5G-Loginnov – Living Lab Hamburg

SIS 96, Hamburg, 12th Oct.
I.T.S. World Congress 2021
Ralf Willenbrock, T-Systems

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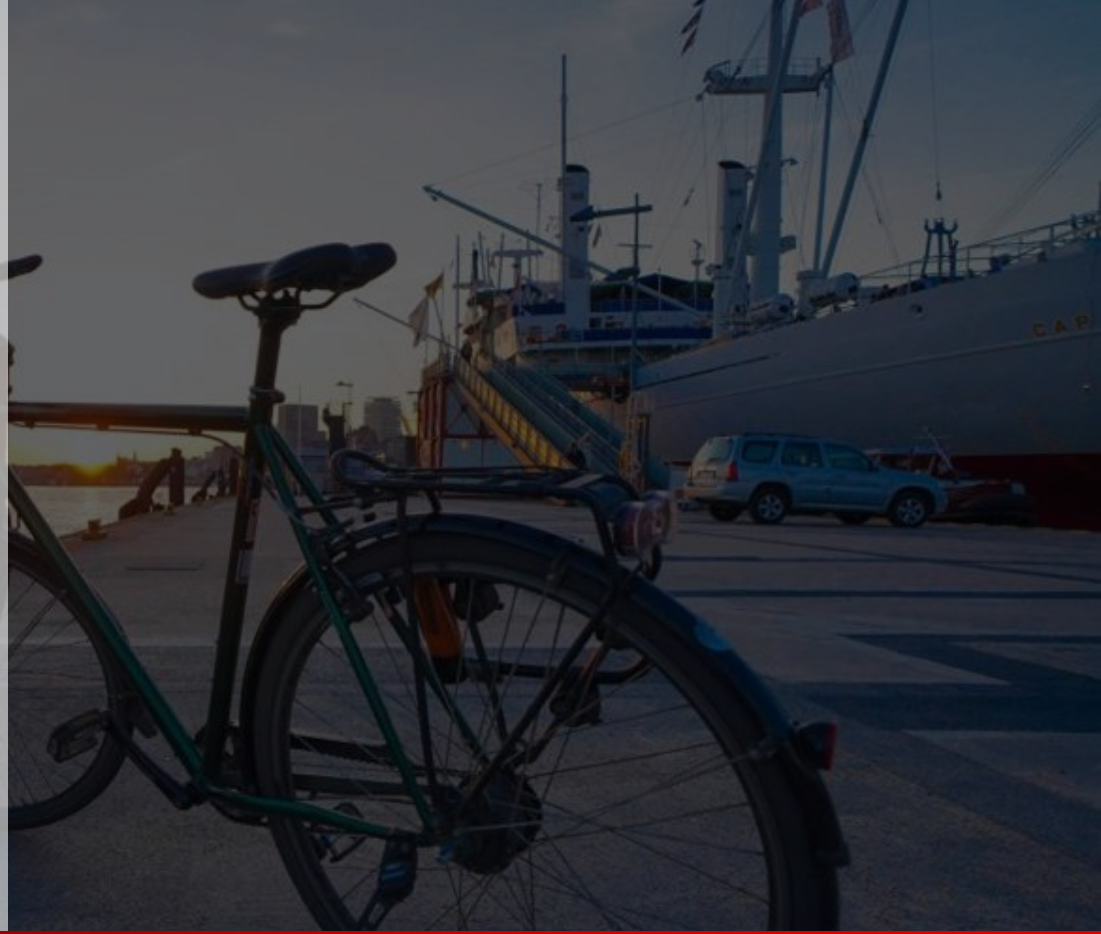

1. 5G - Loginnov
2. TAVF + Kattwyk
3. GLOSA & Collision Alert
4. CO_2 Impact Assessment

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1. 5G - Loginnov

Connected Logistics and
Mobile Communication

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.

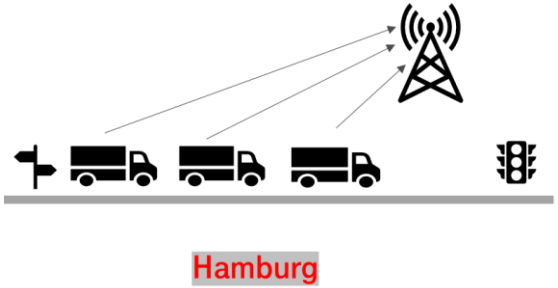
UC7: Predictive Maintenance
- 5G access point installed on yard vehicles
- AP will collect and forward in real time with low latency telemetry data over the 5G network

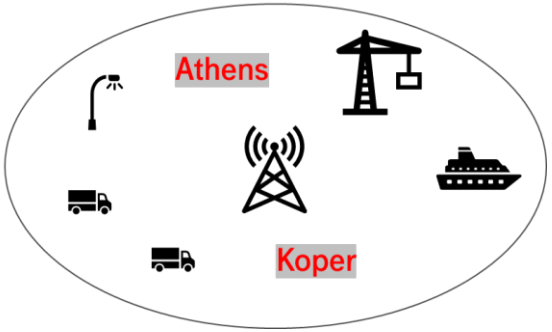
UC1: **port control, logistics and remote automation**

