5GLoginnov Truck Platooning

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https://5g-ppp.eu/5g-loginnov/

5G LOGINNOV
Connected and Automated Logistics

5G improves logistics and environmental challenges of European ports by connecting 5G devices, data analytics and next generation traffic management

- Development and deployment of innovative ports and logistics hubs operation system integrated in 5G networks

- Optimise ports & logistics hubs operation reducing OPEX

- Reducing ports & logistics emissions (CO_2, NOx)

- Regulate freight traffic on 5G logistics corridors according to the EU GREEN DEAL program

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Co-funded by the Horizon 2020
Framework Programme of the European Union

5G LOGINNOV – Facts & Figures

Start 10 oct 2020, duration 36 months

7,9 million €

Consortium with 15 members from 7 countries (BE, FR, IT, RO, GR, SL, DE)

Members represent stakeholders from Logistics, Automotive and Telecom Industry working closely with Infrastructure operators and Research Institutes.

SMEs and Start-Ups will be integrated for future 5G market uptake across Europe

T-Systems contribution

Project lead with partners Continental, Swarco and TEC4U

Project members

- ERTICO
- AKKA
- CIRCLE
- Continental
- ICCS
- ICOOR
- ININ
- Luka Koper
- PCT
- SWARCO
- tec4U
- Telekom Slovenije
- T-Systems
- VICOM
- VODAFONE

Per type of partner:

Pie chart:
- Logistics: 13%
- 5G: 22%
- SMEs: 9%
- Research: 19%
- Industry: 13%
- Services: 9%
- Other: 15%
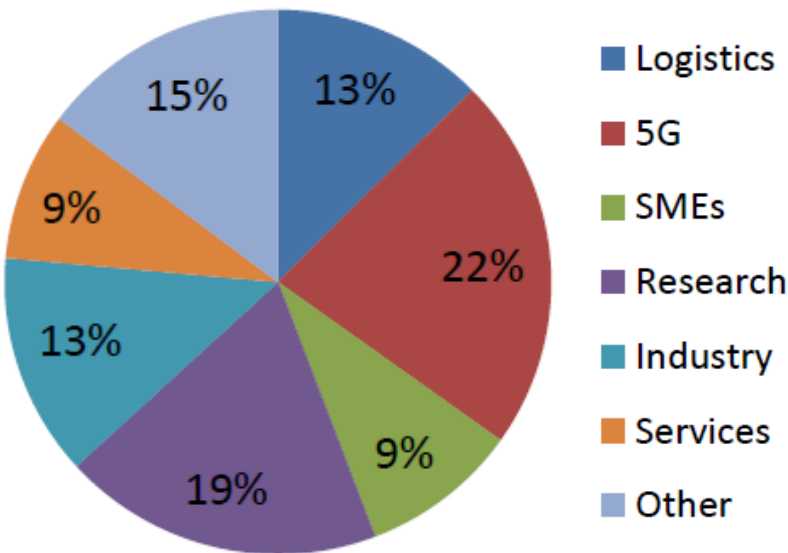
5G LOGINNOV – Project overview
Deployment of 5G enabled Connected and Automated Logistics

Project goal

Design an innovative framework of 5G enabled Connected and Automated Mobility technologies inside and outside modern ports (Hamburg, Athens, Koper)

- Development of 5G enabled ports and logistics hub operation
- 5G integrated predictive maintenance to anticipate breakdowns
- CAM truck platooning from hinterland to port
- GLOSA for truck platooning and sustainable traffic management

Benefits

- Significant reduction of CO_2 and NO_x caused by hub logistics
- Boost CCAM based on 5G technology and hub-centric use cases
- Establish new business models and 5G CCAM based Go-to-Market strategies in ports according to the Green Deal policy requirement

