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challenging limits

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Connected Cities

How cities can improve road safety and Traffic Management using Cooperative ITS technology

23.11.2023 / Marcus Handl

Urban Roads Safety

VRUs (pedestrians, cyclists and users of powered two-wheelers) represent just under 70% of total fatalities

EU-wide, road deaths in 2021 rose by 5% on the previous year

3790 VRUs fatalities

897 Car Vehicle vs. Vehicles fatalities

ROAD TRAFFIC FATALITIES URBAN AREAS IN THE EU (2021)

by road user and (other) 'main vehicle' involved in the crash

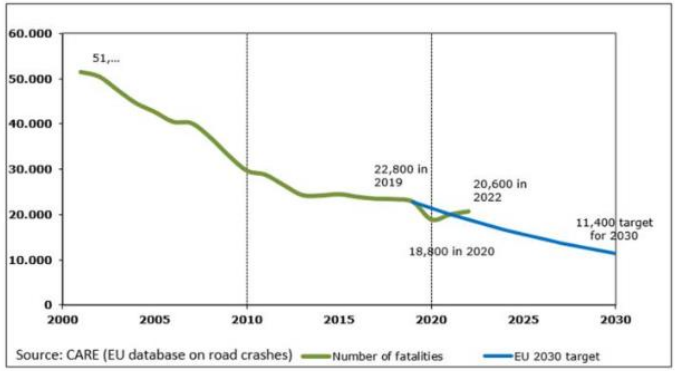
FATALITIES	IN A COLLISION WITH... PEDESTRIAN	BICYCLE	MOPED	MOTORBIKE	CAR	LORRY (<3.5T)	HEAVY GOODS VEHICLE (>3.5T)	BUS OR COACH	OTHER VEHICLE/ UNKNOWN	NO OTHER VEHICLE INVOLVED	TOTAL
PEDESTRIANS	0	26	15	98	1 635	306	246	87	125	0	2 538
CYCLISTS	4	19	4	11	404	95	134	20	51	268	1 010
MOPED RIDERS	0	0	4	3	107	26	16	4	14	109	283
MOTORCYCLISTS	8	3	5	31	539	95	65	11	31	424	1 213
CAR OCCUPANTS	13	3	2	7	581	150	129	37	100	1 127	2 149
LORRY (<3.5T) OCCUPANTS	1	0	0	0	30	14	15	2	8	75	145
HEAVY GOODS VEHICLE (>3.5T) OCCUPANTS	0	0	0	0	3	1	14	1	2	28	49
BUS OR COACH OCCUPANTS	3	0	0	0	6	1	0	3	1	10	24
OTHER/UNKNOWN	1	2	1	2	64	15	10	2	13	144	254
TOTAL	30	53	31	152	3369	703	629	167	346	2 185	7 665

European Commission | Mobility and Transport

Methodological note: the data cover fatalities in single-vehicle crashes and crashes involving one or more traffic units. For the majority of fatal crashes, only one other vehicle is involved in the crash. For multi-vehicle crashes, the 'main vehicle' is the heaviest of the vehicles involved as this tends to be responsible for the most serious consequences. As a result, the figures in each column likely underestimate the number of cases a particular vehicle was involved in a crash. Source: EU CARE database on road crashes.

Data refer to the year 2021 except IE (2017), MT and SE (2019), CZ, EE, EL, CY, LV and SK (2020)

2022 Road safety statistics



Preliminary 2021 EU Road Safety Statistics (europa.eu)

How can we make our urban roads safer?

Road Infrastructure Digitalization

1 ***Digitalization of transport corridors: Make use of your existing infrastructure***

… for additional digital data using the existing infrastructure, to enable a new era of proactive safety and connected services.

Traffic Intelligence

2 ***Identify Safety Hotspots using Traffic Analytics***

… to identify accident prone hotspots, to measure results and validate actions.

Road Users Connectivity

3 ***Connect to Driver and involve road users***

… to keep road users safe and make traffic management more relevant to the users.

