COLLABORATIVE INNOVATION DAY
4th October 2022 | Virtual Event

5G-Loginnov Project

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ORGANIZED BY:

5GLOGINNOV

alice | Alliance for Logistics Innovation through Collaboration in Europe

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CONTENTS

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1

1. 5G - Loginnov

Connected Logistics and
Mobile Communication

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5G LOGINNOV –

Use cases in living labs

UC8/9: 5G-LOGINNOV Floating Truck and Emission Data (FTED)

UC10: **5G-LOGINNOV 5G GLOSA and Automated Truck Platooning** (GTP) under 5G-LOGINNOV Green initiative

UC11: 5G-LOGINNOV dynamic control loop for environment sensitive traffic management actions (DCET)

UC3: Optimal selection of yard trucks

- Installation of a 5G access point on yard trucks
- 5G latency, precise localization services, etc.

UC4: surveillance cameras / video analytics

- Installation of connected 4K surveillance cameras
- AI/ML solution for container seal presence, human presence detection, social distancing etc.

UC7: Predictive Maintenance

- 5G access point installed on yard vehicles
- AP will collect and forward in real time with low latency telemetry data over the 5G network

UC1: **port control, logistics and remote automation**

UC2: business critical and mission critical communications

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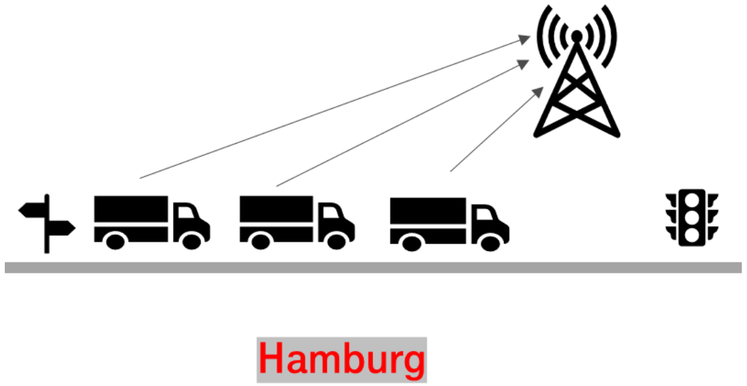
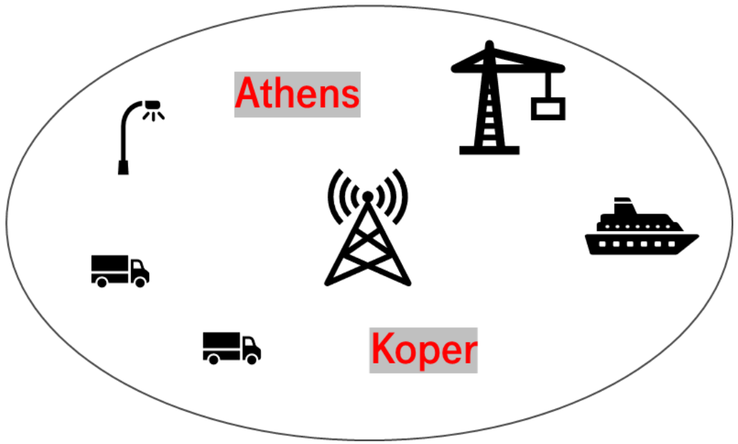
4

