

# 5G V2X

The automotive use-case for 5G

Fred Soudain  
LOGOS Public Affairs

- 
- According to WHO, there were about **1.25 million road traffic fatalities** worldwide in 2013, with another 20–50 million injured or disabled through traffic accidents
  - The overall economic impact of road crashes was estimated to be \$518B globally and in some countries this represents 1-5% of the GDP
  - Advanced sensing, **communication** and computing technologies should be integrated into vehicles to improve these statistics and save lives
  - Beyond saving people's lives, these technologies will also enable fully autonomous driving, which will profoundly transform transportation



## INNOVATION ON CONNECTED CARS: TOWARDS EU REGULATION(S)

Regulatory context setting: 14 April 2016, the European Commission, EU member states and the transport industry adopted the [Amsterdam Declaration](#) laying down the steps necessary for the development of self-driving technology in the EU,

Cooperation public-private: **The 5G-Infrastructure-PPP** is a 1.4 Billion Euro joint initiative between the European ICT industry and the European Commission to create the next generation of communication networks and services

Consultations started: **GEAR 2030 HLG** set up to assist the Commission on all matters relating to the competitiveness and sustainable growth of the automotive industry to facilitate the roll out of autonomous and automated vehicles

Regulatory machine in action: **5G Action Plan** (released 14 September 2016) including among others:

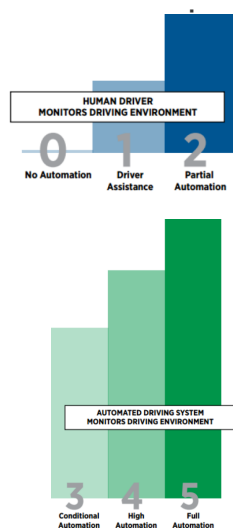
- Agree by end of 2017 on the full set of spectrum bands to be harmonised for deploying 5G networks
- Ensure the availability of the initial global 5G standards by the end of 2019
- Establish appropriate cross-industry partnerships, by the end of 2017, to support the timely definition of standards

# WHEN INNOVATION MIXES WITH CRISIS: TESLA'S AUTOPILOT

Tesla's Autopilot approved by Netherlands as ADAS but interpretation contested by others e.g. Sweden, Germany

Germany's Federal Highway Research Institute (BAST): "**erhebliche Verkehrsgefährdung**"

Marketing vs. Liability or Self Driving vs. Assisted Driving: safety concerns "stronger" than



environmental issues

## Short-term:

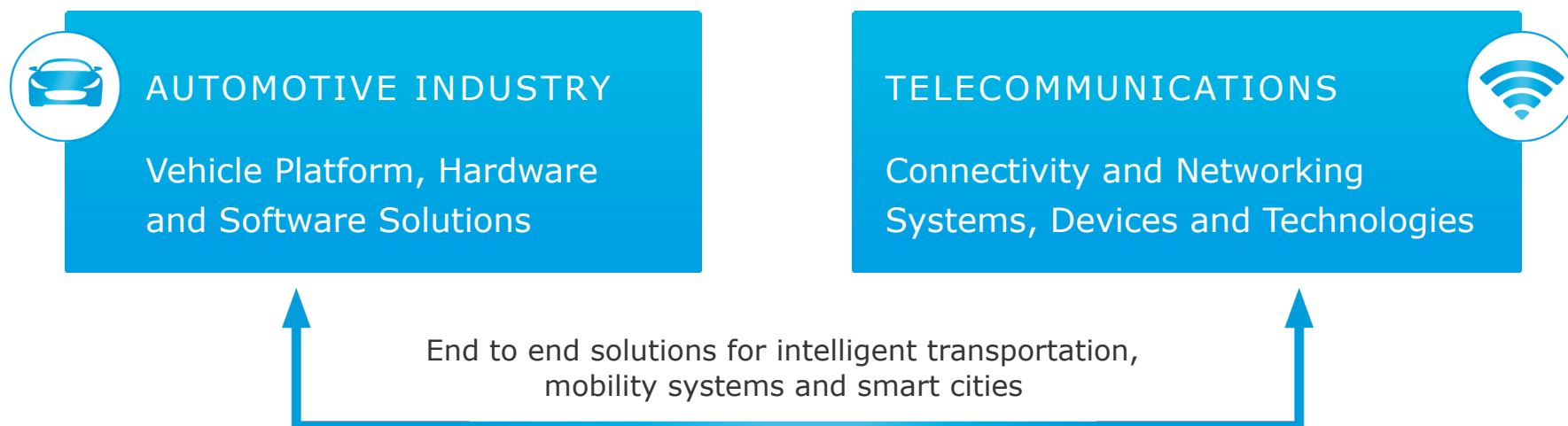
- No major compatibility issue with the EU legislation for automation systems up to level 3
- 1968 Vienna Convention amended to allow more advanced systems, but not driverless cars
- National traffic rules apply for testing/unregulated systems

