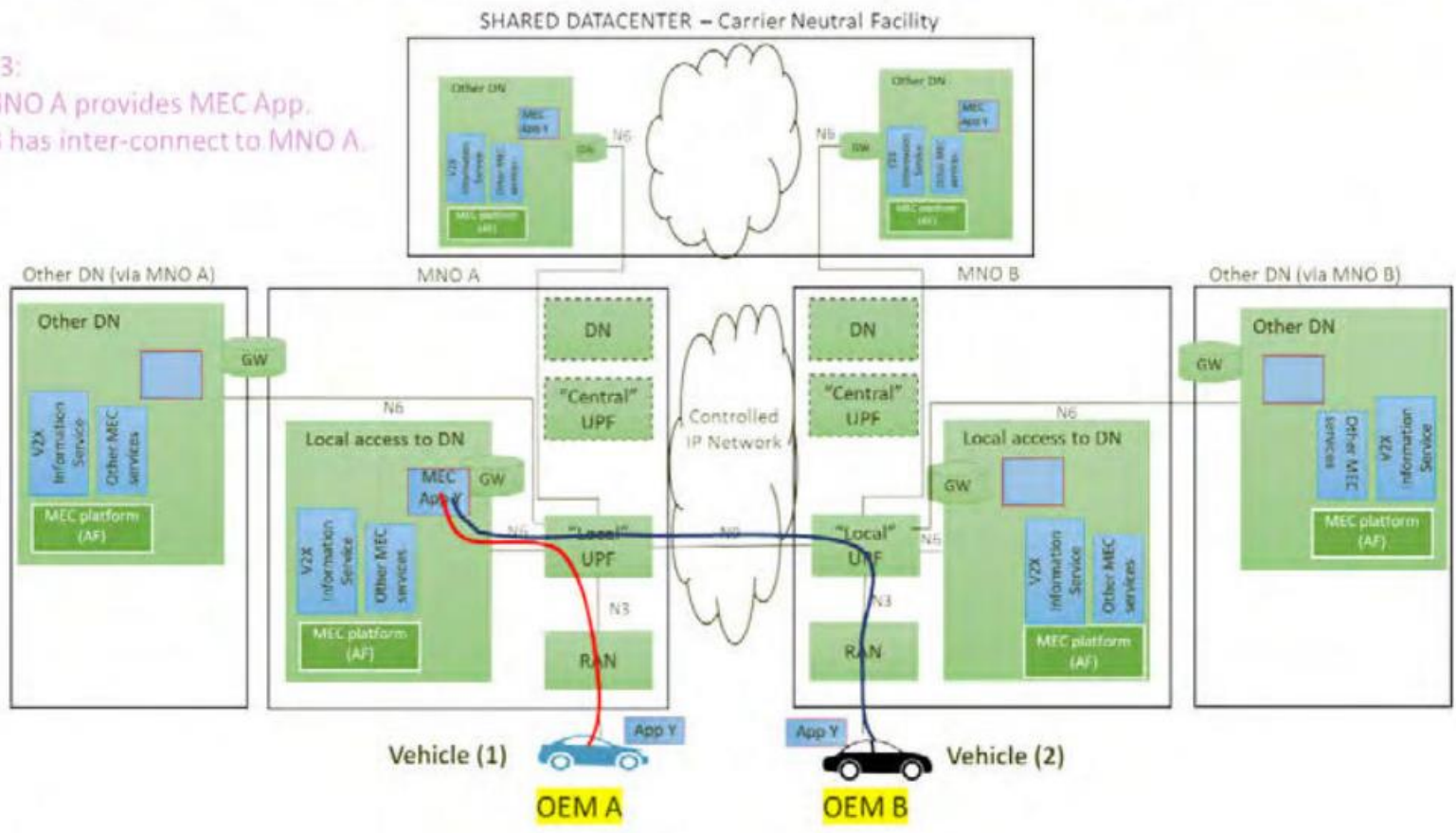


Figure 4.2.1.4-2: Interoperability of MEC, required inter-OEM MEC service