Video Analytics powered by Kapsch Deep Learning Versatile Platform (DLVP)

Road Infrastructure Digitalization

Hardware agnostic video analytics**,** DLVP**,** as a SaaS ready platform translates visual input into digital data and can be deployed on a City's CCTV cameras by adding AI to provide data for:

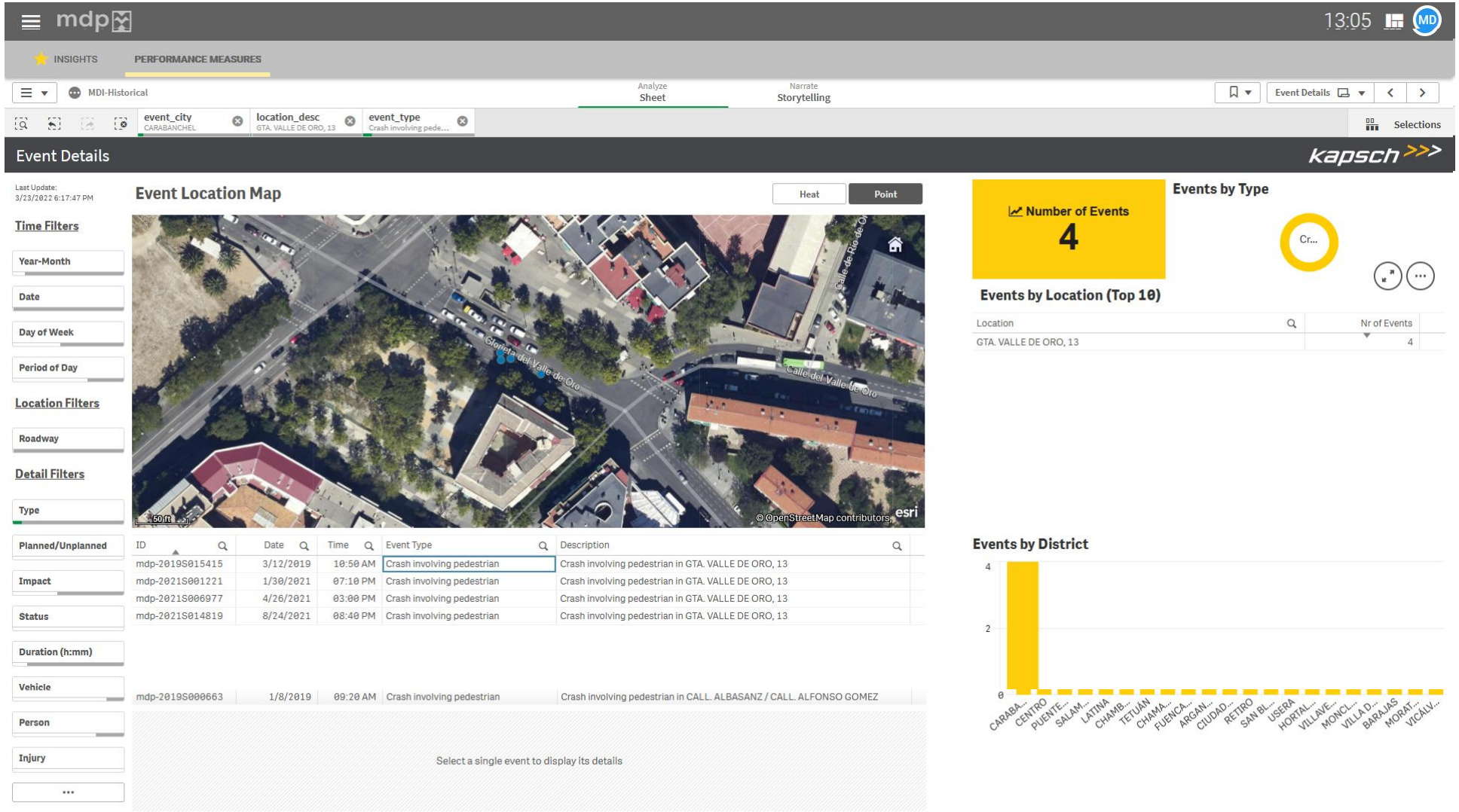
Traffic Insights: Optimize urban and highway traffic flows