5G LOGINNOV –

Use cases in living labs



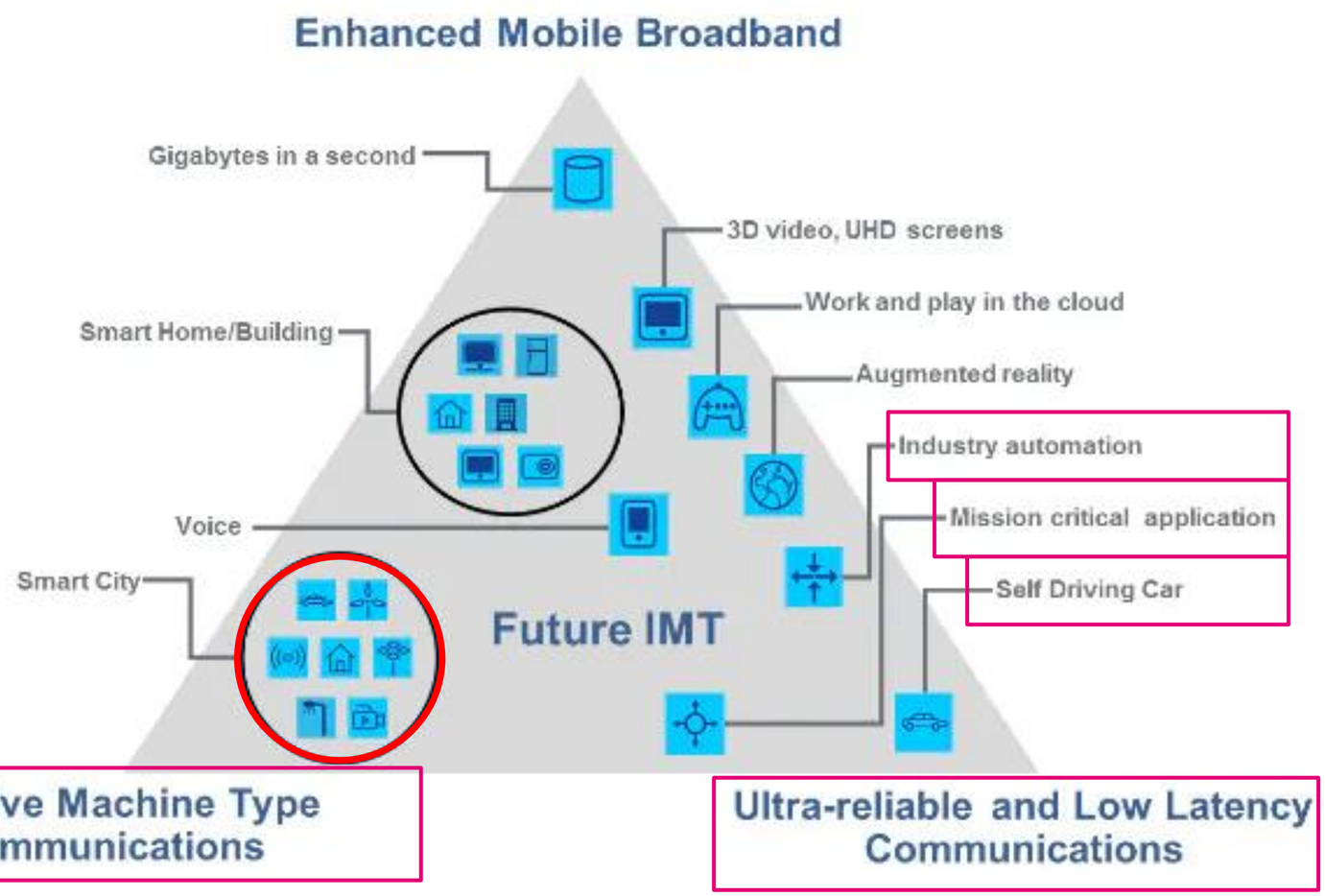


5G enabled Automation

a) **Inside the port (yard logistics)**

b) **Outside the port (Hinterland connection)**

5G ASPECTS COVERED IN 5G-LOGINNOV

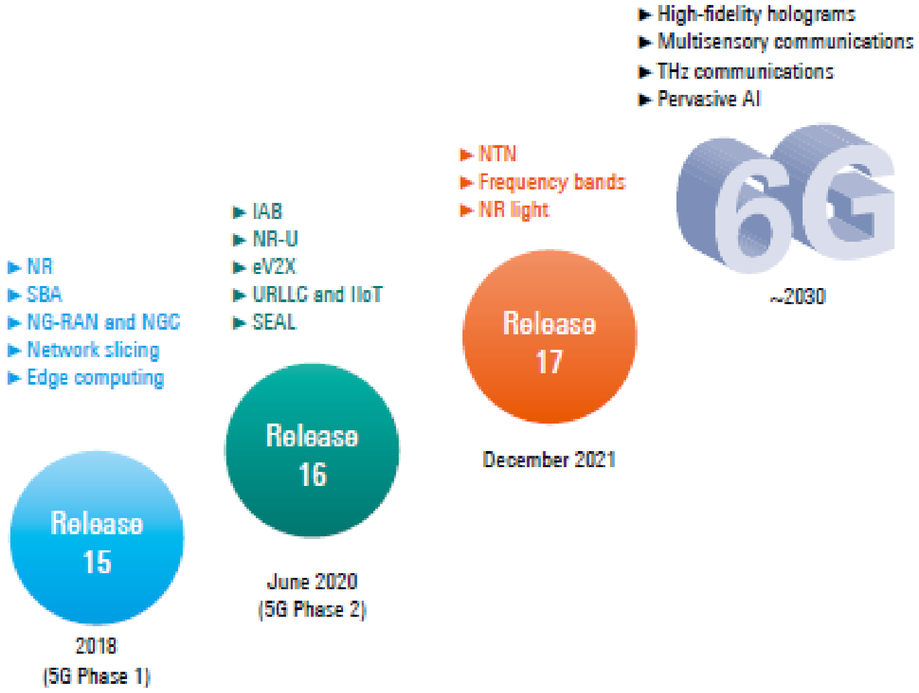


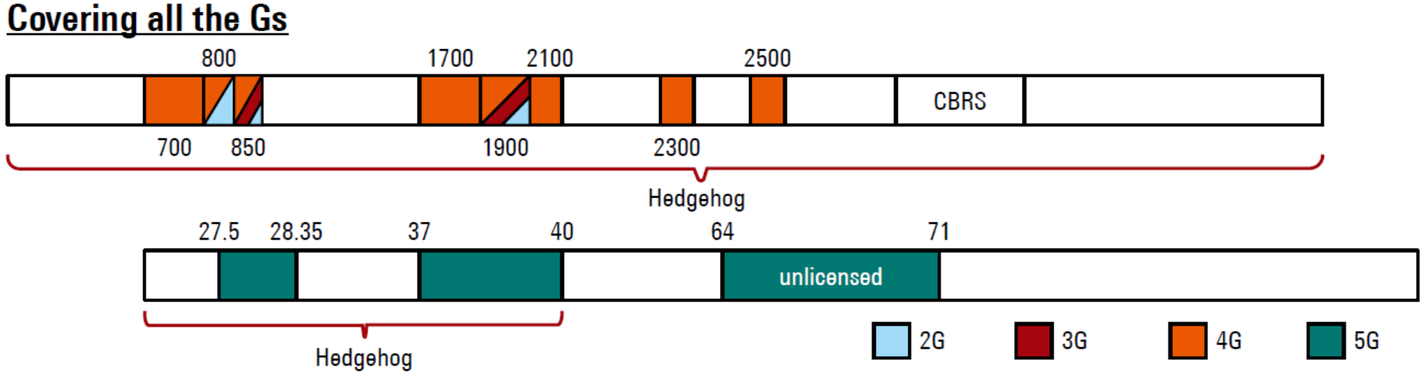
5G enabled Precise Positioning, MEC

Real-time tracking & enhanced visibility