## Long-term:

- Liability/ethical issues when vehicle takes over driving (Motor Insurance Directive/national legislation) - MIT "Moral Machine"
- Type-approval (WVTA): interaction driver-vehicle (HMI, automated driving strategy), emergency manoeuvres, cybersecurity
- Traffic rules (national/UN legislation), driving licence (EU/national legislation), infrastructure (e.g. lane marking), roadworthiness, etc.
- Data issues (EU/national legislation) linked to connected vehicles: security, data sharing, privacy, etc.



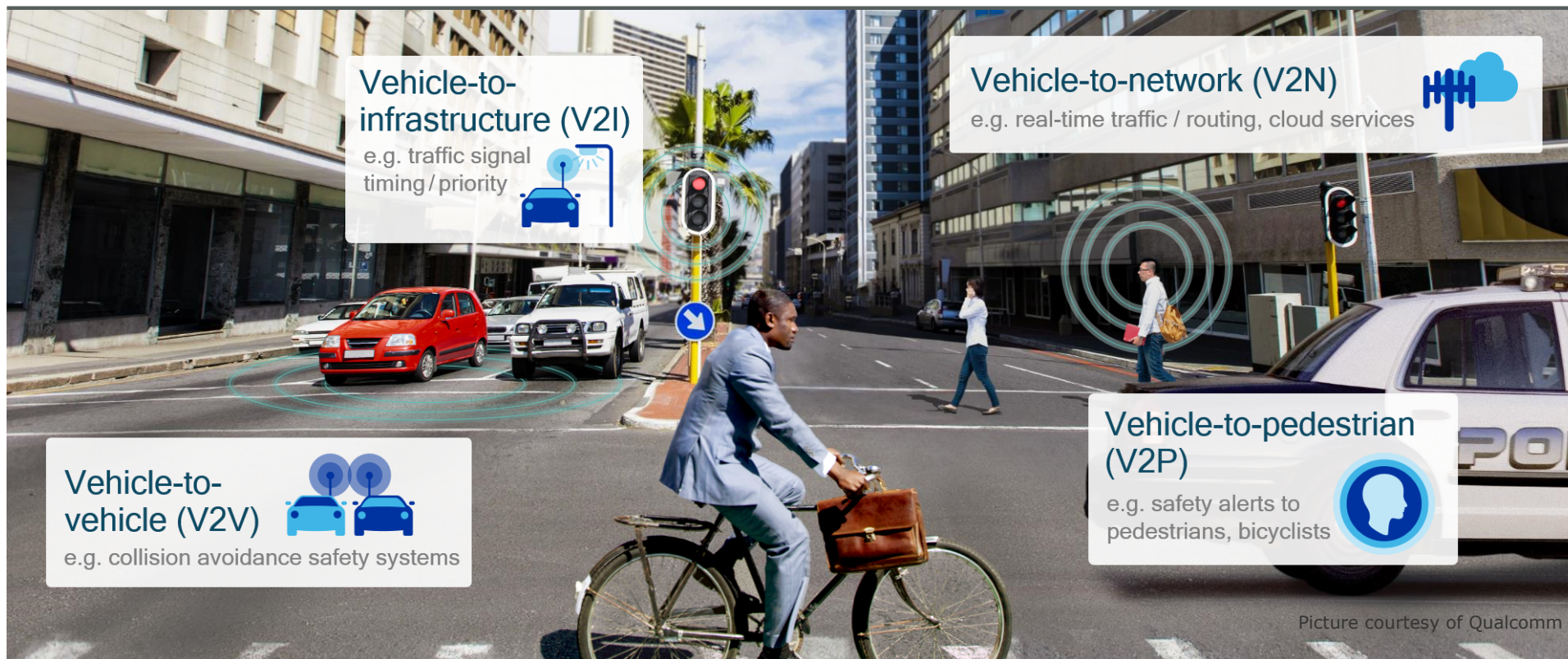
5GAA was created to connect telecom industry and vehicle manufacturers and work closely together to develop end-to-end solutions for future mobility and transportation services