Safety Insights: Increase safety on the roads

Traffic Analytics using Kapsch Mobility Data Platform Dashboards

2

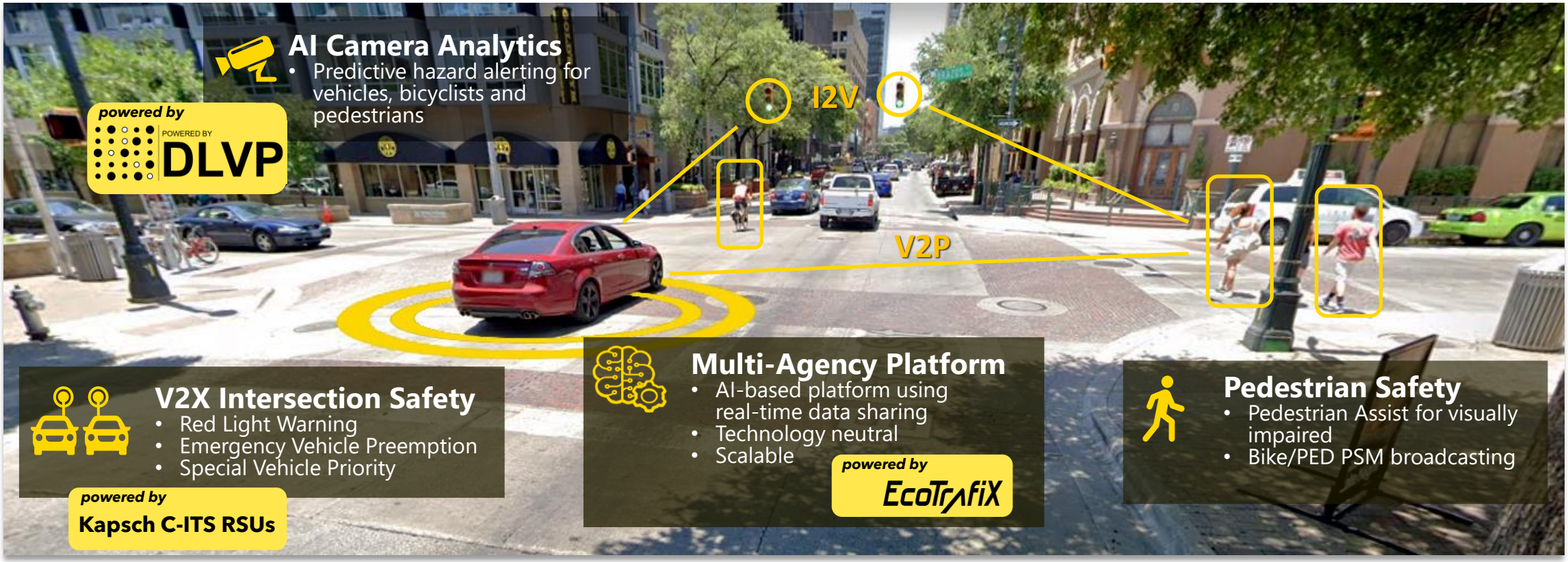
Traffic Intelligence to identify road safety concerns and target hotspots to address



Road User Connectivity. Involve Road Users

3

Intersection Safety & Management

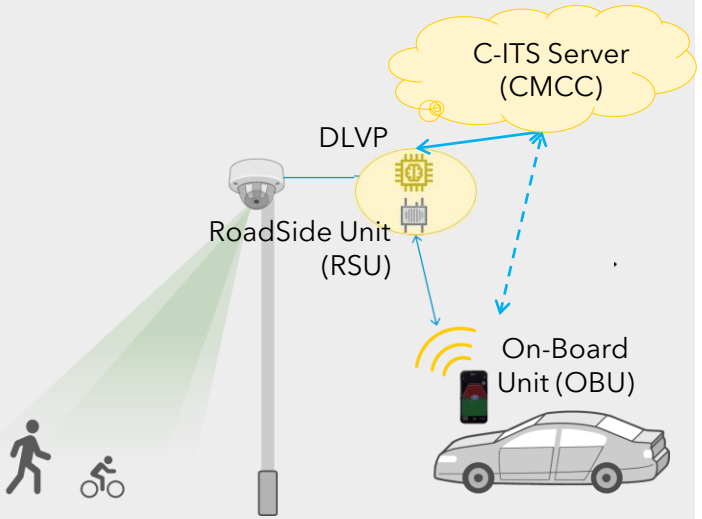


Intelligent warnings: Alerting drivers to protect Vulnerable Users

Road Users Connectivity

3

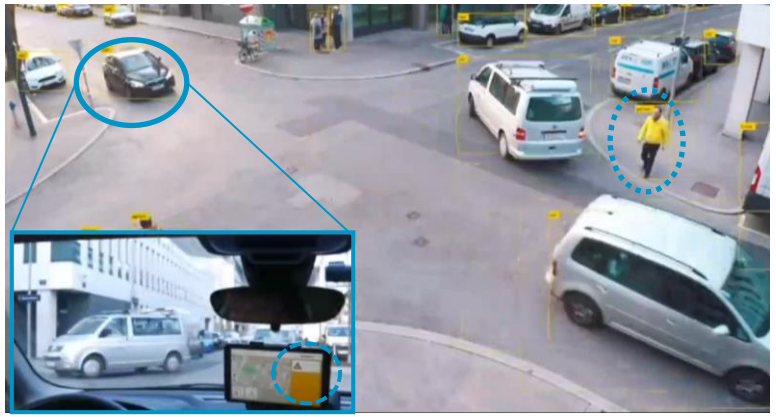
1 Video recognition based on AI to detect possible collisions and high-risk situations (pedestrians or cyclists)



Send warming to drivers in their vehicles via:

- C-ITS technology to the OBU.
- cellular mobile with and App (vOBU).