Use cases

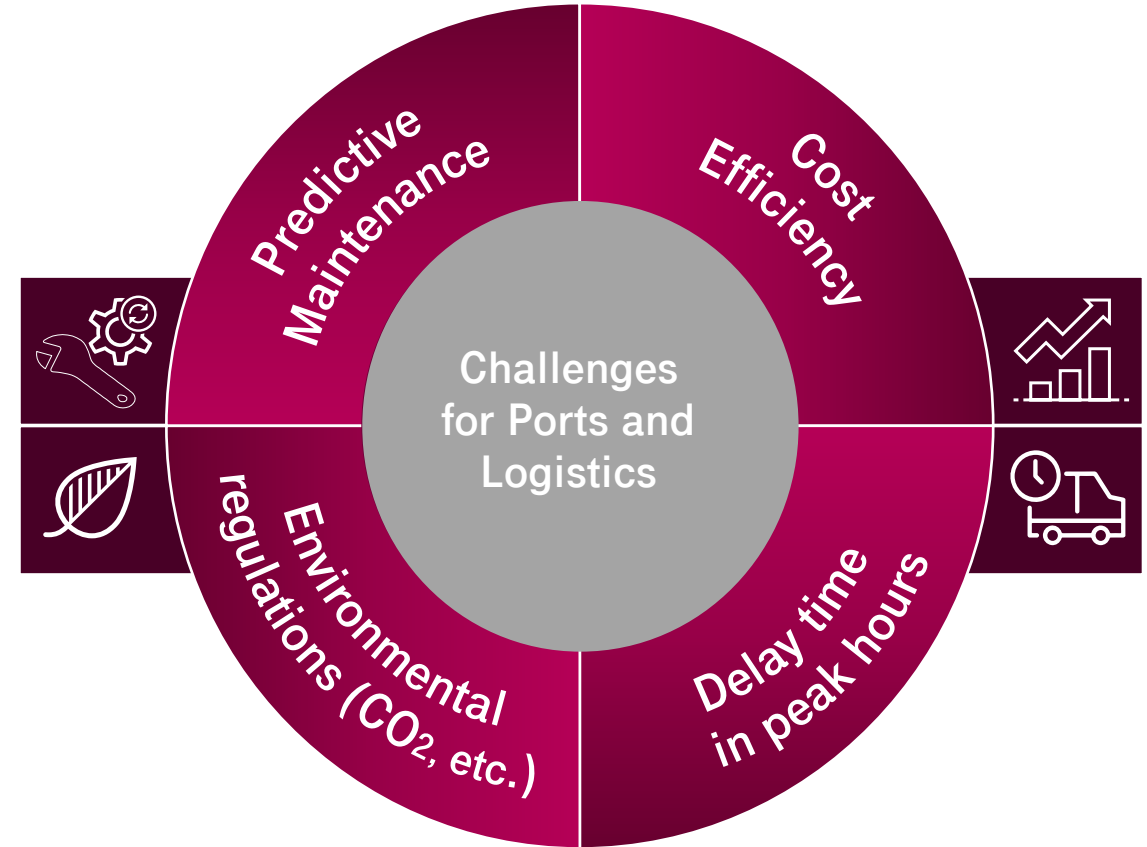| Hamburg port:	Athens port:	Koper port:
5G Floating truck and emission data for automated truck platoons using GLOSA	Remote automation, 5G communication in ports and predictive maintenance	5G based V2X data exchange of surveillance data for yard truck logistics

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5G LOGINNOV – Market challenges

- Cargo port operators are under high pressure to **comply with increasingly stricter environmental regulations** and societal views for sustainable operations

- **Managing delay during peak times** due to capacity problems and traffic congestions

- Reducing **operating costs** for infrastructure investment and innovation

- **Improving port operation** to protect infrastructure assets by predictive maintenance

- **Digital Transformation:** make optimum use of 5G capabilities for yard operation and Hinterland connectivity

The solution: **Building 5G port and logistics operation systems** with connected and automated vehicles and innovative IOT sensor platforms

Predictive Maintenance

Cost Efficiency

Challenges for Ports and Logistics

Environmental regulations (CO_2, etc.)

Delay time in peak hours

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5G LOGINNOV – Use cases in living labs

Hamburg

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)

Athens (Piraeus)