Requirements for Vehicles platooning: <25ms cellular V2X /V2V

Trends of Next Releases R16, R17 and beyond





5G-Loginnov Elements covered by 5G

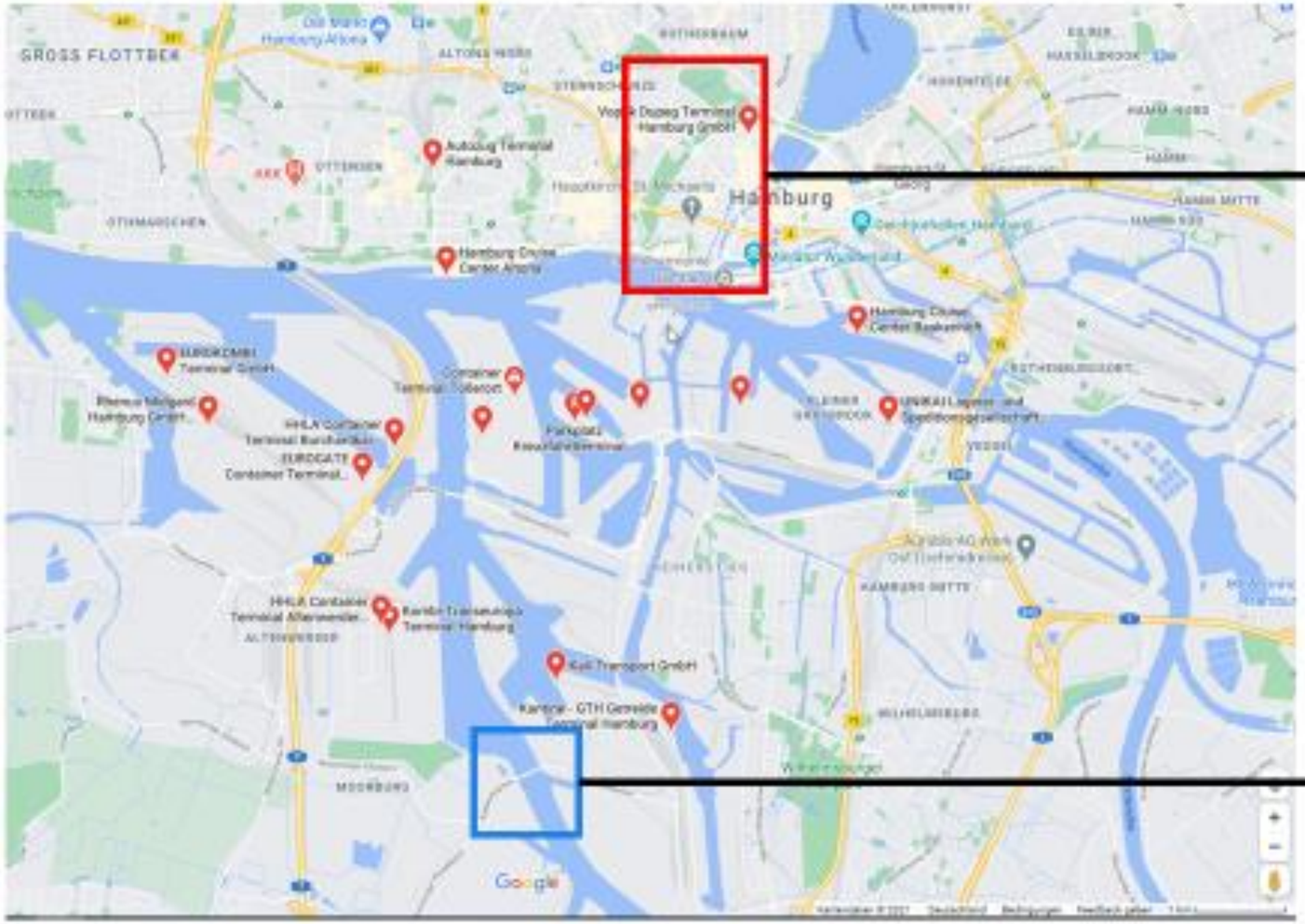
(uRLCC) Edge Computing & Collission Alerts
(MEC) CCAM and vehicle platooning
(MEC) Floating Truck Emission Data
(mMTC) Sustainable Traffic Management

2

Hamburg I.T.S. (TAVF + HPA)