*New 3GPP logo for 5G*

- The telecom industry is in the process of defining the 5G standards
- 5G will be much more than mobile broadband connectivity, covering a variety of use-cases and industries
- One of the most interesting 5G use-cases is V2X, the framework that will allow vehicles to **communicate** with each other and beyond
- 5GAA will partner with the relevant SDOs to drive the requirements of 5G V2X and to create a successful ecosystem for V2X



Picture courtesy of Qualcomm



## SAMPLE USE-CASES ENABLED BY V2X (1)

<b>Left Turn Assist</b>	Alerts are given to the driver as they attempt an unprotected left turn across traffic, to help them avoid crashes with opposite direction traffic
<b>Intersection Movement Assist</b>	Informs driver when it is not safe to enter an intersection—for example, when something is blocking the driver's view of opposing or crossing traffic.
<b>Emergency Electronic Brake Lights</b>	Driver is alerted to hard braking in the traffic stream ahead. This provides the driver with additional time to look for, and assess situations developing ahead
<b>Queue Warning</b>	Intended to engage well in advance of any potential crash situation, providing messages and information to the driver in order to minimize the likelihood of his needing to take crash avoidance or mitigation actions later. The infrastructure will broadcast queue warnings to vehicles in order to minimize or prevent rear-end or other secondary collisions.
<b>Speed Harmonization</b>	Determines speed recommendations based on traffic conditions and weather information. It detects the developing roadway or congestion conditions that might necessitate speed adjustments for upstream traffic and broadcasts such recommendations to vehicles long before they reach the affected area.
<b>Real Time Situational Awareness</b>	Provides mechanisms for vehicles to receive real time information about city/roadway projects, lane closures, traffic, and other conditions that may necessitate adjustments to driving patterns.

## SAMPLE USE-CASES ENABLED BY V2X (2)

<b>Software updates</b>	Provides mechanisms for vehicles to receive the latest software updates and security credentials required to ensure their safe operation.
<b>Remote Vehicle Health Monitoring</b>	Provides mechanisms to diagnose vehicle issues remotely. As driving becomes more autonomous this becomes the key mechanism for remote supervision of vehicle functions and its health.
<b>Real-Time High Definition Maps</b>	Provides situational awareness for Autonomous vehicles at critical road segments in cases of changing road conditions (e.g. new traffic cone detected by another vehicle some time ago)
<b>High definition sensor sharing</b>	Provides mechanism for vehicles to share high definition sensor data (Lidar, cameras, etc) to enable better driving coordination for platooning and intersection management
<b>See-Through</b>	Provides ability for vehicles such as trucks, minivans, cars in platoons to share camera images of road conditions ahead of them to vehicles behind them
<b>Vulnerable Road User Discovery</b>	Provides ability to identify potential safety conditions due to the presence of vulnerable road users such as pedestrians or cyclist