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
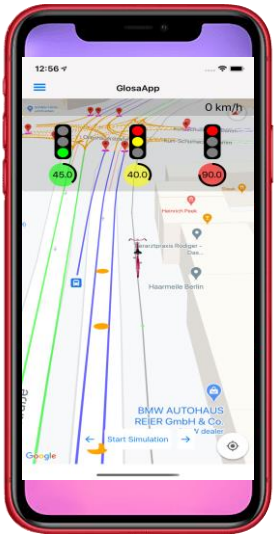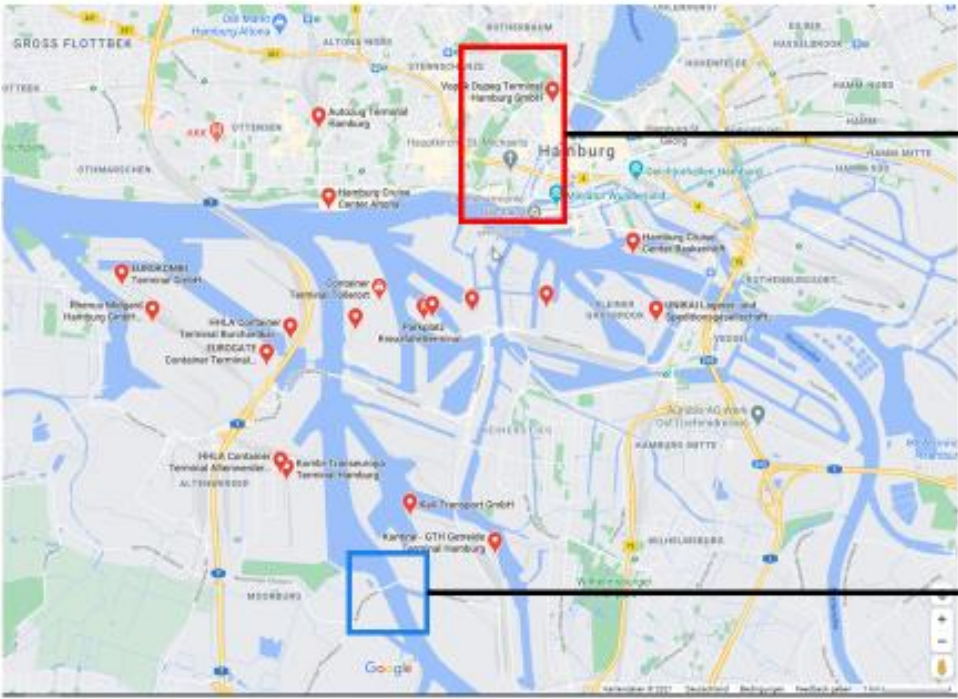- AP will collect and forward in real time with low latency telemetry data over the 5G network

Koper (Luka)

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

UC2: business critical and mission critical communications

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Logistics corridor aspects in Hamburg

LL Hamburg => TAVF & Kattwyk

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5G LOGINNOV – Use Cases of Living Lab Hamburg

1) **Truck & Emission Data** for **Sustainable Traffic Management** based on 5G V2X in Hamburg

2) **Automated Truck Platooning using 5G based GLOSA** in the logistics corridor of Hamburg to **achieve low emission targets** for ports and hub-logistics

3) **Data exchange with SWARCO traffic management center.** Dynamic control loop for the reduction of CO_2/NO_x emissions from trucks by **avoiding Start-Stop events** by using GLOSA technology

With 5G-LOGINNOV, ports will **minimize their environmental footprint to the city**. They will decrease disturbance to the local population through a **significant reduction in the congestion** around the port.

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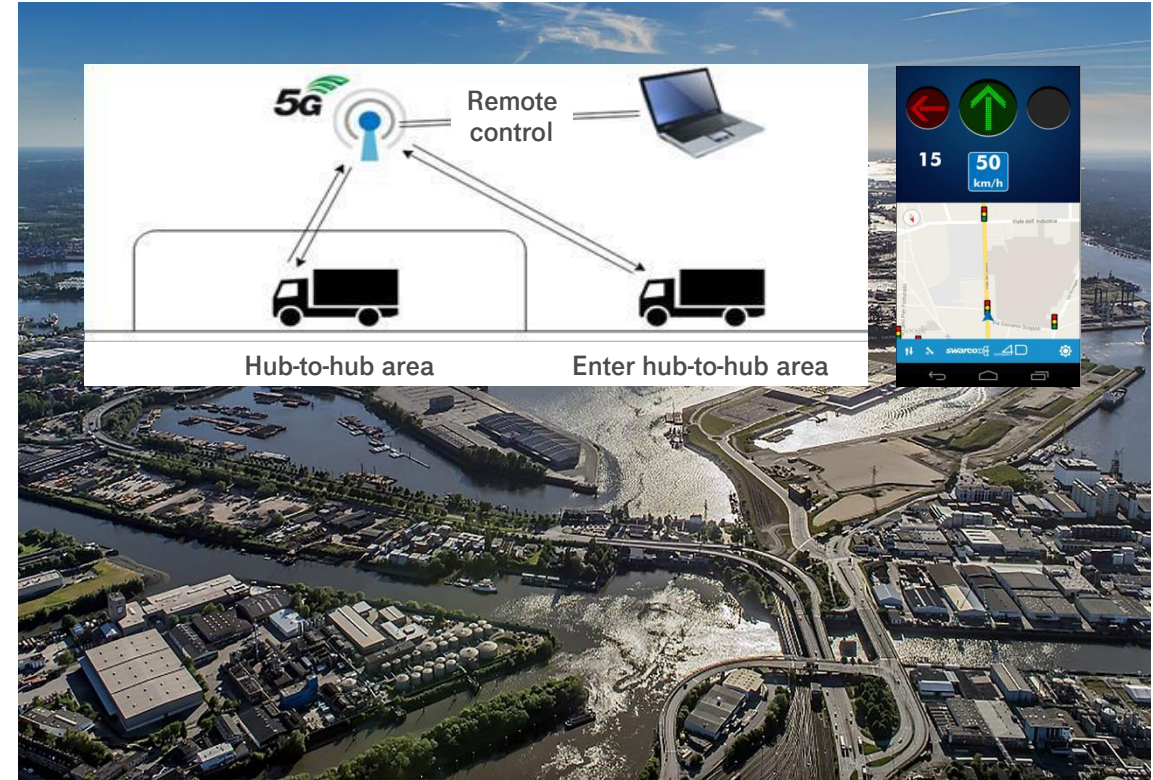
5G LOGINNOV
Contribution of project lead partners