# 5GAA Face2Face Detroit, Oct. 2023

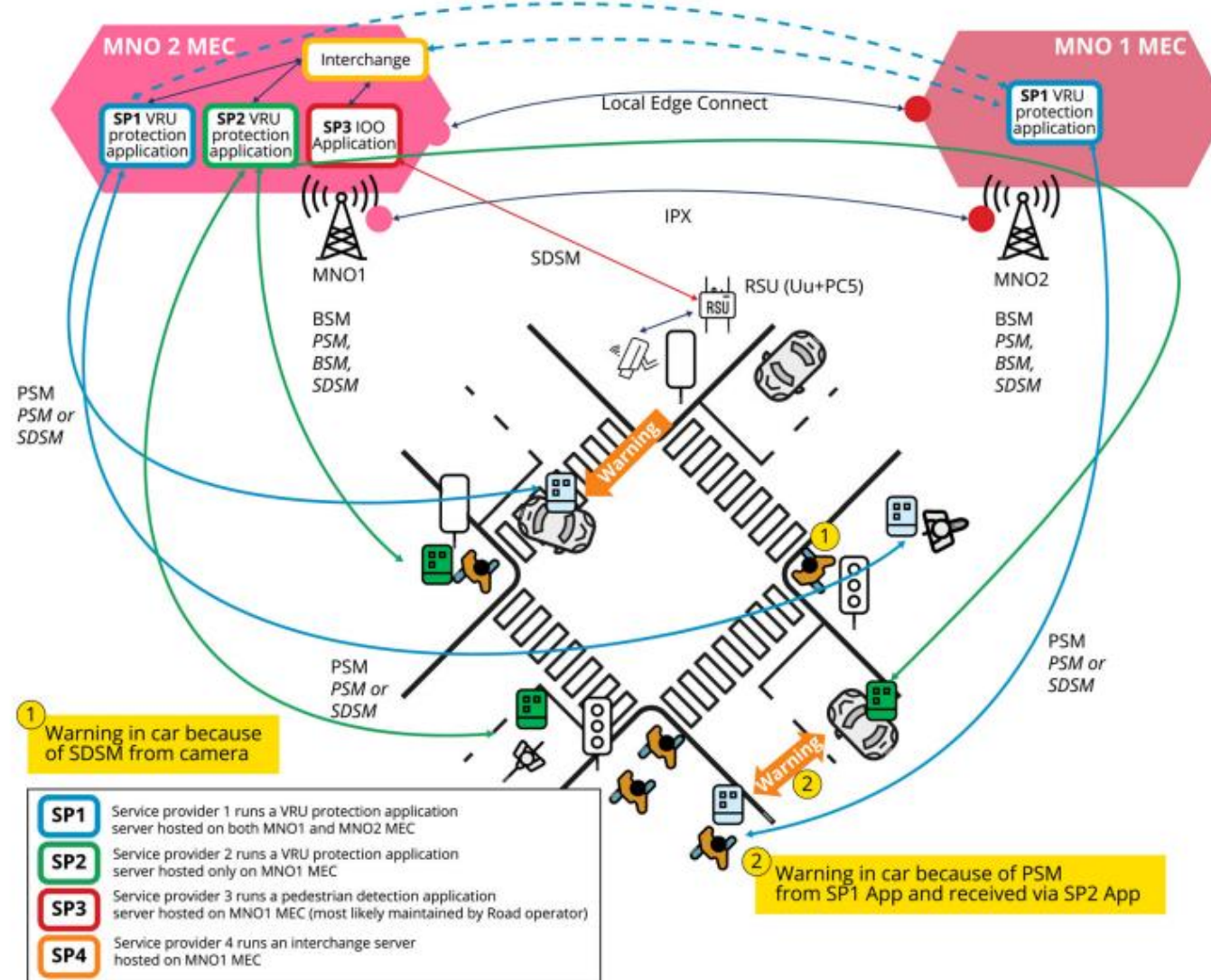
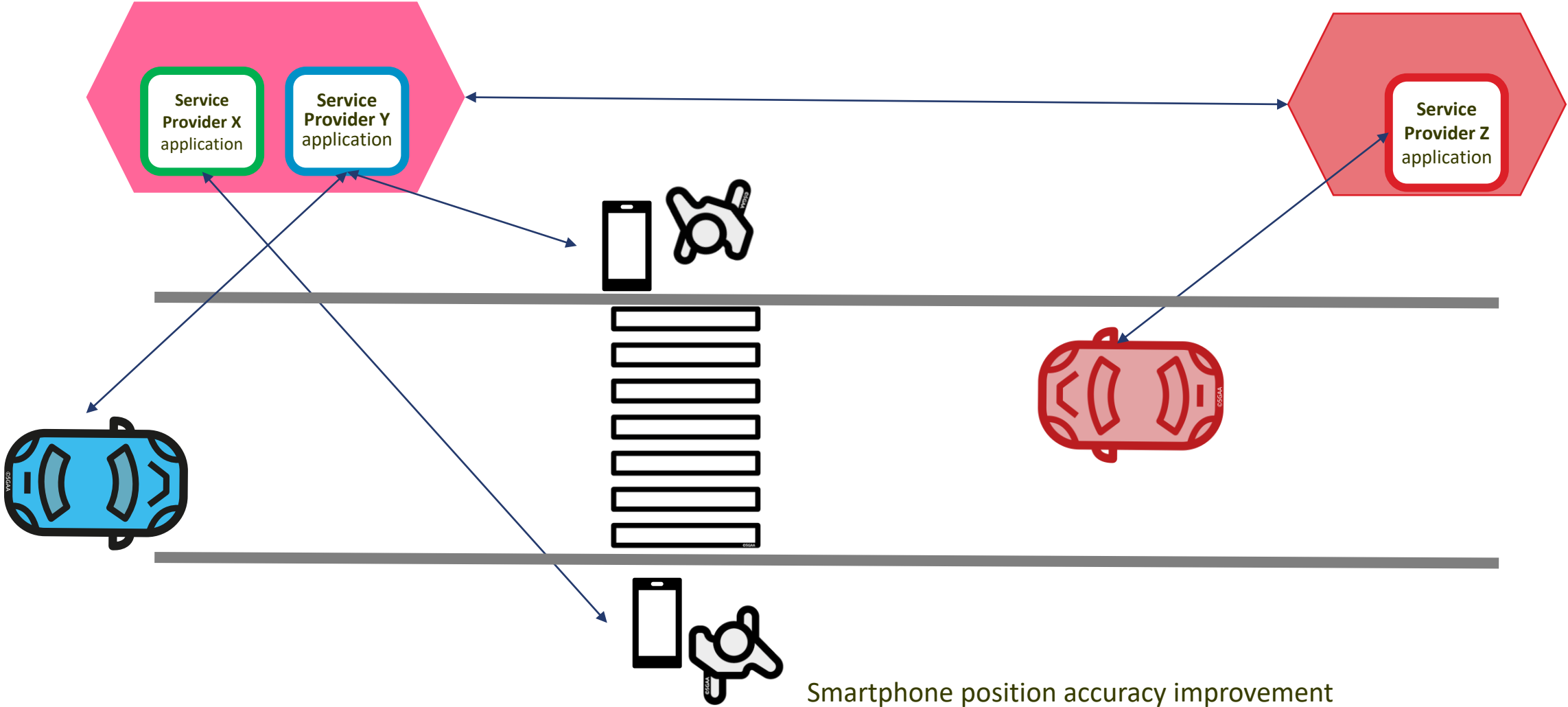