> **C-ITS equipped vehicles:**
Warnings in OBU or dashboard.



> **Rest of the vehicles and pedestrians:**
Warnings in an iOS/Android App (vOBU)

Selected Projects Showcases

Bicycle to Connected Automated Vehicle

Focus on detection of collistion risk and protection of cyclists. Salzburg, Austria

As a project partner, we installed roadside infrastructure for V2X communication and video analysis.

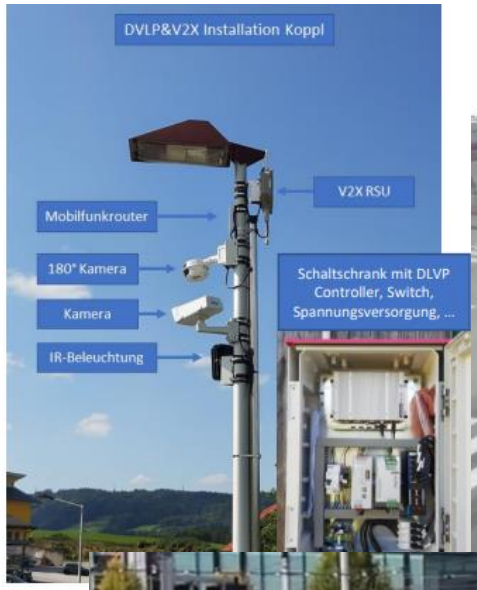
A V2X ITS-G5 RSU (Roadside Unit) enables communication with bicycles and Connected Automated Vehicles (CAV) equipped with a C-ITS Onboard Unit (OBU).

Object Detection via Cameras + DLVP technology for the detection and classification of bicycles, pedestrians and vehicles.

Detection of collision risks between vehicles and bicycles with edge computing (processing takes place directly on site in the controller).

Video analysis data is also transmitted to roadside users and a central platform via the RSU.

Expansion of V2X-communication from day-1 services, which focus on motor vehicles, to vulnerable road users (in this case, the bicycle) represents a new, innovative safety aspect.



Kapsch/Lexus – Connected Vehicle Intersection

Melbourne, Australia

C-ITS Roadside Unit successfully connected to Lexus test vehicles for V2I applications.

Successful deployment of Kapsch Video Analytics (DLVP) for “Safety Insights” to detect pedestrians in real-time.

Event-based messages to the driver about any pedestrians ahead in the crossing and improve safety at intersection.

Figure 2: Kapsch RSU and CCTV Installation (Source: Kapsch TrafficCom)