- **SWARCO** is Traffic Light and **Traffic Systems Provider**
- **SWARCO** is Traffic Management System (**TMS**) **Provider** in Hamburg
- T1.3 Lead (**LL infrastructure requirements**) and **GLOSA**

- **Continental** is **Automotive** Systems and Engineering **Supplier**
- **Supplier** of 5G and IoT based sensors **for Truck Telematics**
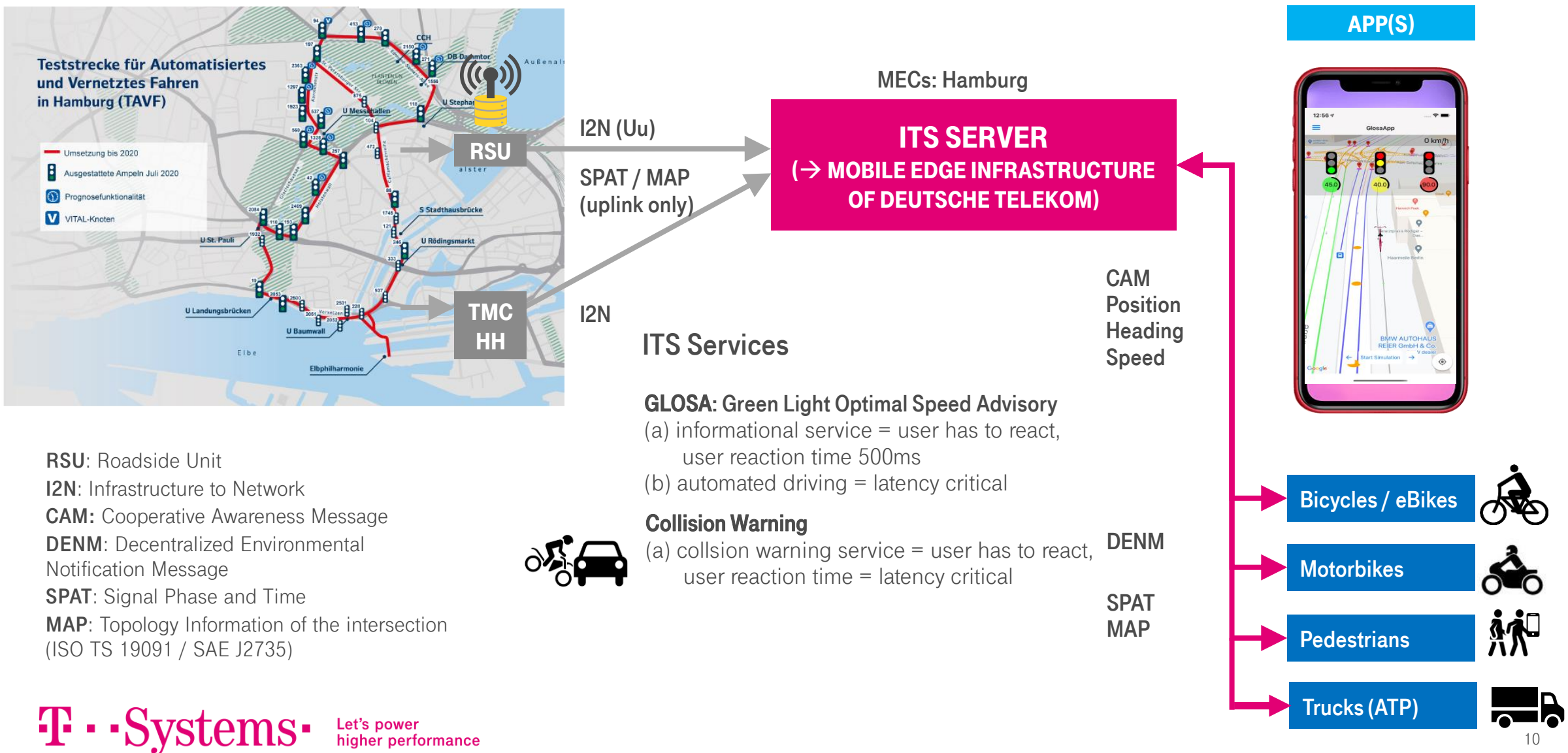- **Sensor data supplier** for **Automated Truck Platooning and GLOSA**