Figure 1: General System Setup



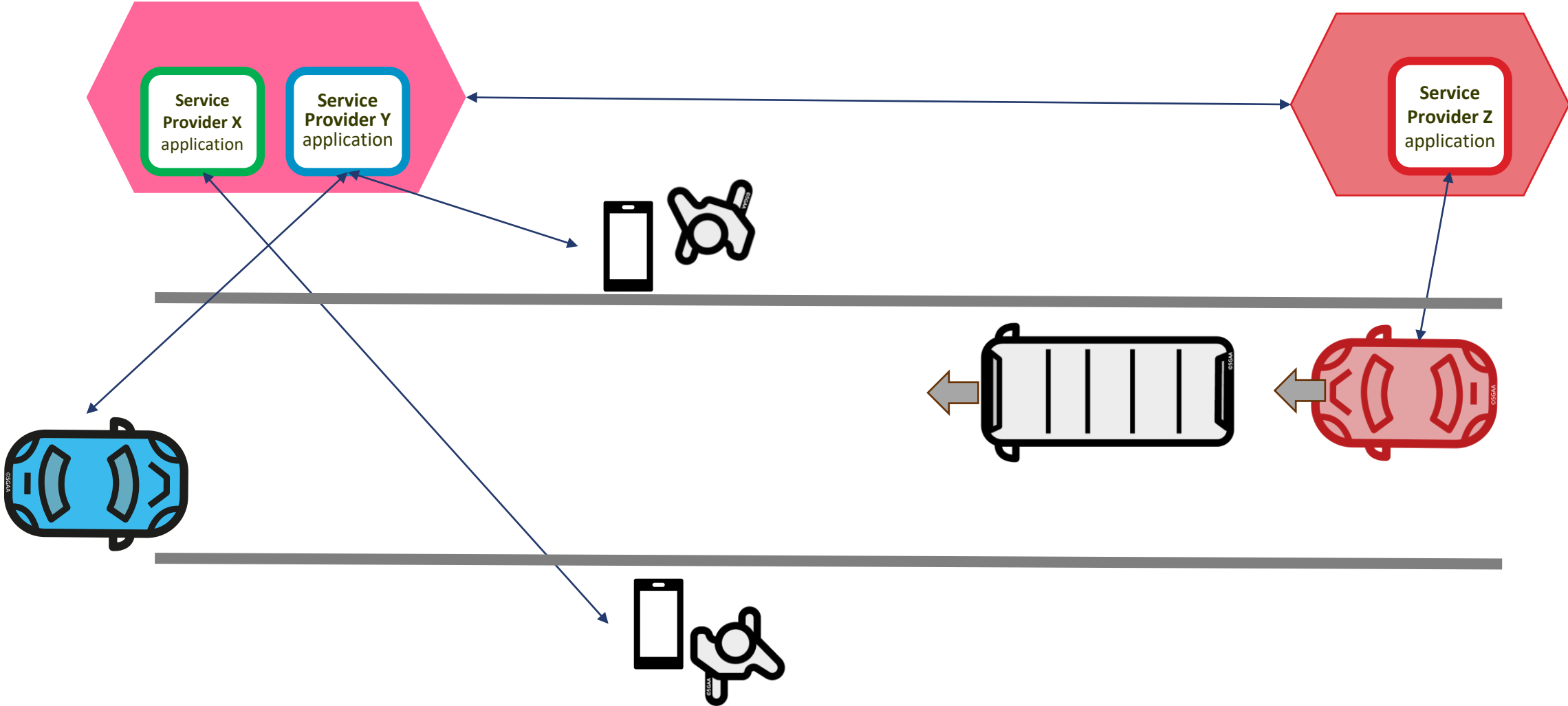


# Example: Pedestrian crosswalk