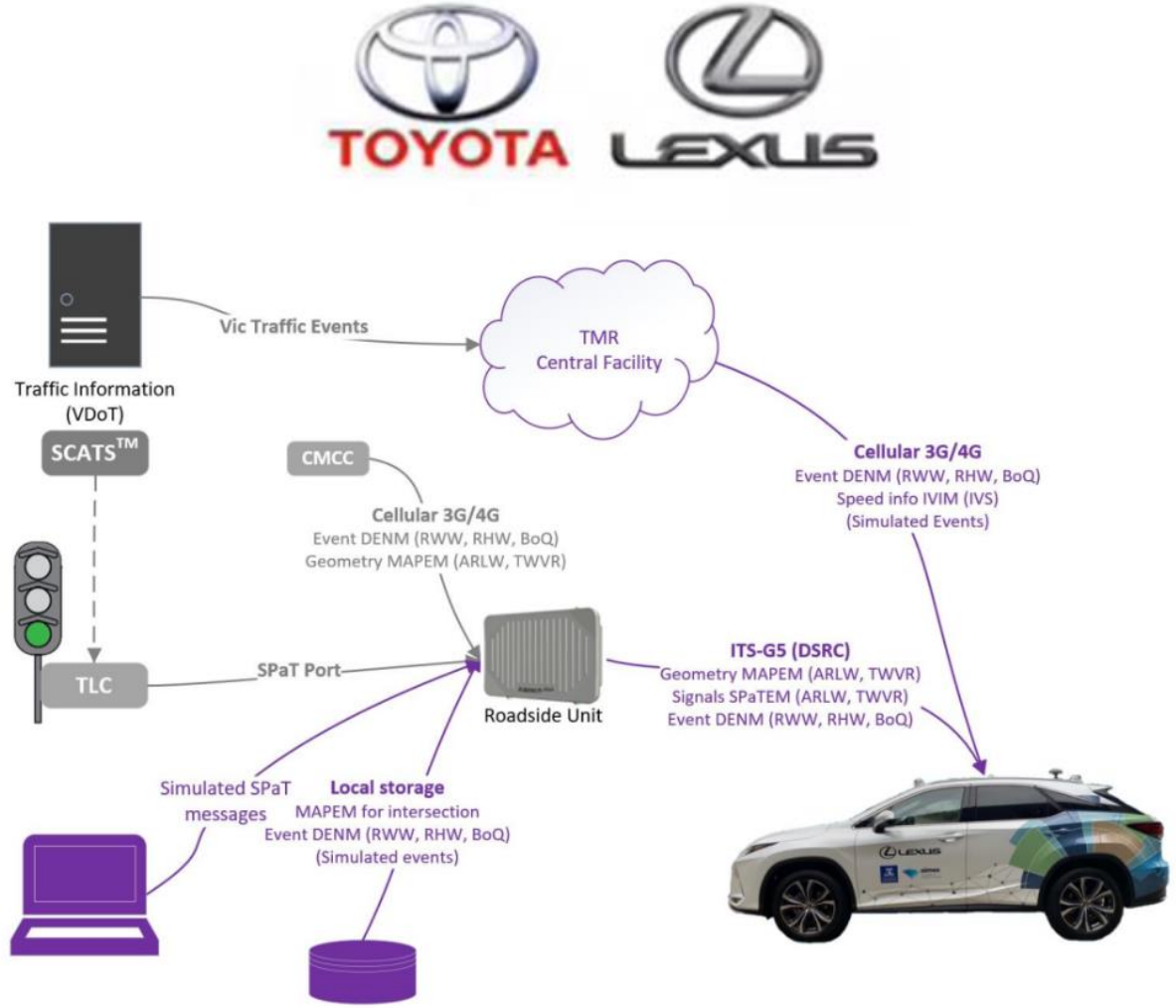


Figure 1: Test Vehicle and Infrastruc

Gwinnett County Smart Corridor

Improve Safety and reduce congestion with C-ITS in Georgia, USA

Kapsch in partnership with 360NS is leading the C-ITS hardware and software integration, and application deployment.

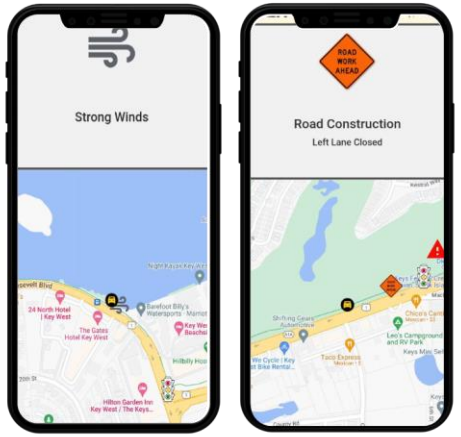
90 Kapsch On-Board Units (OBUs) installed in fire, transit and maintenance vehicles, and integrated with third-party RSUs

Cloud-based management of C-ITS Environment for visualization and monitoring of real-time events for traffic management

Innovative virtual Roadside Unit concept under deployment including mobile applications

Several safety use cases deployed:

- Signal Phase and Timing (SPaT)
- Emergency Vehicle Preemption (EVP)
- Transit Signal Priority (TSP)
- Construction and Maintenance Vehicle Alert (CMVA)
- Rail Intersection Blocked Alert (RIBA)
- Pedestrian Presence Alert (PPA)



Construction and Maintenance Vehicle Alert (CMVA)

Pedestrian Presence Alert (PPA)

Rail Intersection Blocked Alert (RIBA)

Smart Columbus Connected Vehicle Environment.

Smart City disseminating lessons learned and best practices to cities across US.

Project Objectives

Improve Vehicle Operator Safety and Intersection Safety

Reduce Speeds in School Zones and increase driver awareness

Improve emergency response times

Improve reliability of transit vehicle schedule adherence

Reduce truck delay at signalized intersections

Improve transit and traffic management

Kapsch Solution

C-ITS safety and mobility applications including **Reduced Speed Zone Warning, Transit Signal Priority** and **Emergency Vehicle Preemption** and SPaT/MAP are deployed

Approximately 100 intersections with 67 Kapsch C-ITS Roadside Stations and 43 RSUs from multiple other vendors