- **Tec4u** is a **Fleet and Engineering SME** for **Truck Telematics**
- **Tec4u develops logistics application** for Living Lab Hamburg
- **Support** and involvement **for SME's, Start-Ups and Market Deployment**

- **Deutsche Telekom** is national **mobile network operator** providing 5G-based services
- **T-Systems** is **Service provider** LCMM (Carbon Footprint Monitoring) and GLOSA
- **T-Systems** is **LL Hamburg coordinator**, WP3 lead beneficiary

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How does it work?

Teststrecke für Automatisiertes und Vernetztes Fahren in Hamburg (TAVF)

Umsetzung bis 2020
Ausgestattete Ampeln Juli 2020
Prognosefunktionalität
VITAL-Knoten

RSU

TMC HH

I2N (Uu)

SPAT / MAP (uplink only)

I2N

MECs: Hamburg

ITS SERVER
(→ MOBILE EDGE INFRASTRUCTURE OF DEUTSCHE TELEKOM)

CAM
Position
Heading
Speed

ITS Services

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

DENM

SPAT
MAP

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)

Bicycles / eBikes

Motorbikes

Pedestrians

Trucks (ATP)

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5G enabled FTED for Sustainable Traffic Management

Apps: GLOSA, EnTruck, et. al

5G

vehicle pos / speed data (CAM)

environmental data
aggregated movement data

Traffic Light Forecast
(SPAT/MAP)

Service Centre

Virtual
Traffic Management Centre

City Traffic Management Centre(s)

City access point
(e..g Urban Data Platform)

Traffic Signal
State [forecast]

Traffic Management
Strategy measures,
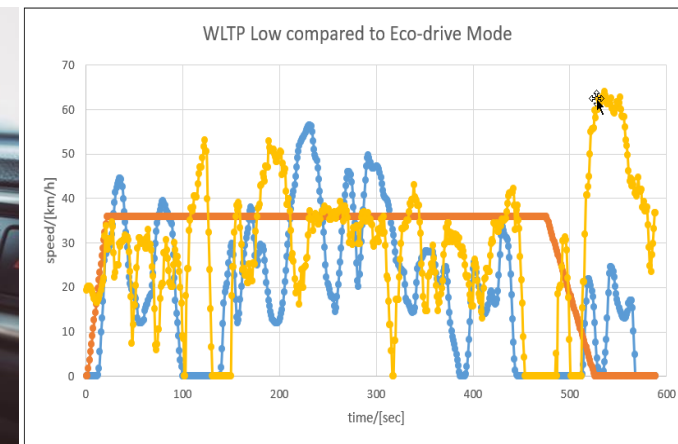vehicle trajectories for
traffic control

other
environmental
data

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STARLING®

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Mobility Management
(LCMM)
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ISO-23795-DIS
compliant

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WENIGER KRAFTSTOFFVERBRAUCH
UND TREIBHAUSGASE DURCH
LOW CARBON MOBILITY MANAGEMENT