- 
- For the access part, 3GPP finalized an initial version of V2X in Release 14. Discussion is ongoing to define next generation V2X capabilities
  - For the upper layers, V2X will leverage ETSI-ITS, ISO, SAE and IEEE standards and tests refined by the automotive industry and others in the ITS community for over a decade
  - Multiple trial activities are ongoing (see next slide)

Name, Place	Companies
RACC track, MWC 2017	Audi, Vodafone, Huawei @ MWC
ConVeX (A9), Germany	Audi, Ericsson, Qualcomm, Swarco, Kaiserslautern Univ.
Towards 5G, France	Ericsson, Orange, Qualcomm, PSA Group
Mobilifunk (A9), Germany	Vodafone, Bosch and Huawei
UK CITE, UK	Jaguar Land Rover, Vodafone, et al
DT (A9), Germany	Audi, Deutsche Telekom, Huawei, Toyota
Car2X at A9, Germany	Continental, DT/T-Systems, Nokia, Fraunhofer
Car2X in Wuzhen, China	CMCC, Continental, Nokia, Fraunhofer
ICV pilot projects, China	CMCC, Huawei, SAIC, et al
MEC pilot project, Germany	Bosch, DT/T-Systems, Nokia



## DRIVING ASSISTANCE POWERED BY C-V2X

VR Demo in Vodafone FIRA stand



Use cases experience on VR Simulator

In RACC car Track beside Barcelona F1



C-V2X demo outside of MWC Venue

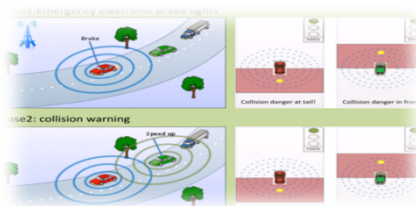
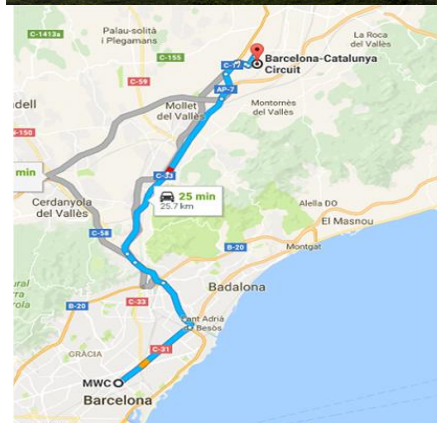


Live Demo @ outside track



## LIVE DEMO ON CAR TRACK

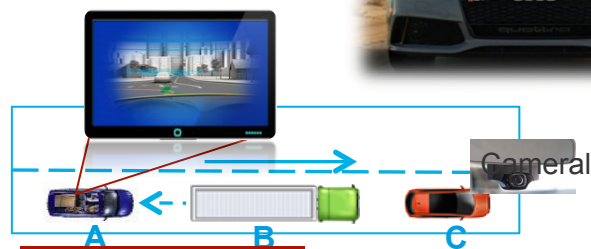
### Demo Use cases



V2V: emergency braking



V2I: Optimal speed advisory



V2N: See Through



V2P: Pedestrian alarm

- 1) For the time being, PTWs industry is absent from these ongoing initiatives (may be exception made of OEMs with dual Car/PTWs activities (BMW, Honda))
- 2) PTWs not enough mentionned in the category of vulnerable users
- 3) Several tesbeds and trials are in the process to be preparer → still room for establising liaison between PTWs community and 5GAA
- 4) It also appropriate to assess whether PTWs could be inserted in EU backed innovation and tests projects (see current activities by EATA)



## INFORMATION

---

For more information please contact:

Fred Soudain: [fred.soudain@logos-eu.com](mailto:fred.soudain@logos-eu.com)

WWW.5GAA.ORG