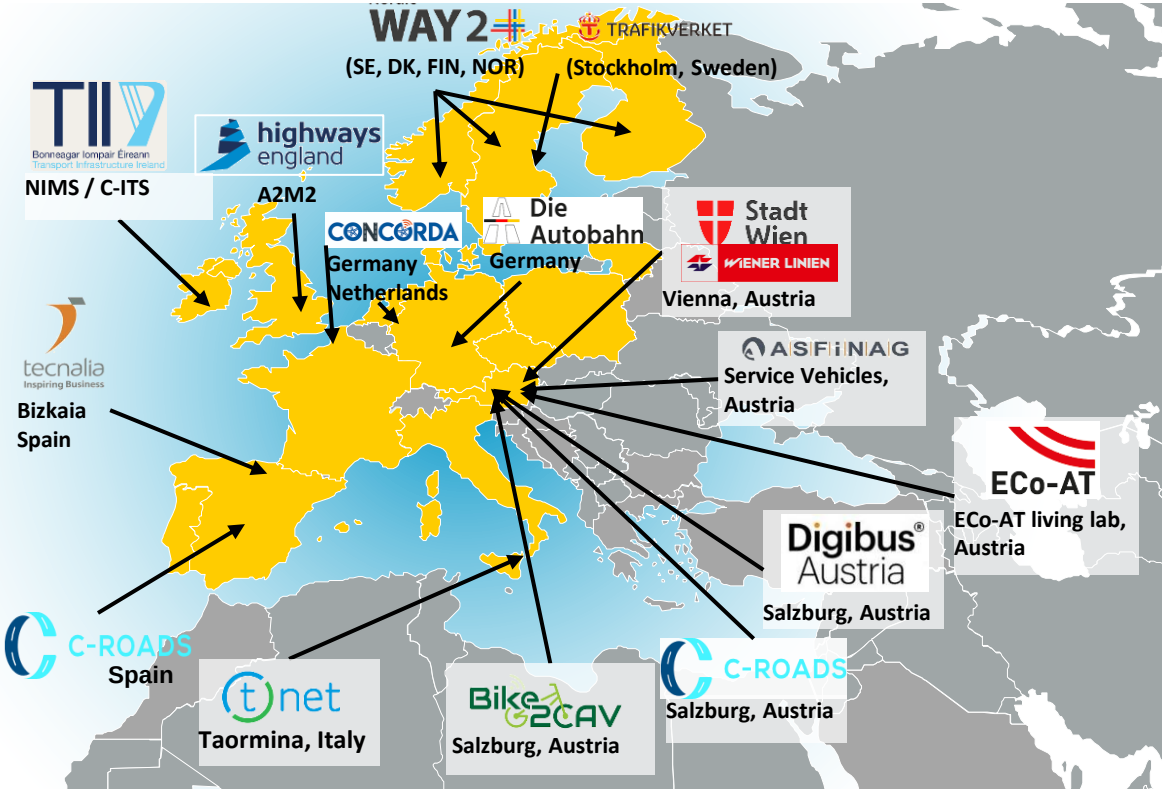
C-ITS Control Center (CMCC) used for MAP messages, data management, monitor and control for all RSUs in the area

Figure 1: Connected Vehicle Environment Applications by Intersection

Source: City of Columbus

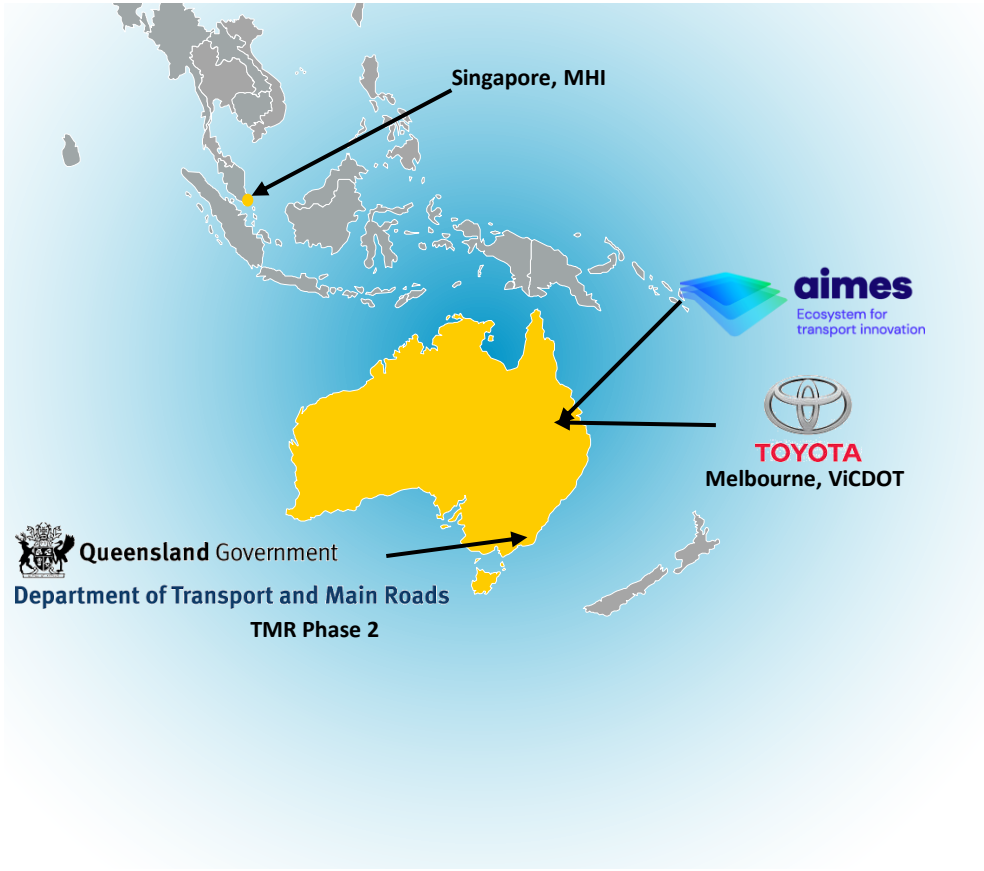
EMENA / APAC Connected Vehicle C-ITS Projects