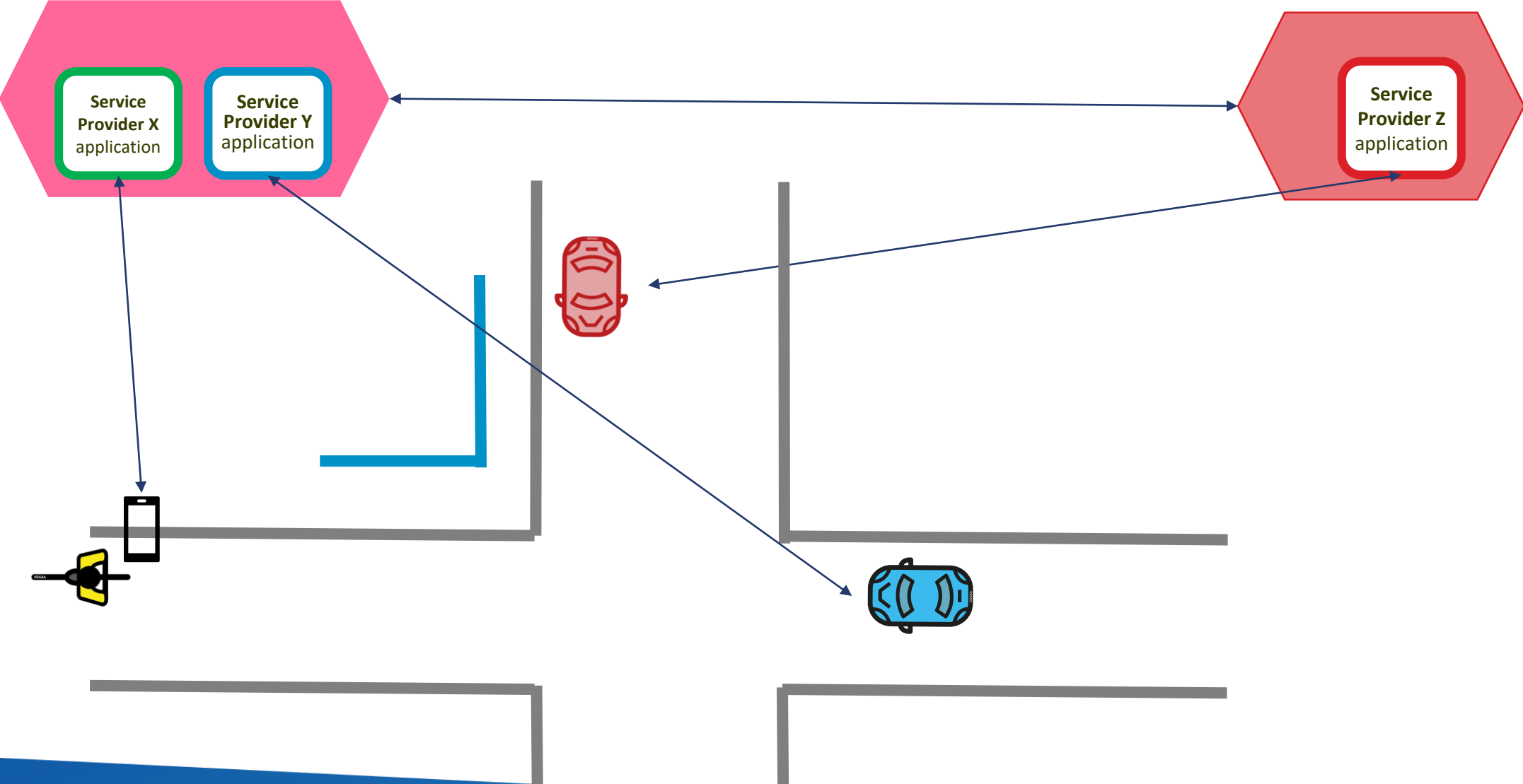
Smartphone position accuracy improvement by e.g. GNSS dual frequency, precise positioning, ....