CO2

WLTP Low compared to Eco-drive Mode

SPAT/MAP for 5G GLOSA Truck Platooning

GLOSA: Green Light Optimum Speed Advise

Platoon adapted GLOSA: Green Light Optimum Speed Advise

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

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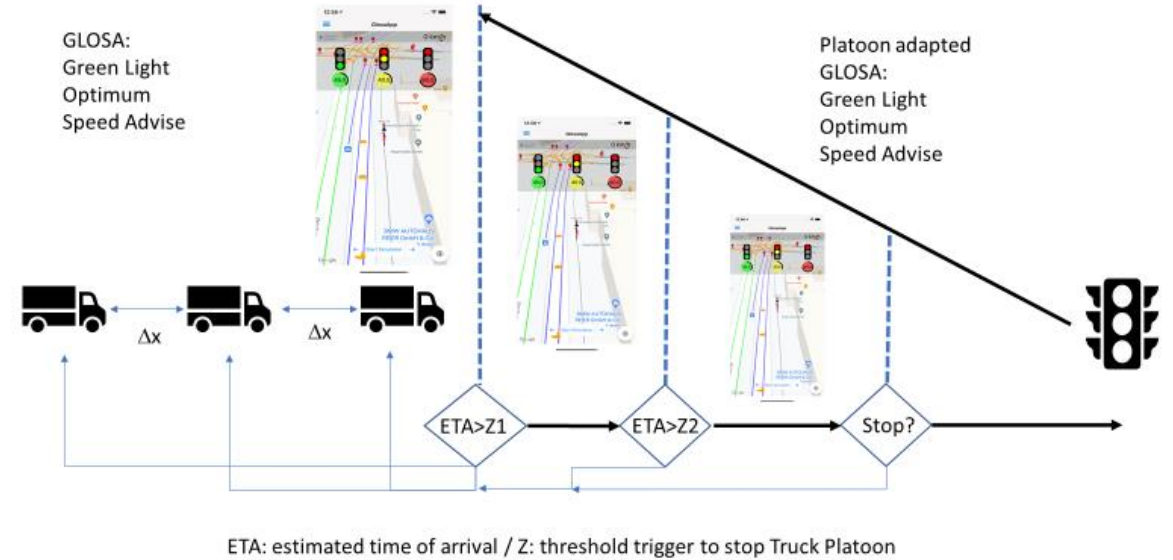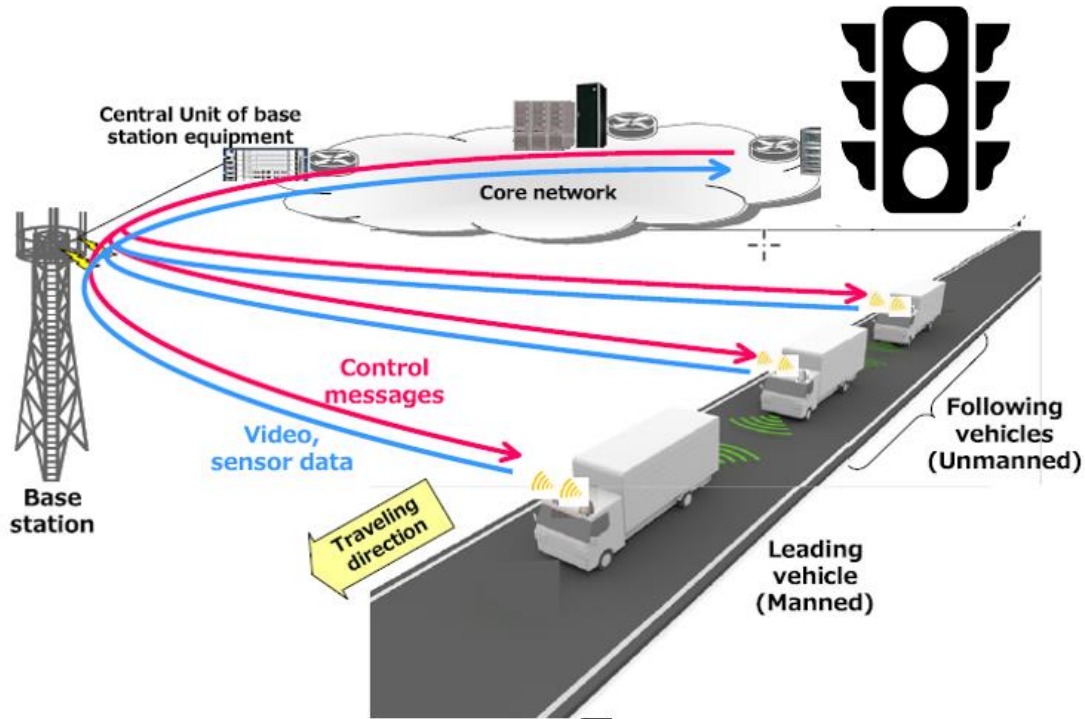
5G ASPECTS COVERED IN 5G-LOGINNOV