UC2: business critical and mission critical communications

5G LOGINNOV –

Use cases in living labs



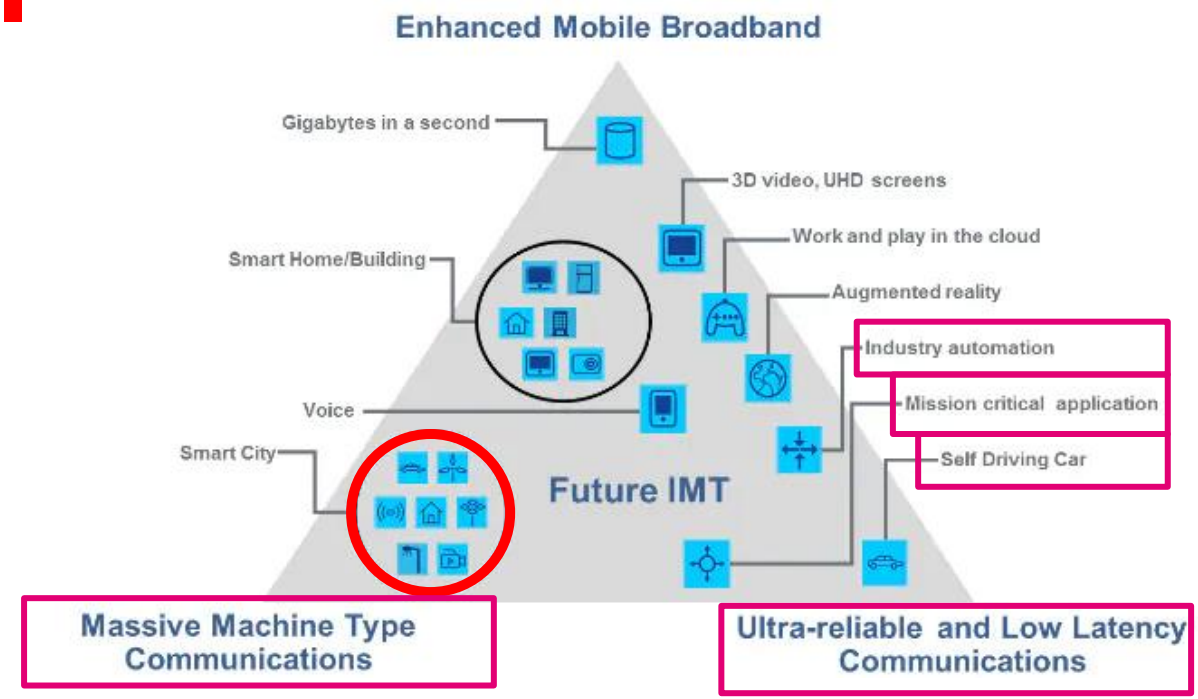


5G enabled Automation

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

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

5G ASPECTS COVERED IN 5G-LOGINNOV

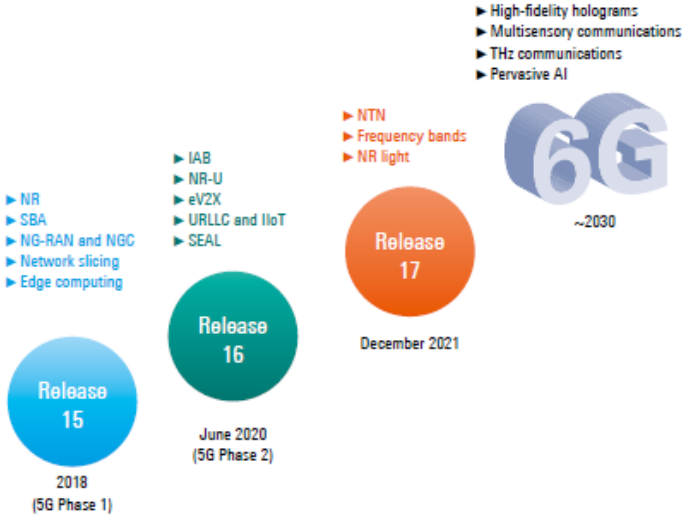


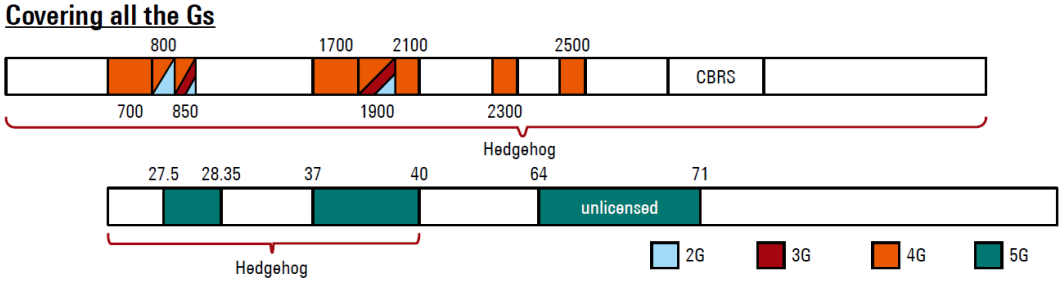
5G enabled Precise Positioning, MEC

Real-time tracking & enhanced visibility

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

Trends of Next Releases R16, R17 and beyond





Industrial IOT and Vertical SBA (e.g.)