# Example: Pedestrian jaywalking

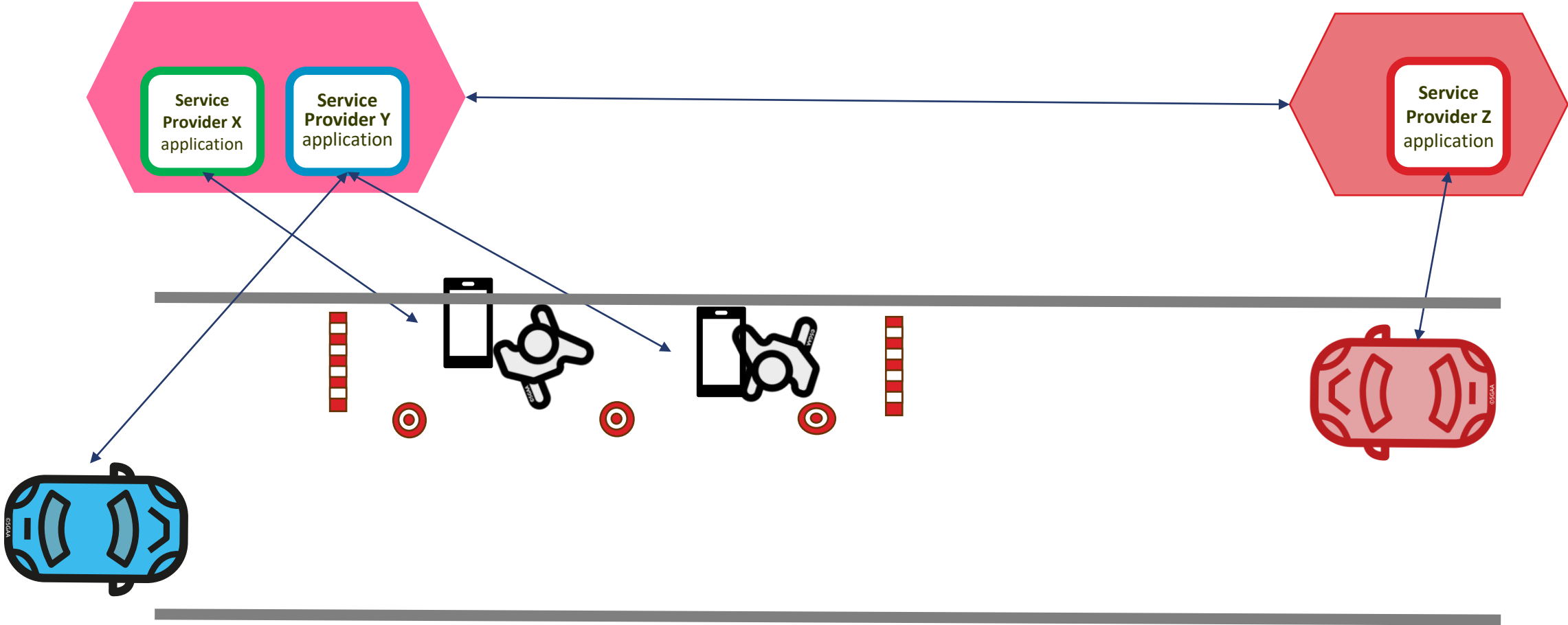




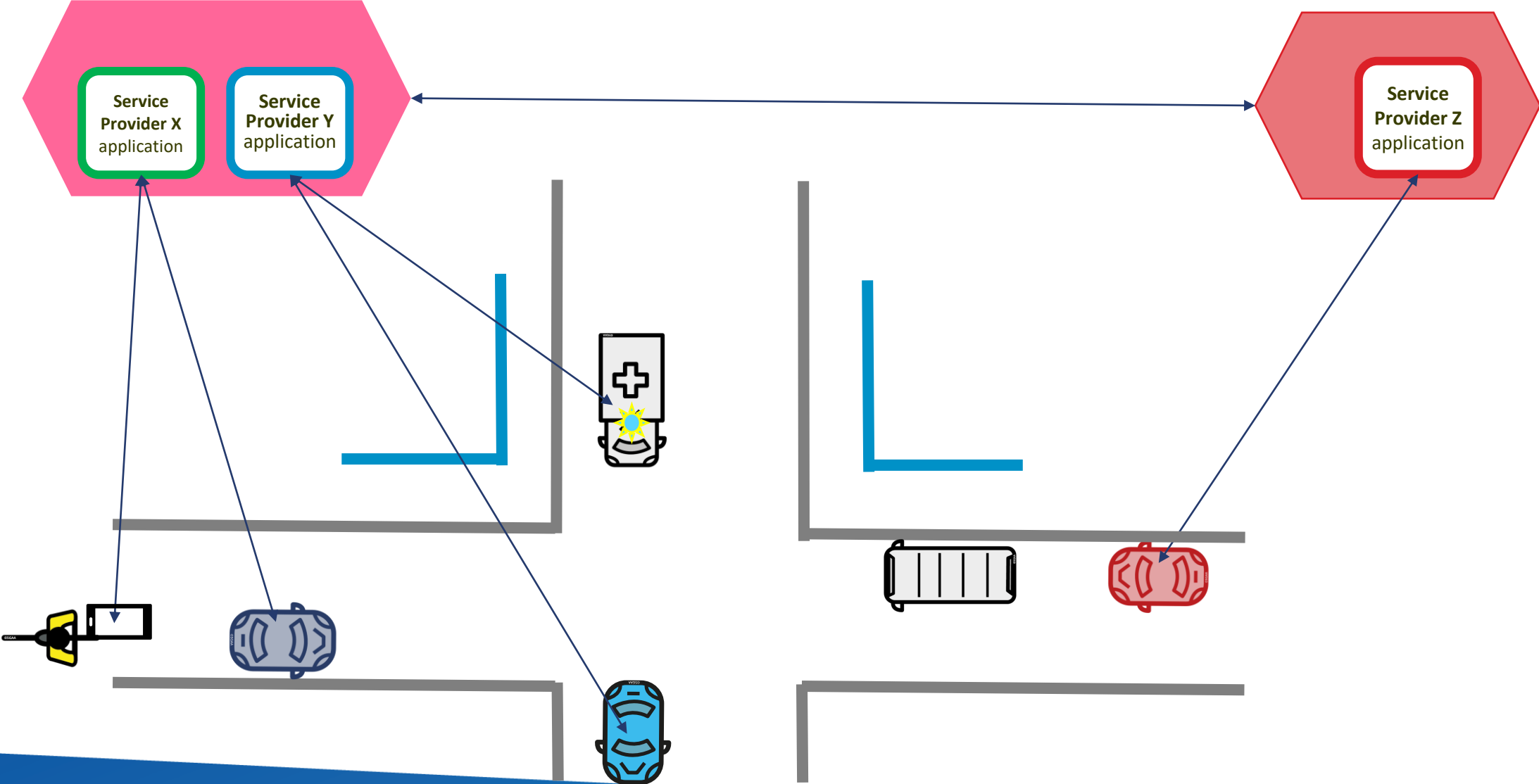
# Example: Bicycle approaching



# Example: Roadwalkers Presence



# Example: Emergency vehicle approaching



## Further Requirements (Examples)

### → MEC availability

MEC is relevant for latency sensitive applications

→ MEC availability is key