Hamburg I.T.S. Policy

LL Hamburg => TAVF & Kattwyk



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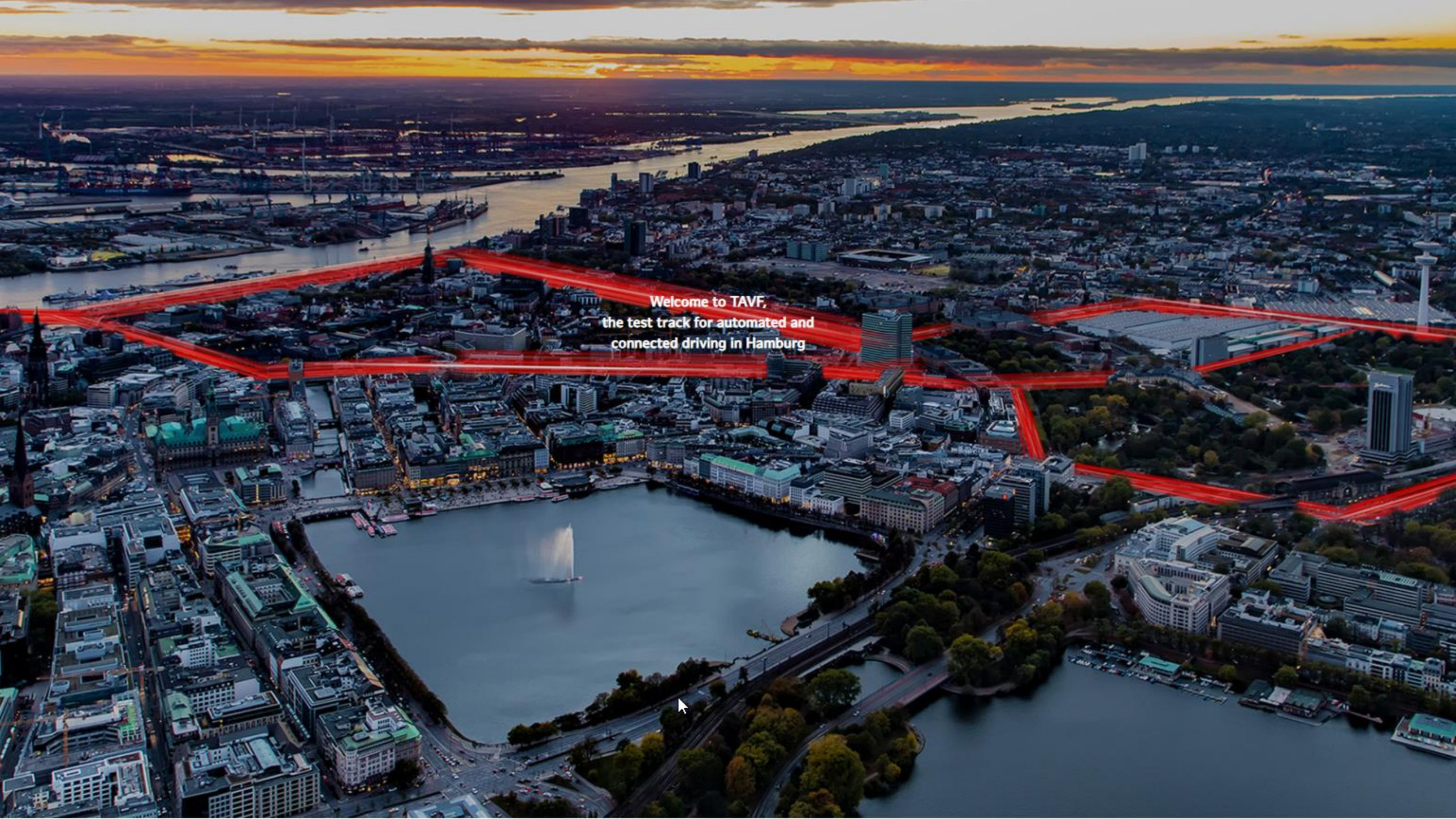
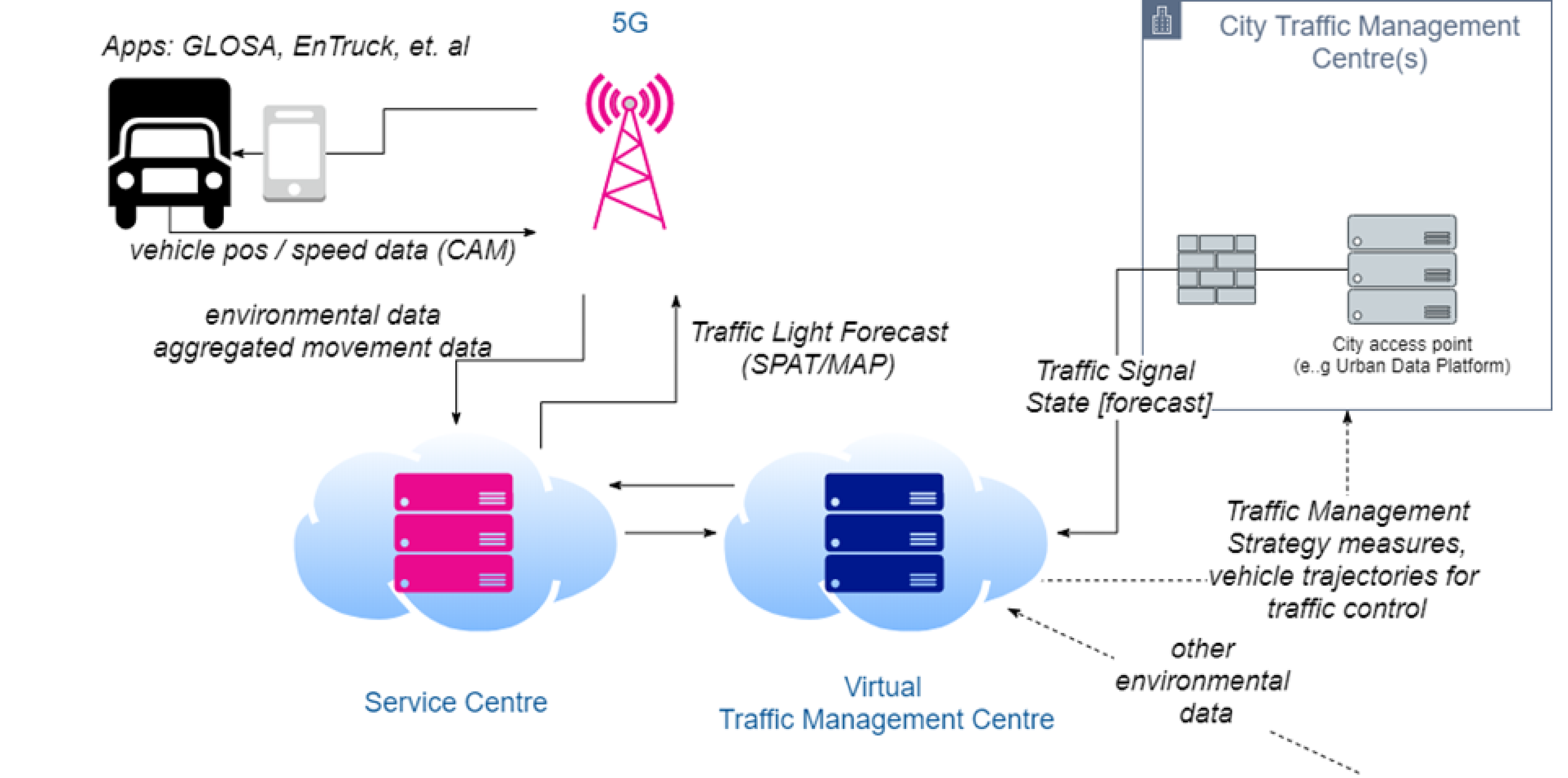

Welcome to TAVF,
the test track for automated and
connected driving in Hamburg



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How does it work?

RSU: Roadside Unit
I2N: Infrastructure to Network
CAM: Cooperative Awareness Message
DENM: Decentralized Environmental Notification Message
SPAT: Signal Phase and Time
MAP: Topology Information of the intersection (ISO TS 19091 / SAE J2735)

MECs: Hamburg

RSU

TMC HH

I2N (Uu)

I2N

SPAT / MAP
(uplink only)

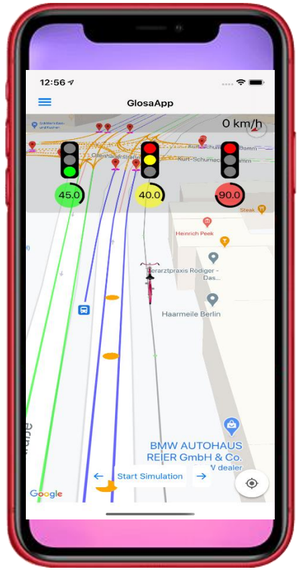
ITS SERVER
(→ MOBILE EDGE INFRASTRUCTURE OF DEUTSCHE TELEKOM)

CAM
Position
Heading
Speed

GLOSA: Green Light Optimal Speed Advisory
(a) informational service = user has to react, user reaction time 500ms
(b) automated driving = latency critical

Collision Warning
(a) collsion warning service = user has to react, user reaction time = latency critical
(b) Cellular V2X, V2V < 25 ms

APP(S)



- Bicycles / eBikes
- Motorbikes
- Pedestrians
- Trucks (ATP)