(uRLCC) Edge Computing & Collission Alerts
(eMBB) Over-The-Air SW Updates
(eMBB) Infotainment CMM systems
(MEC) CCAM and vehicle platooning
(MEC) Floating Truck Emission Data
(mMTC) Sustainable Traffic Management

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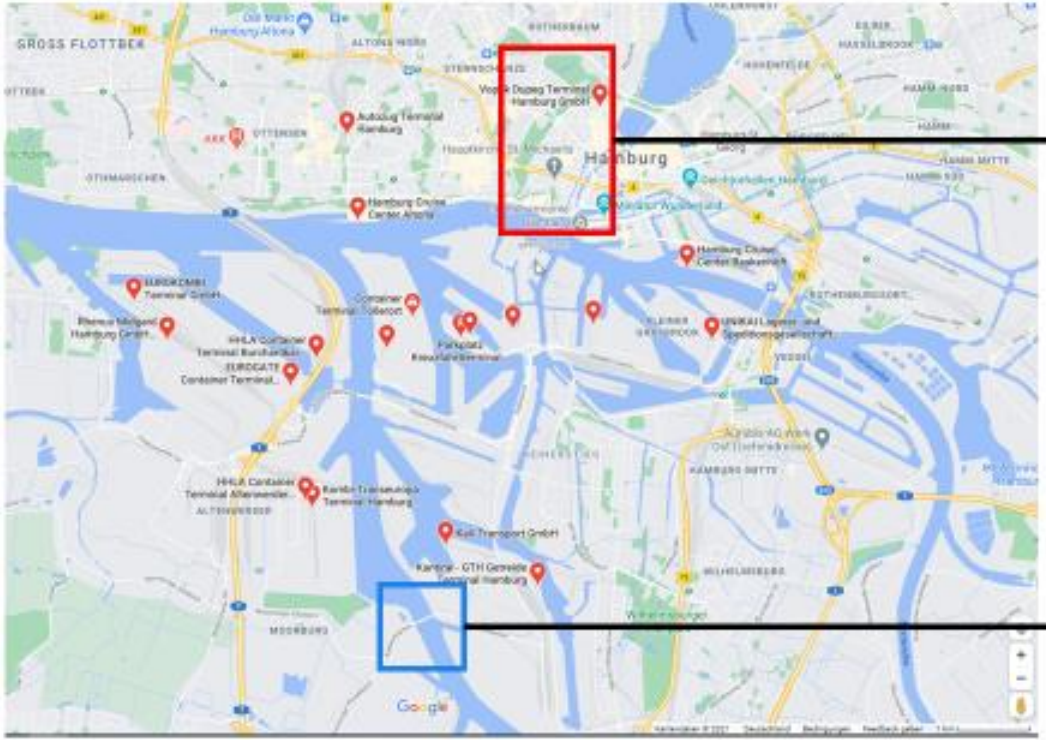
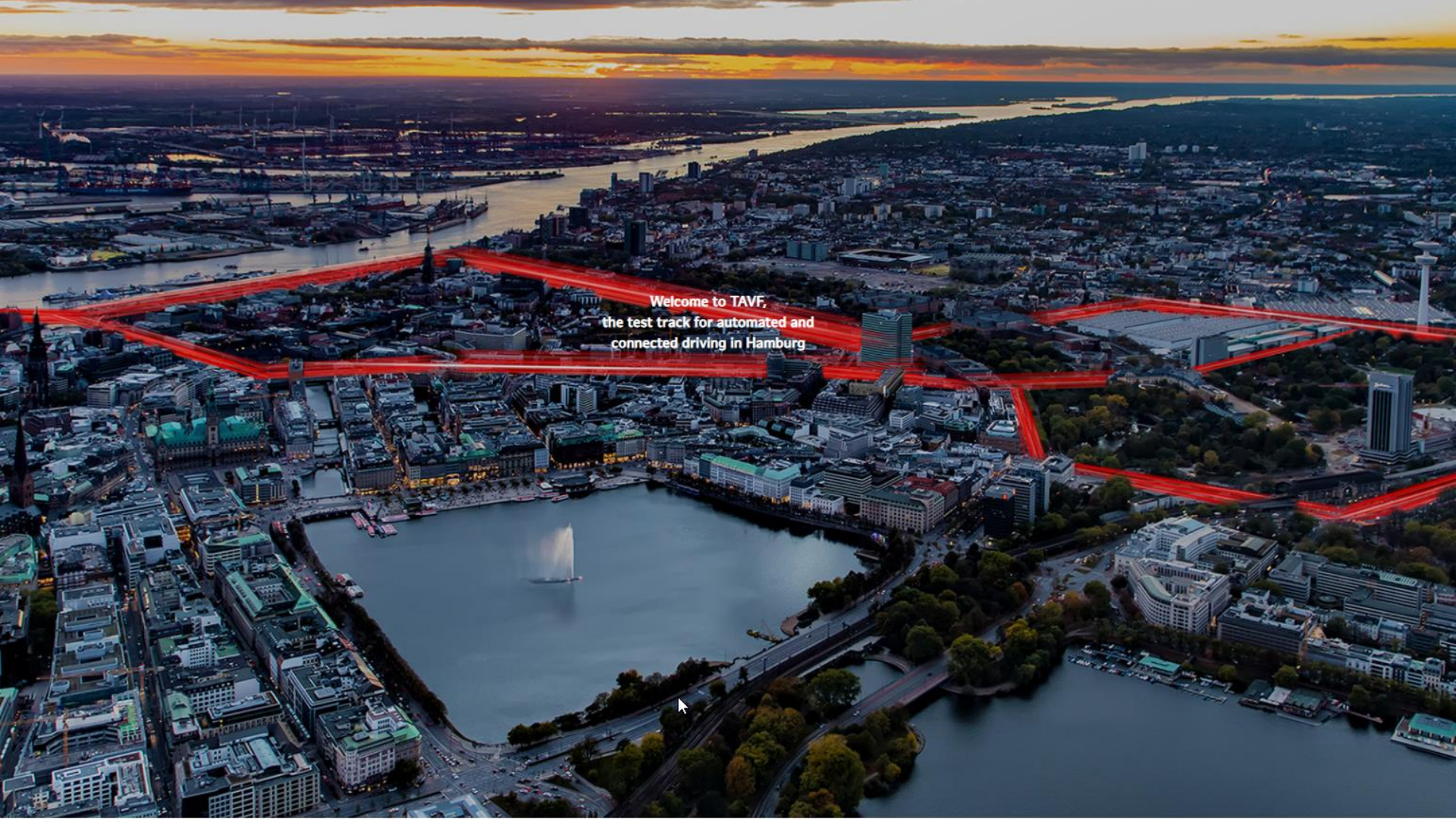
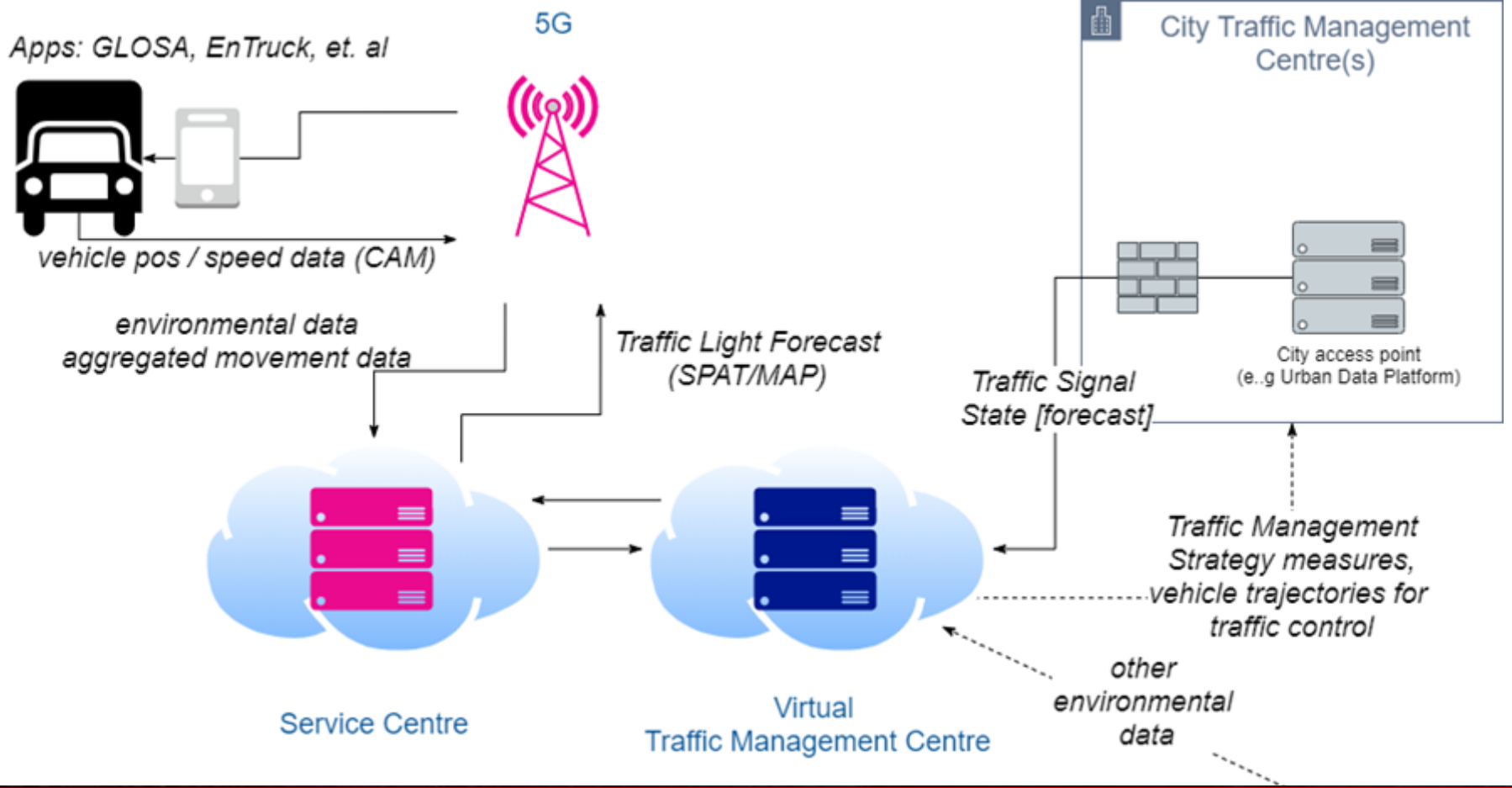
Hamburg I.T.S. (TAVF + HPA)