EMENA



APAC

Die Autobahn



Die Autobahn: the C-ITS Project in Germany

First major commercial deployment of Connected Vehicles in Europe

Die Autobahn

Based on **C-ITS-G5** (802.11p) technology, with the possibility of switching to C-V2X.
According to the C-ROADS project specifications

Coverage: **All the highway network in Germany.**

Divided into 3 lots. Lots 1 and 2 awarded to Kapsch.

Installation of about **1,800 V2X Roadside Unit (RSU) equipment** in **phase 1**.

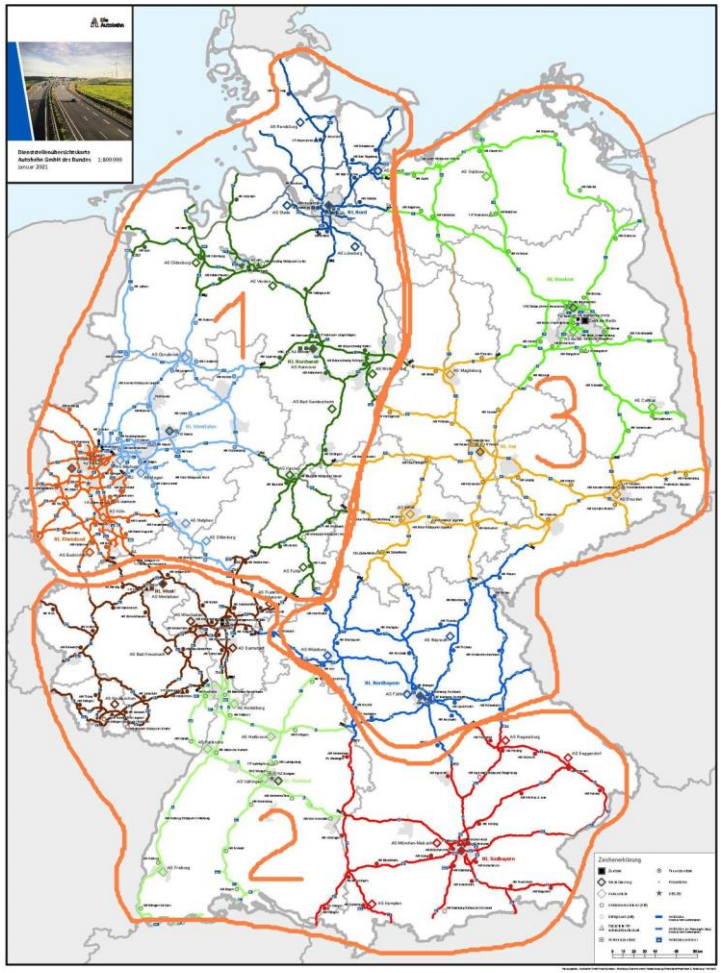
The number of RSUs is expandable in subsequent phases.

The system includes **IT security** functions: PKI.

Secure exchange of messaging with vehicles.

Timeframe: **Phase 1: 2023-2024** / Remaining phases and maintenance: **until 2035.**

The dates of the following phases will be defined as the project progresses.



Die Autobahn: the C-ITS Project in Germany.