Enhanced Mobile Broadband

- Gigabytes in a second
- 3D video, UHD screens
- Work and play in the cloud
- Smart Home/Building
- Augmented reality
- Voice
- Industry automation
- Mission critical application
- Smart City
- Self Driving Car

Future IMT

Massive Machine Type Communications

Ultra-reliable and Low Latency Communications
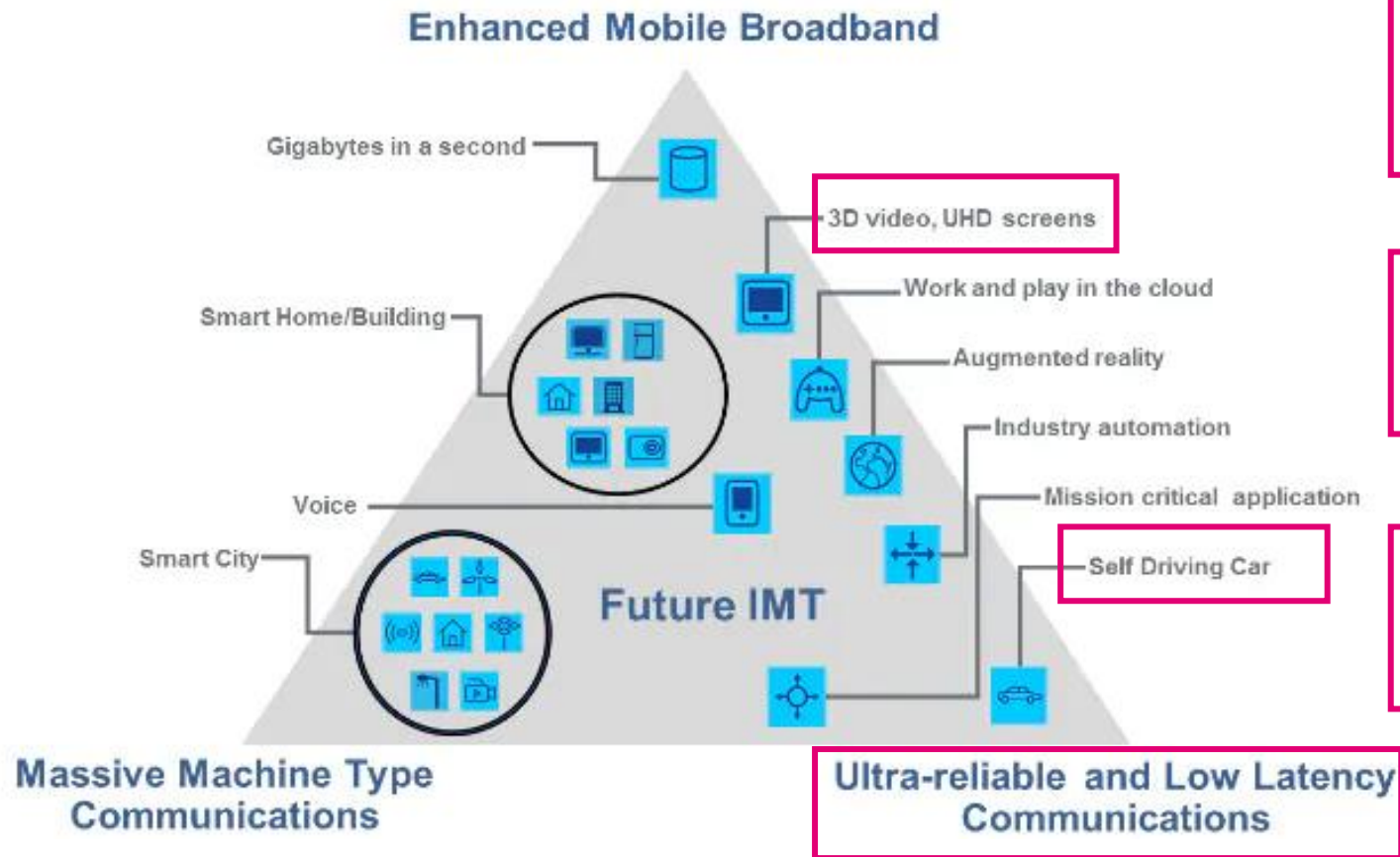
5G enabled Precise Positioning, MEC