Hamburg I.T.S. Policy

LL Hamburg => TAVF & Kattwyk




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


5G
Apps: GLOSA, EnTruck, et. al
vehicle pos / speed data (CAM)
environmental data
aggregated movement data
Traffic Light Forecast
(SPAT/MAP)
City Traffic Management
Centre(s)
City access point
(e..g Urban Data Platform)
Traffic Signal
State [forecast]
Traffic Management
Strategy measures,
vehicle trajectories for
traffic control
other
environmental
data
Service Centre
Virtual
Traffic Management Centre

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)

RSU

TMC HH

I2N (Uu)

I2N

SPAT / MAP (uplink only)

MECs: Hamburg

ITS SERVER (→ MOBILE EDGE INFRASTRUCTURE OF DEUTSCHE TELEKOM)

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)

CAM
Position
Heading
Speed

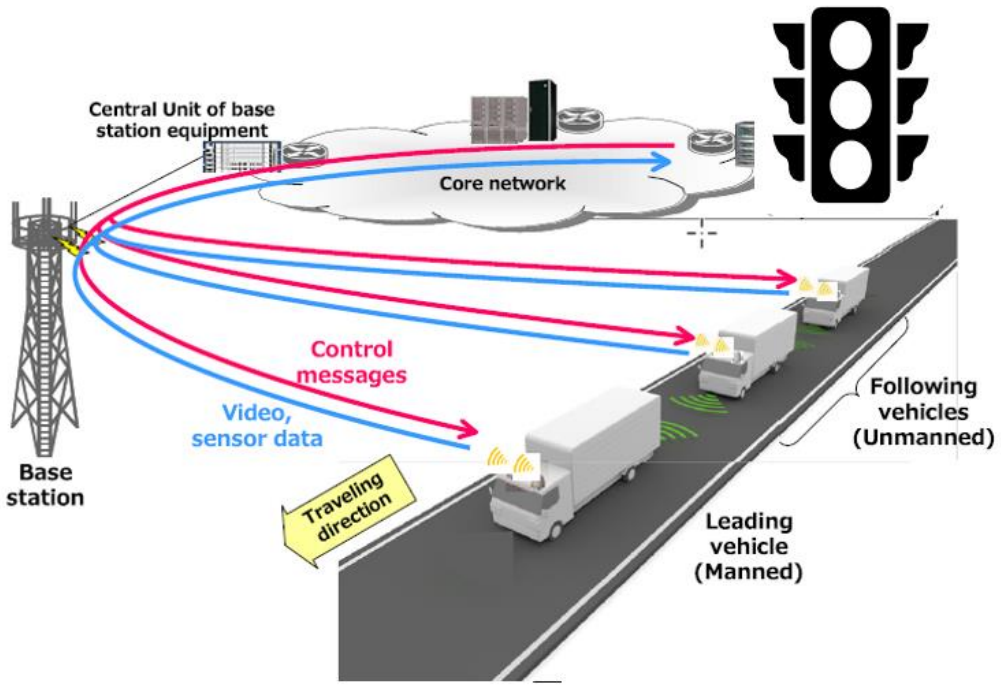
- Bicycles / eBikes
- Motorbikes
- Pedestrians
- Trucks (ATP)