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3

uRLLC - Collisions Alerts

About Low Tech and High Tec Telematics

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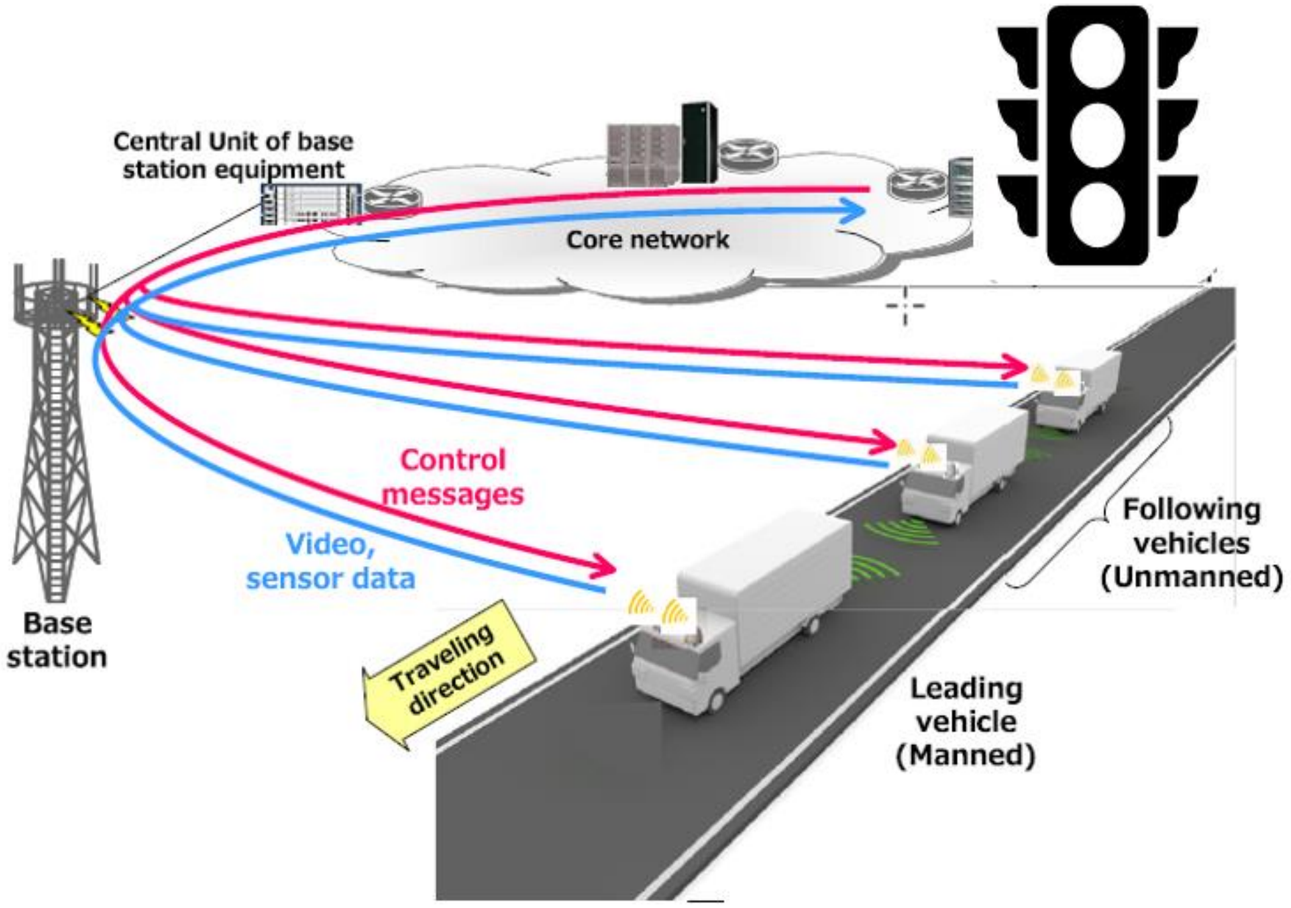
Use Cases planned for Living Lab Hamburg