Root causes for loosing connectivity to a MEC (beside white spots):

(1) Border crossing

→ Service continuity when crossing the border / switching from one MNO to another

(2) Network congestion

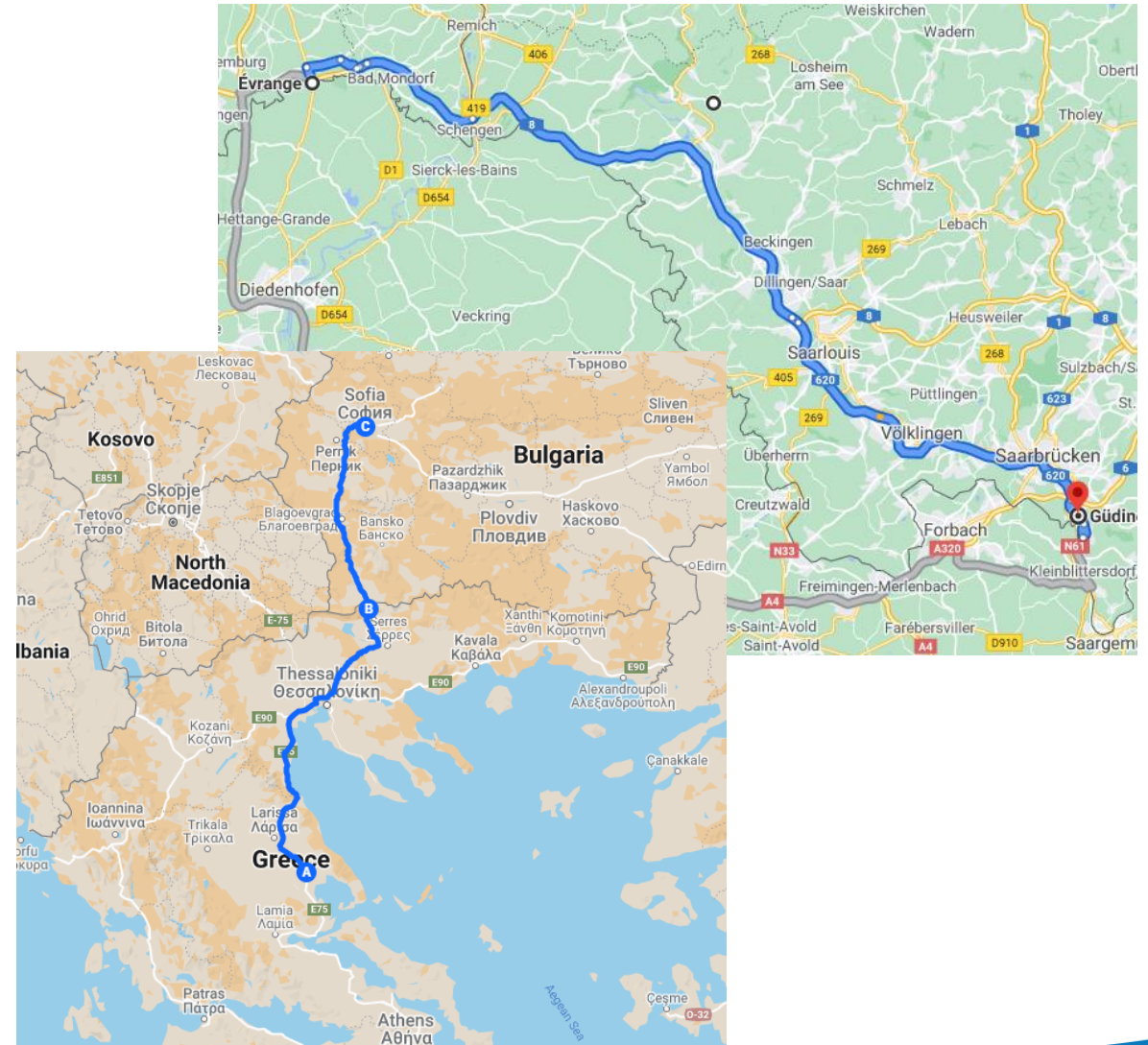
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# Examples: Cross-Border Germany – Luxembourg / Greece - Bulgaria