3

uRLLC - Collisions Alerts

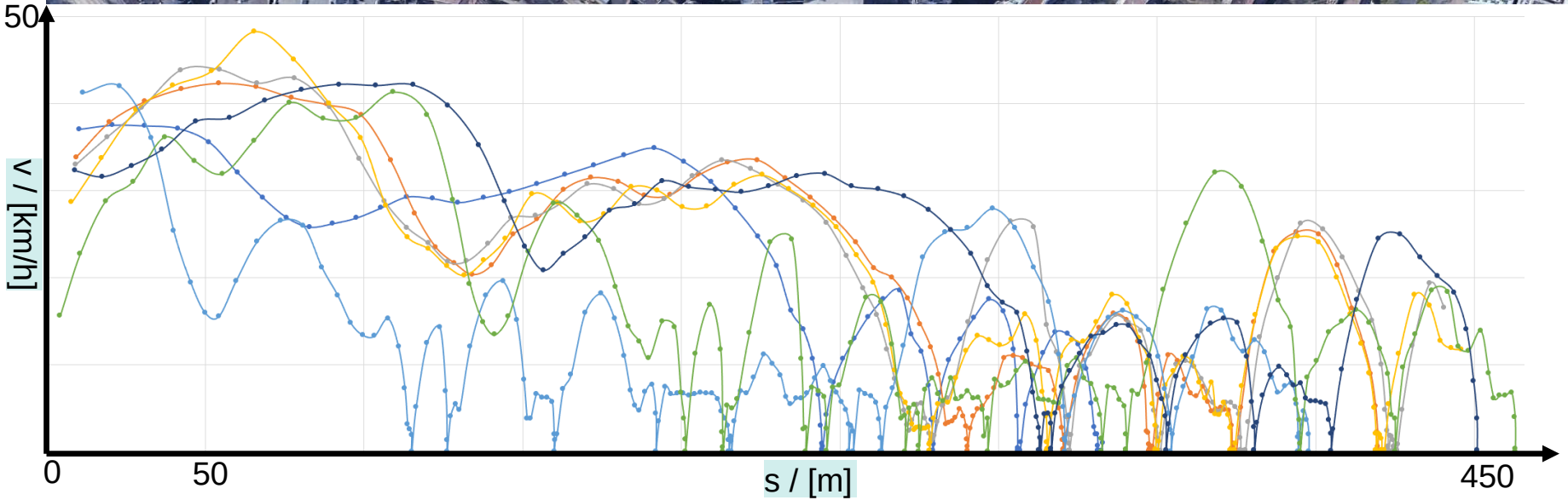
About Low Tech and High Tec Telematics

Use Cases planned for Living Lab Hamburg

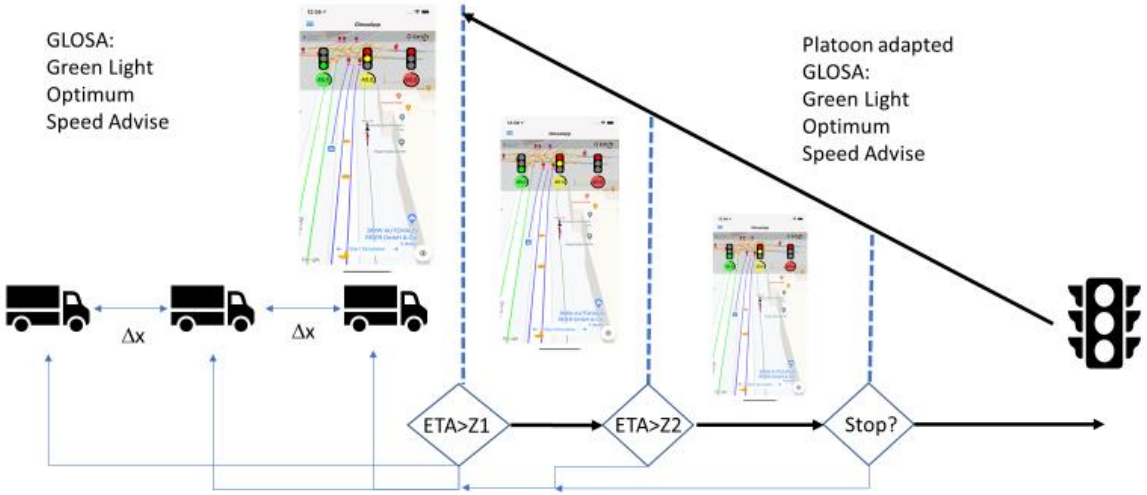


UC8/9		UC10	UC11
FTED by LCMM, ISO/DIS-23795-1, TLF			4G/LTE
5G-Smartphones	enTruck	Conti-IoT	4G/LTE
ATP-GLOSA by 5G V2X and V2V			5G only
MEC	Precise Positioning	uRLLC	5G only
	On-board Video	eMMB	5G only
Public 5G System / MEC Server			5G only

Vehicle platooning in TAVF



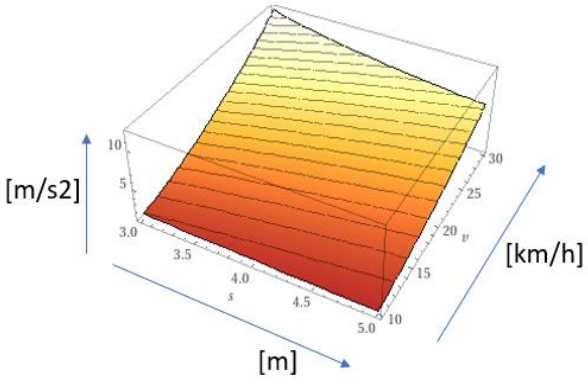
Urban Platooning and Collision Alerts (uRLLC)



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

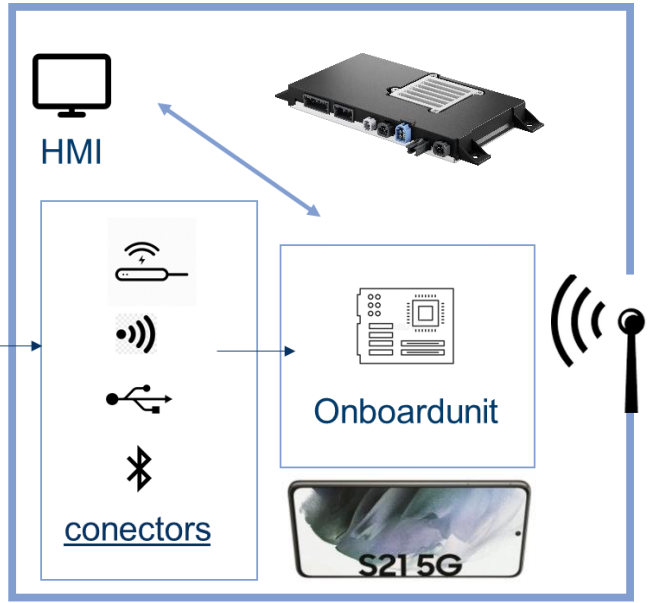
plot	$b = v \times 0.025 + 0.5 \times \frac{v^2}{3.6 \times 3.6\, s}$	$s = 3$ to 5 $v = 10$ to 30

3D plot:



Telematics Big Data Fusion and Network Slicing

Can Bus / FMS
+ External Sensors

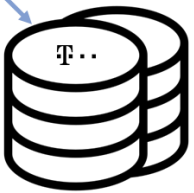


livedata
raw data

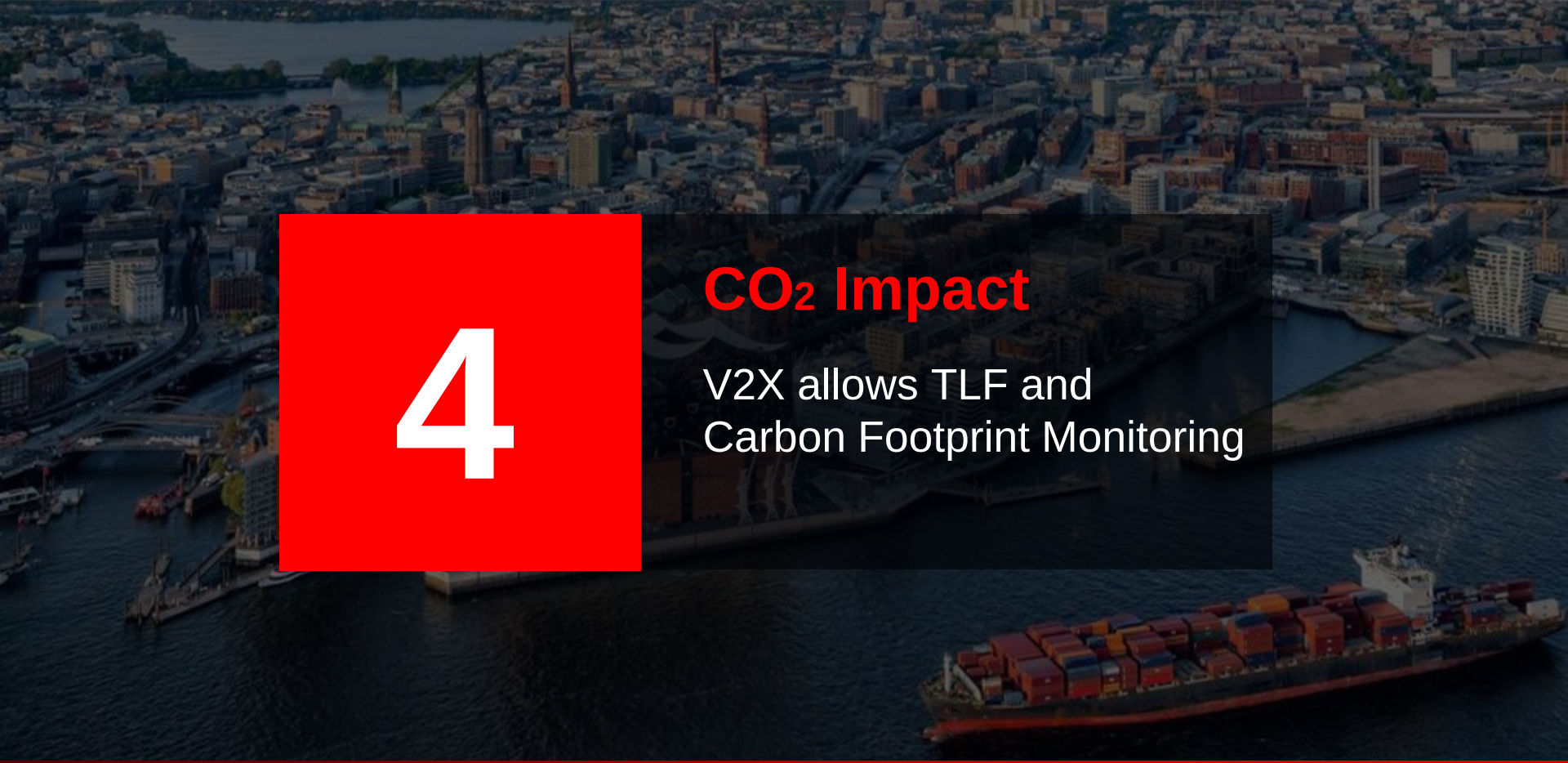
Conti and LCMM

MEC

Input / Output
SWARCO



Database and
Digital Map



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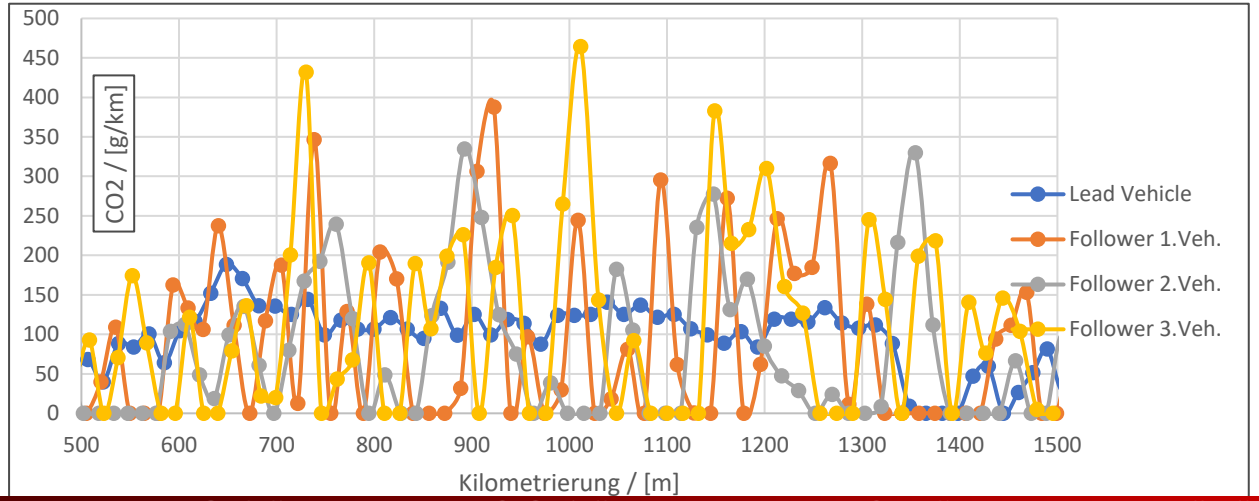
CO_2 Impact