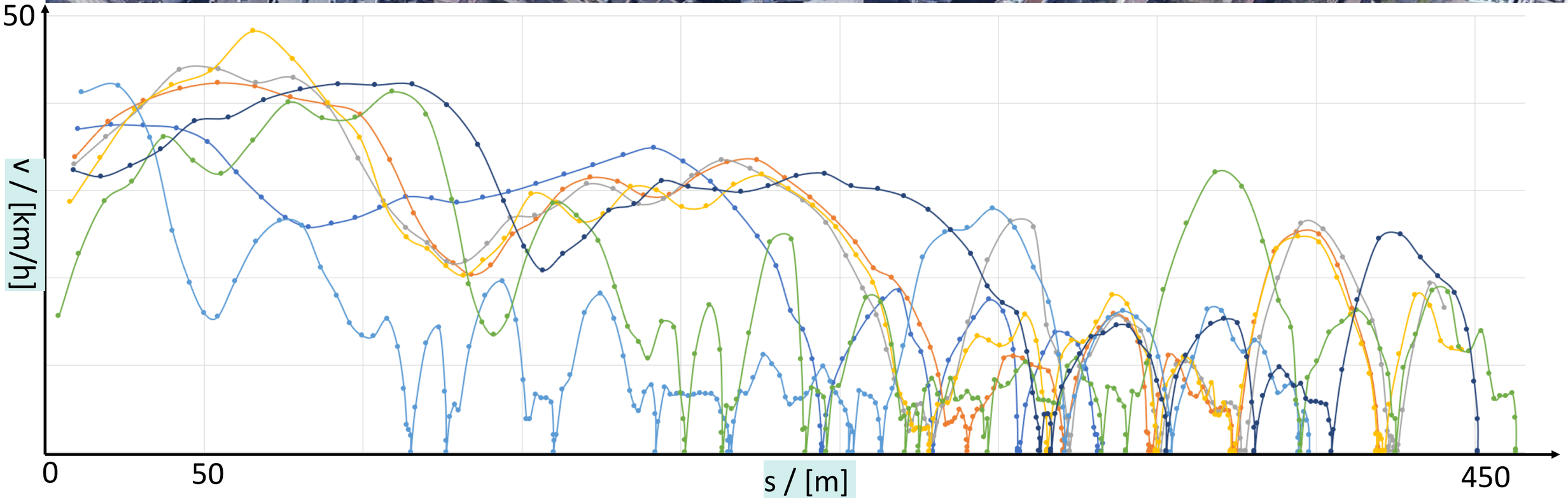


UC8/9	UC10	UC11

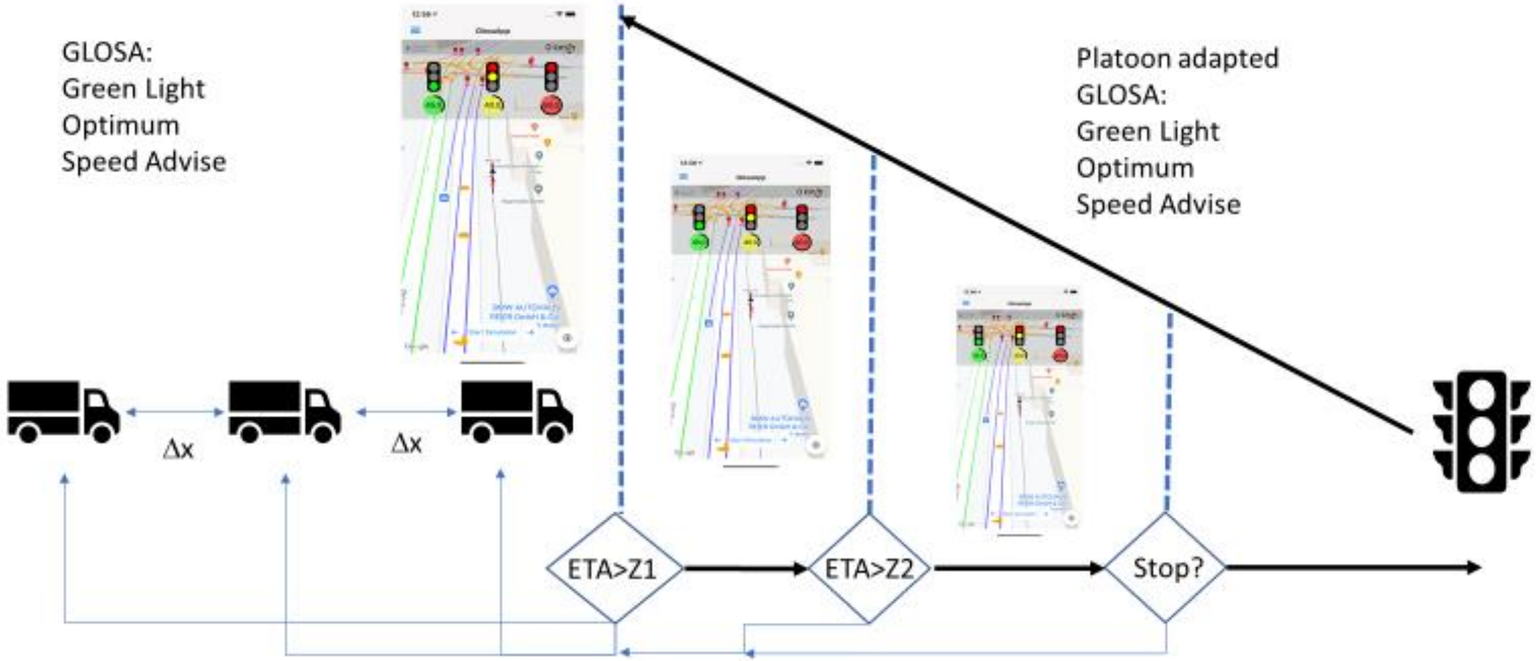
FTED by LCMM, ISO/DIS-23795-1, TLF			4G/LTE
5G-Smartphones	enTruck	Conti-IoT	4G/LTE
ATP-GLOSA by 5G V2X and V2V			5G only
MEC	Precise Positioning	uRLLC	5G only
	On-board Video	eMMB	5G only

Public 5G System / MEC Server	5G only

Vehicle platooning in TAVF



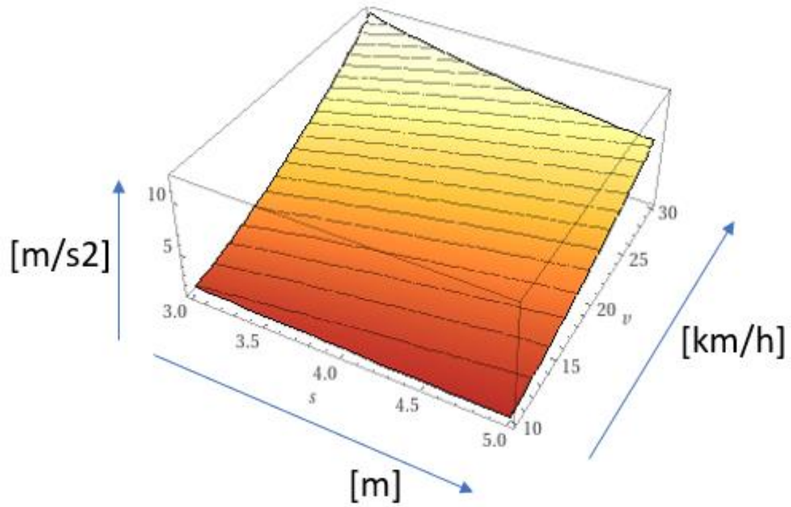
Urban Platooning and Collision Alerts (uRLLC)



ETA: estimated time of arrival / Z: threshold trigger to stop Truck Platoon

plot $b = v \times 0.025 + 0.5 \times \frac{v^2}{3.6 \times 3.6\, s}$ $s = 3$ to 5; $v = 10$ to 30

3D plot:



Communication scenario		Payload (Bytes)	Tx rate (messages per second)	E2E latency (ms)	Reliability (%)	Data rate (Mbps)	Min range (m)
Scenario	Degree						
Cooperative driving for vehicle platooning	Lowest degree of automation	300–400	30	25	90		
Information exchange between a group of UEs supporting V2X application.	Low degree of automation	6500	50	20			350
	Highest degree of automation	50–1200	30	10	99.99		80