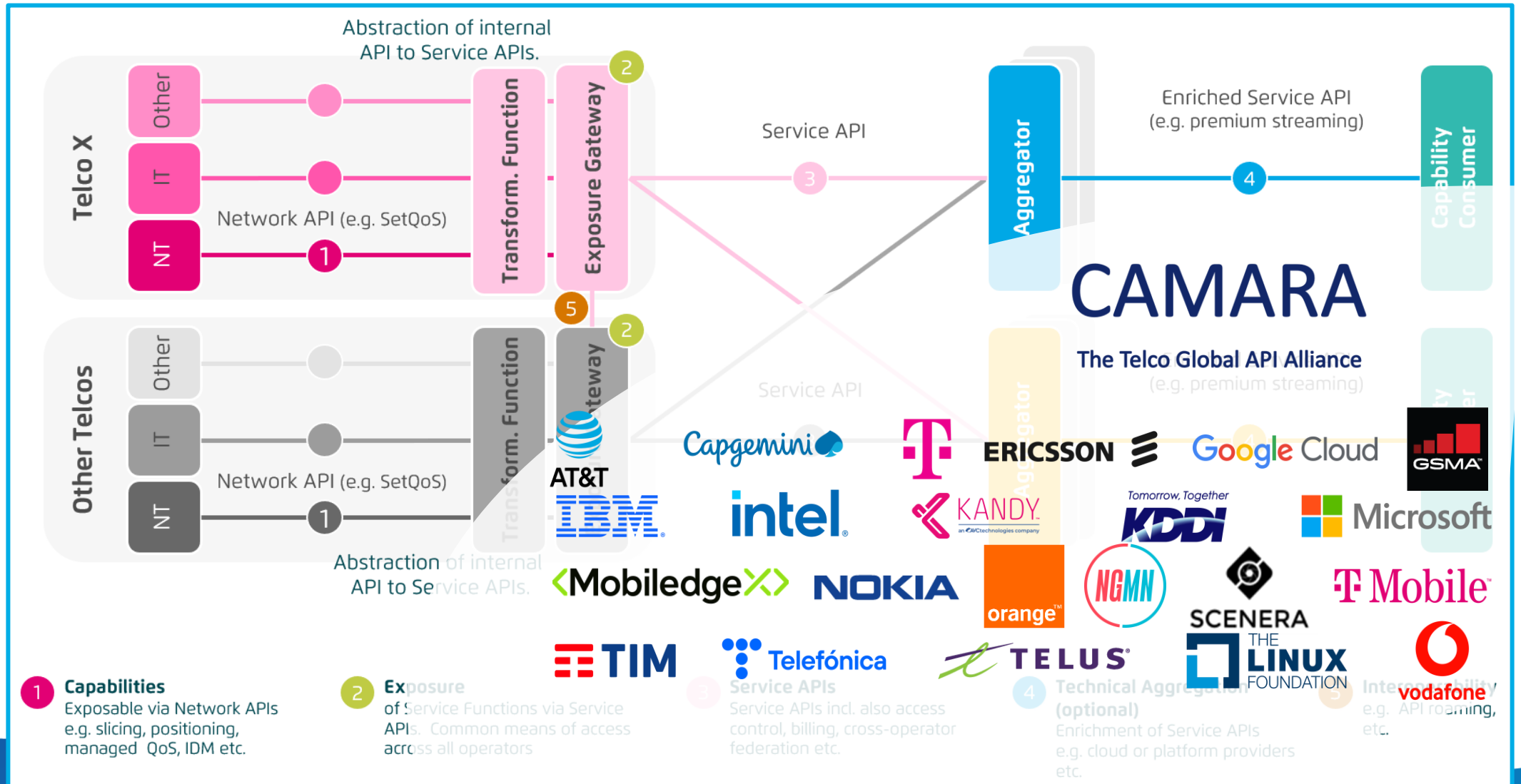
Objective: Seamless Mobility in cross-border driving between different Mobile Network Operators