Defined Use Cases, to be deployed progressively.

Priority 1

- ***Mobile - Road Works Warning*** from road work trailers for short duration works.
- ***Provide Vehicle Data***.

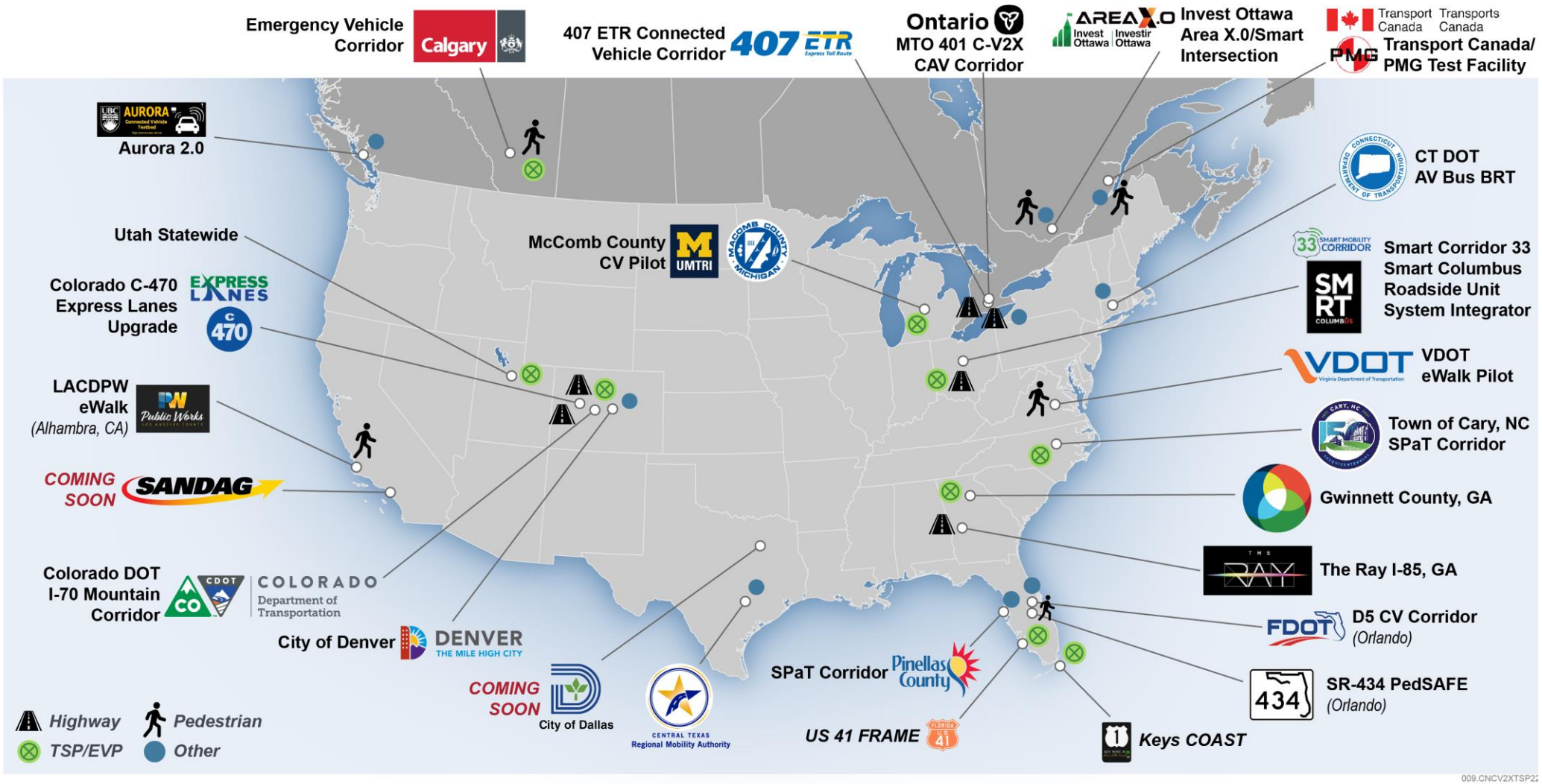
Further services

- ***Road Works Warning*** on all construction sites.
- ***Traffic Jam Ahead Warning*** detected from loop data.
- ***In-Vehicle Signage.***
- ***Route Advice***, copy of the information from the panels.

Further services

- ***Traffic Jam Ahead*** from PVD data.
- **Route Advice**, expanding the information on the panels.
- ***Maintenance Vehicle Warning.***
- ***Weather condition Warning.***

Kapsch C-ITS Safety Projects – North America



Thank you for your attention

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