Real-time tracking & enhanced visibility

Automated Truck Platooning: <25ms cellular V2X /V2V

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First results of ATP tests using ISO/DIS-23795 Carbon Monitoring
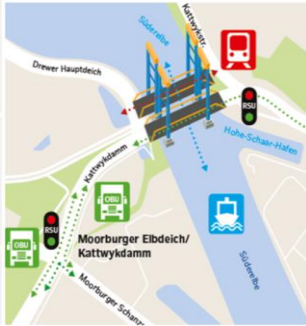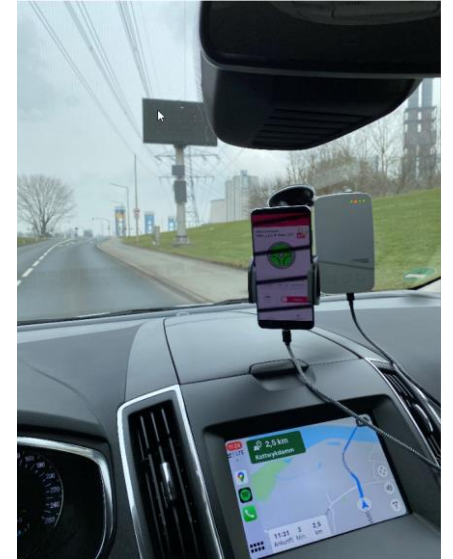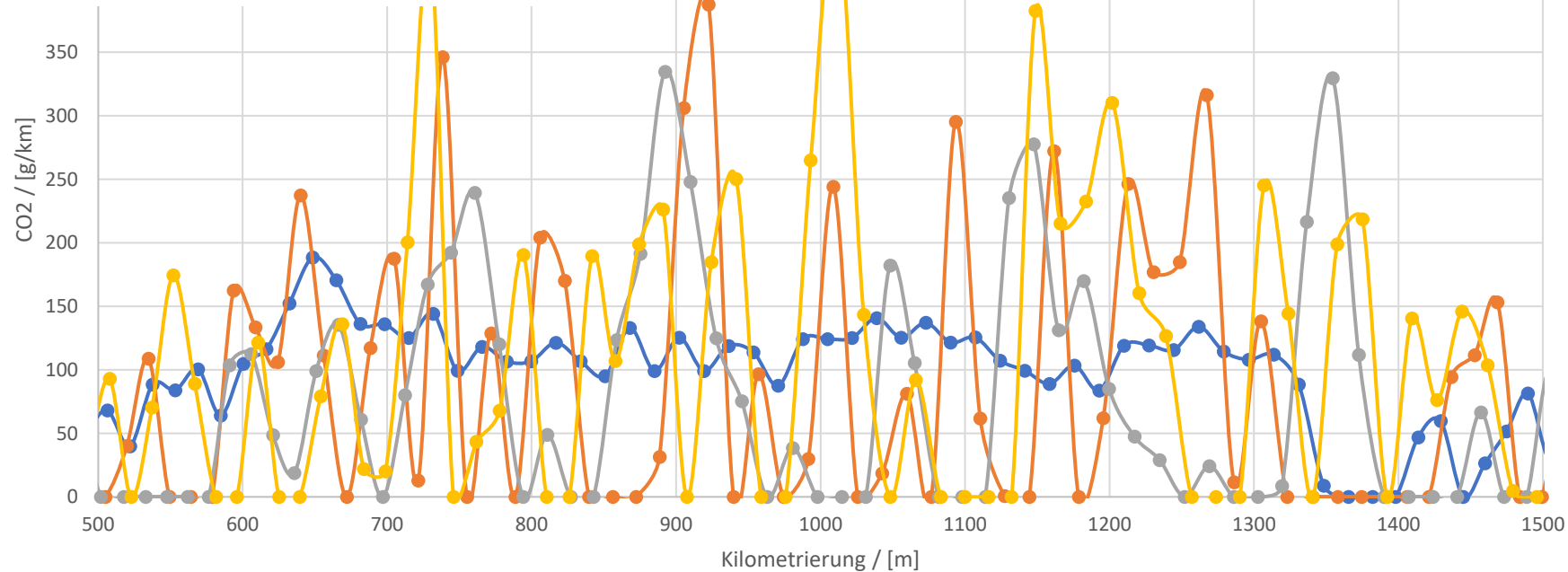
Thank you

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Connecting EU insights
Circle Group

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