V2X allows TLF and
Carbon Footprint Monitoring

First platooning tests using ISO/DIS-23795

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



SHOW

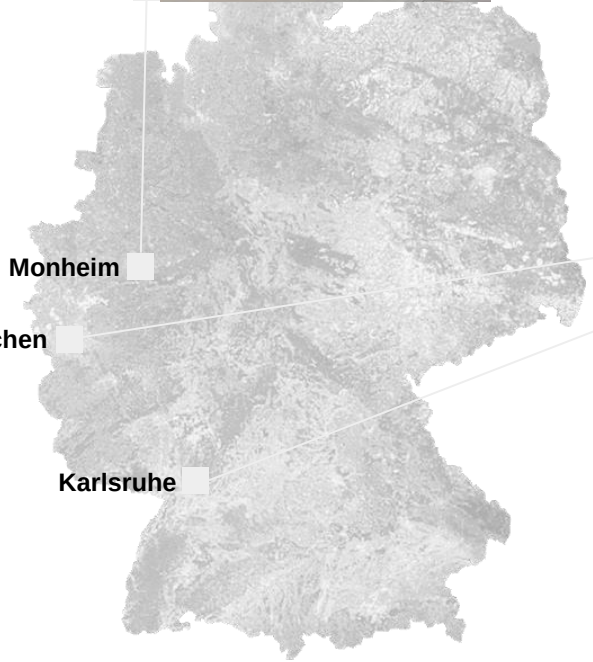
Facts & Figures

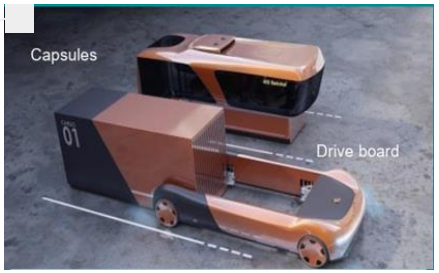
01/2020 – 01/2024 (48 months)

69 partners from 13 EU-countries

Twinning actions with 11 global organisations

30 million €



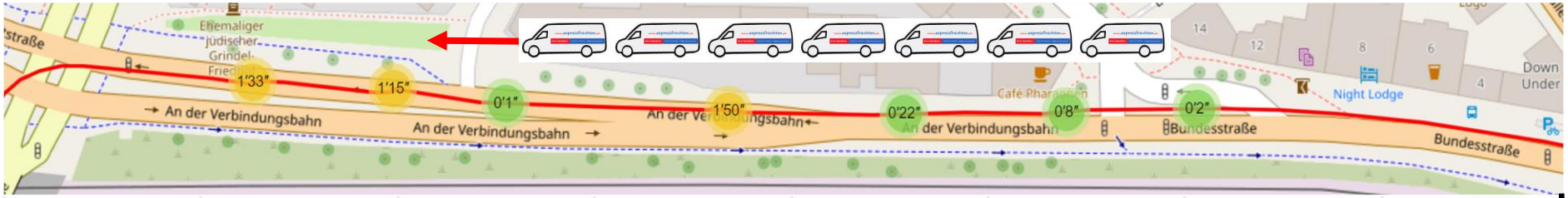


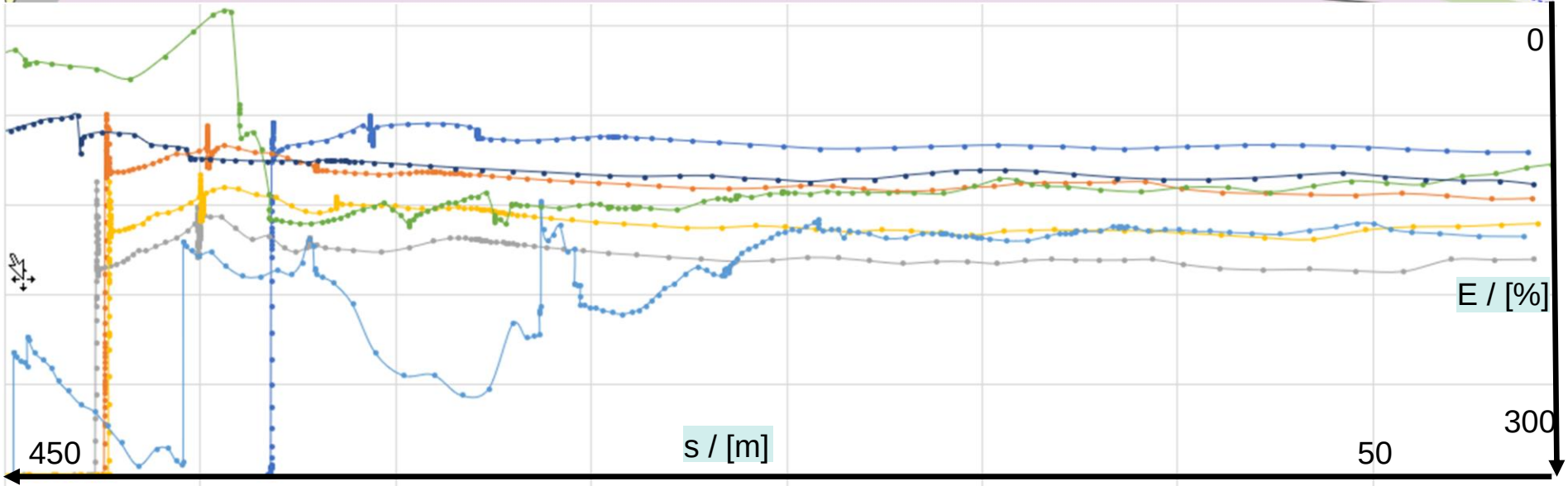
T-Systems contribution

Technical project lead for the Mega Site Germany

- V2X integration
- 5G implementation
- Demonstration of modular vehicle for mixed passenger-cargo transport services (Karlsruhe)

Consulting for Business Models and Exploitation


Ehemaliger
Jüdischer
Grindel-
Friedhof
1'33"
1'15"
0'1"
1'50"
0'22"
0'8"
0'2"
An der Verbindungsbahn
An der Verbindungsbahn
An der Verbindungsbahn
An der Verbindungsbahn
Café Pharaonen
Night Lodge
Down
Under
Bundesstraße
Bundesstraße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GET IN TOUCH

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Exhibition Partner:
T-Systems Hall B5, booth number B5.140

To see 5G technology live, please book in the I.T.S. APP:

5G-Loginnov Demo-Tours

Tue. 12.Oct. 10am – 4pm
Wed. 13.Oct. 10am – 4pm
Thu. 14.Oct. 10am – 4pm