- Previous project/s: 5GCroCo, 5GCarmen
- Deployment projects: 5GDeLux, 5GSeagull
- Stakeholders:
  - Mobile Network Operators: Telekom Germany, Poste Luxembourg, Cosmote, A1 Bulgaria
  - OEMs: BMW, et al.
- CEF2Digital Early Wave (works)
- Remarks: shall be used as a blue-print also for other cross-border seamless mobility

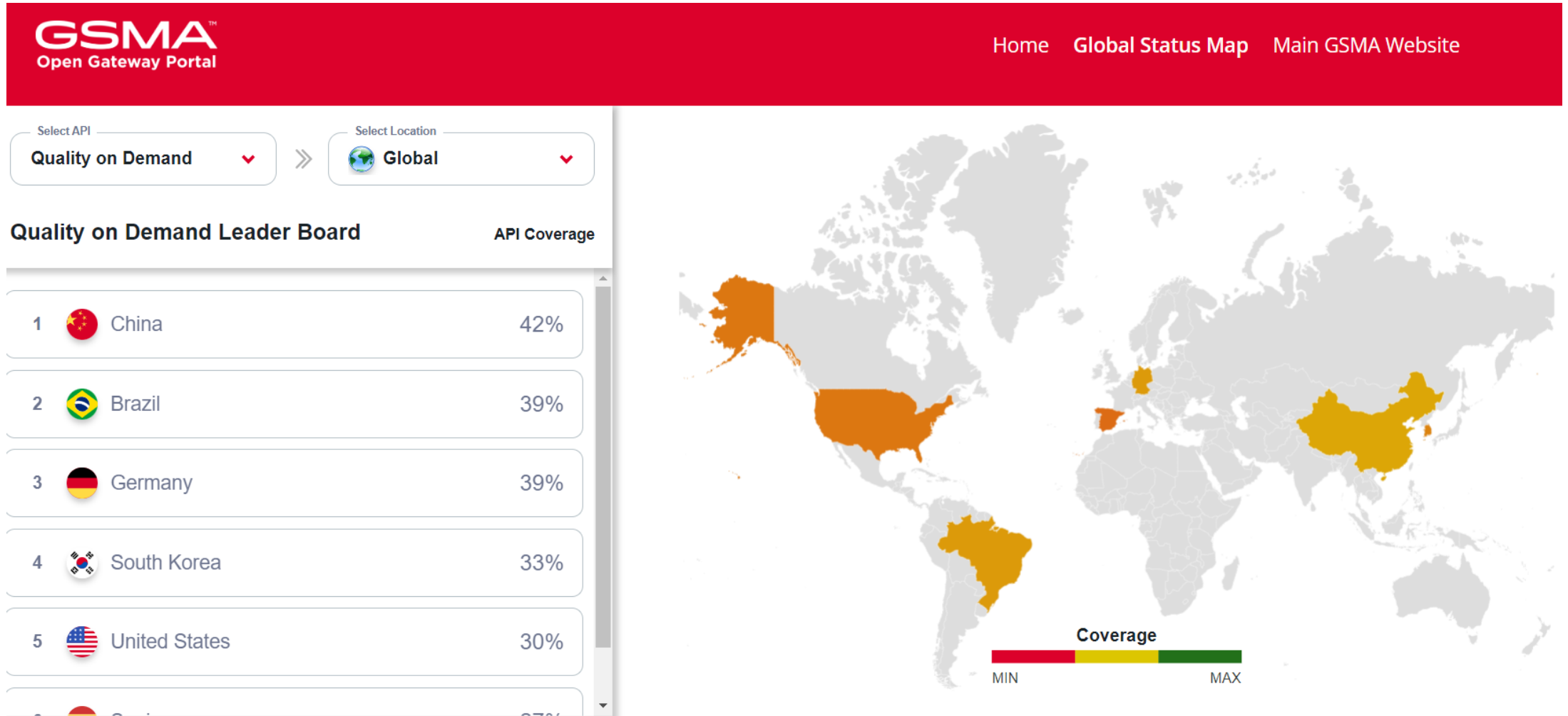


# Increasing service resilience

## Network API's: exposure in a global world



# Network API: Quality on Demand





Thank You !

Learn more at [WWW.5GAA.ORG](http://WWW.5GAA.ORG)