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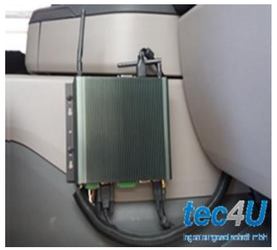
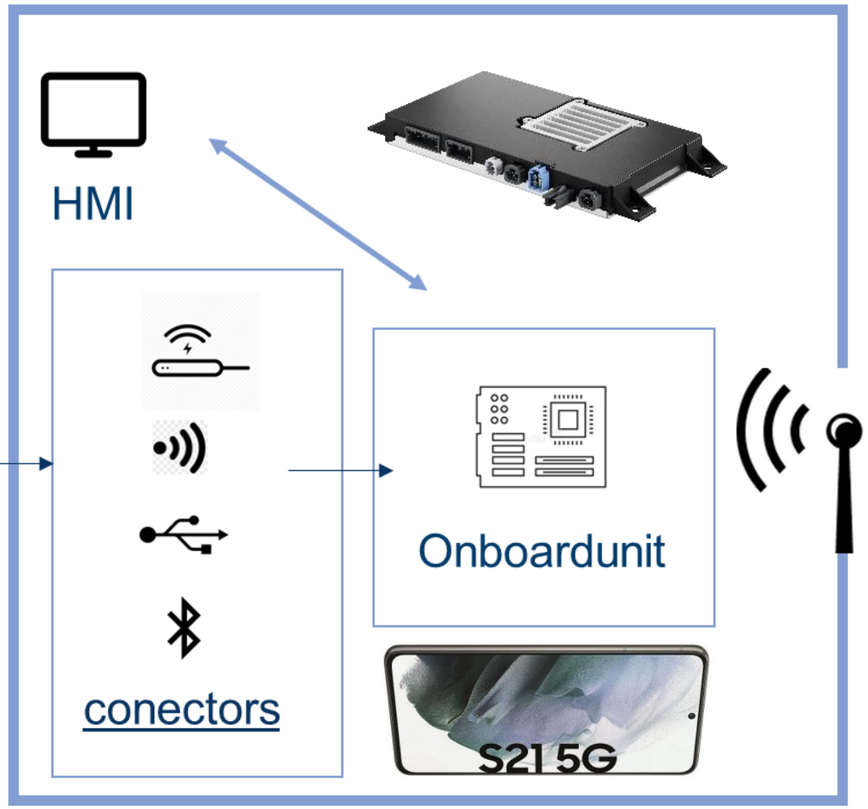
Telematics Big Data Fusion and Network Slicing



Can Bus / FMS
+ External Sensors



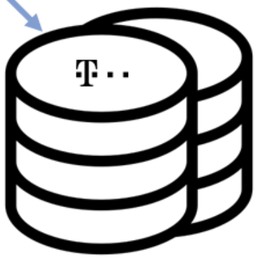
livedata

raw data

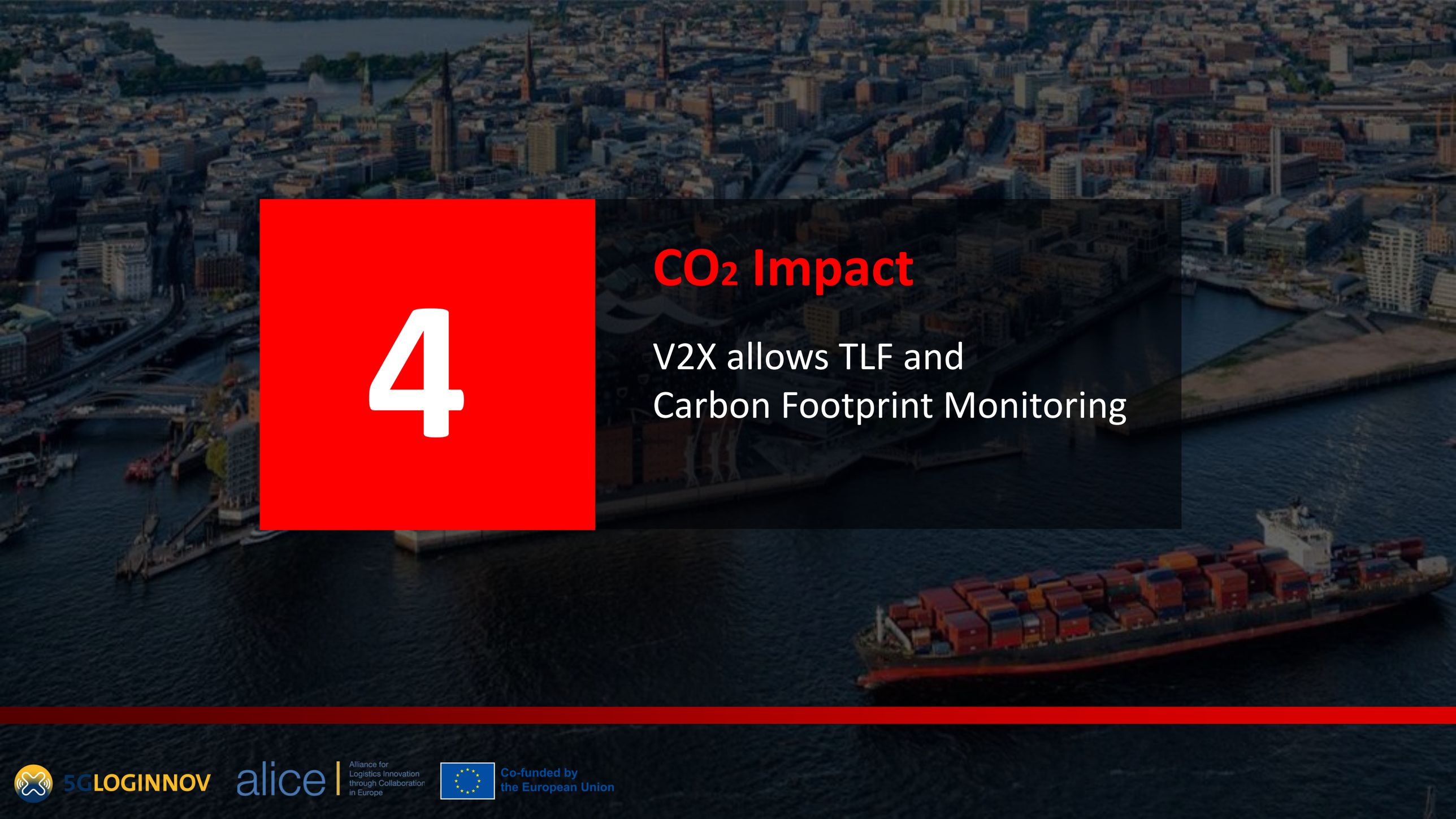
Conti and LCMM

MEC

Input / Output
SWARCO



Database and
Digital Map



4

CO_2 Impact

V2X allows TLF and
Carbon Footprint Monitoring

TAVF-Projektpartner

LSBG
Landesbetrieb Straßen,
Brücken und Gewässer
Hamburg

Hamburg | Behörde für Verkehr und Mobilitätswende

HPA
Hamburg Port A

ITS
MOBILITY

Hamburg
Verkehrsanlagen

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First platooning tests based on ISO-23795-1

Details | Map | Speed Profile | Altitude Profile | Emission Profile | Way Profil | Info

Distance 5.83 Km

Green4TransPORT: Das Projekt

Vorteile

- **Verkehrsfluss verbessern:** Weniger Stop + Go
- **Kraftstoff**verbrauch + **Schadstoff**ausstoß **reduzieren**
- Wenn gewünscht: **Nennung als Projekt-Testpartner** (G4T ist ein Ankerprojekt des ITS Weltkongress 2021)

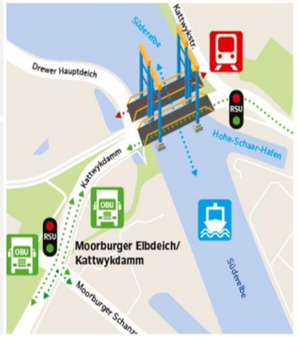
Zielsetzung

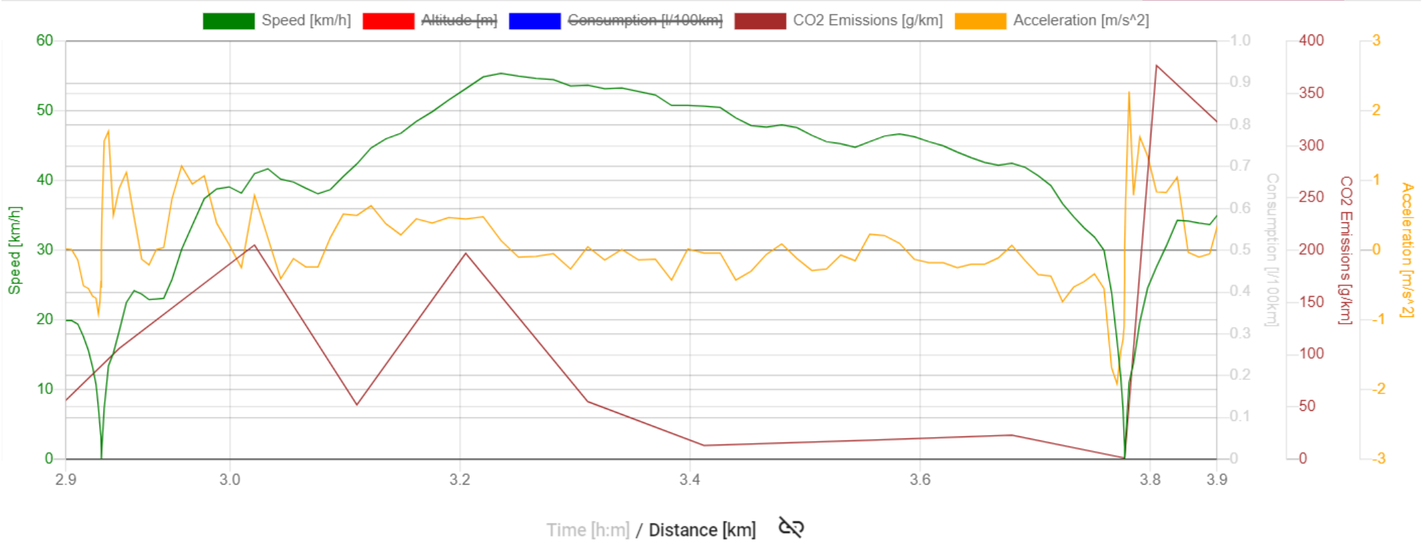
- **Proof of Concept:** Pilotprojekt zur Erprobung der V2X Anwendungen
- **Evaluation:** Einfluss auf Verkehrsfluss und Schadstoffausstoß

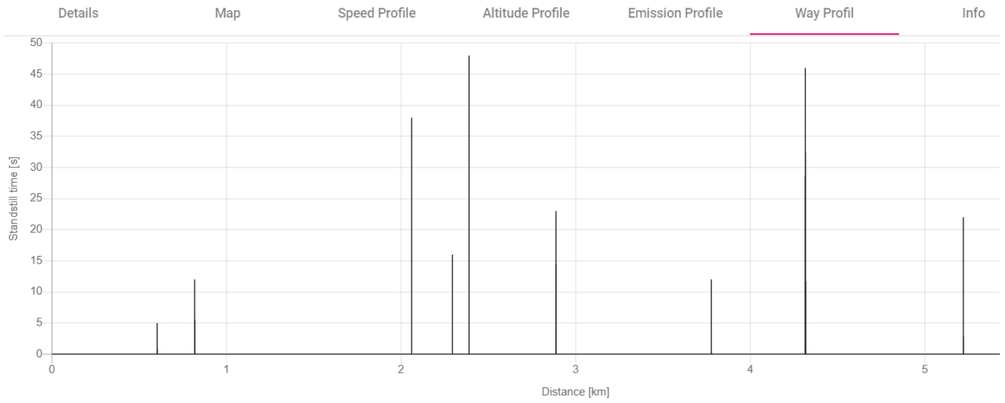
Funktionalität für Testteilnehmer

- **Verlängerung der Ampel-Grünphase erhalten**

Die Teststrecke







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20

CO2 impact assessment based on ISO-23795-1
Potential Carbon Credits for future Emission Trading

Vehicle RG Logi Jeep copy	Group name Loginnov.	Start time 11.04.2022, 08:10	End time 11.04.2022, 08:13
Route ★★★★★	Traffic ★★★★★	Driving Behaviour ★★★☆☆	
Duration 0:03:07	Distance 5,3 km	Speed 101,3 km/h	Fuel Consumption 4,5 l/100km
CO2 Emission 0,6 kg	Zero fuel distance 897 m	Standstill time 0:00:00	ACC Cycle 69,6 %
Aero Cycle 89,4 %	Percentage Standstill Cycle 0 %	Percentage Work Cyle 76,3 %	Energy Performance Index (EPI) 2,8 l/100km*t
Acceleration Performance Index (API) 2,9 kWh/100km*t	AccWork 0,5 MJ	AeroWork 1,3 MJ	Standstill work 0 MJ
RollWork 0,7 MJ	GradeWork -0,1 MJ		
Cross section area 2.35 m²	Efficiency 30 %	Fuel emissions factor 2.664 kg/l	Fuel value 35.712 MJ/l
Mass 1600 kg	Rollfriction coefficient 0.015	Standstill fuel consumption 0.5 l/h	Motorheating ☐
Airconditioning ☑	Start-Stop automatic ☑		

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GET IN TOUCH

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