



DEUTSCHE TELEKOM'S VIEW ON HYBRID COMMUNICATION IN C-ITS

CODECS Workshop, Brussels, 19 May 2017

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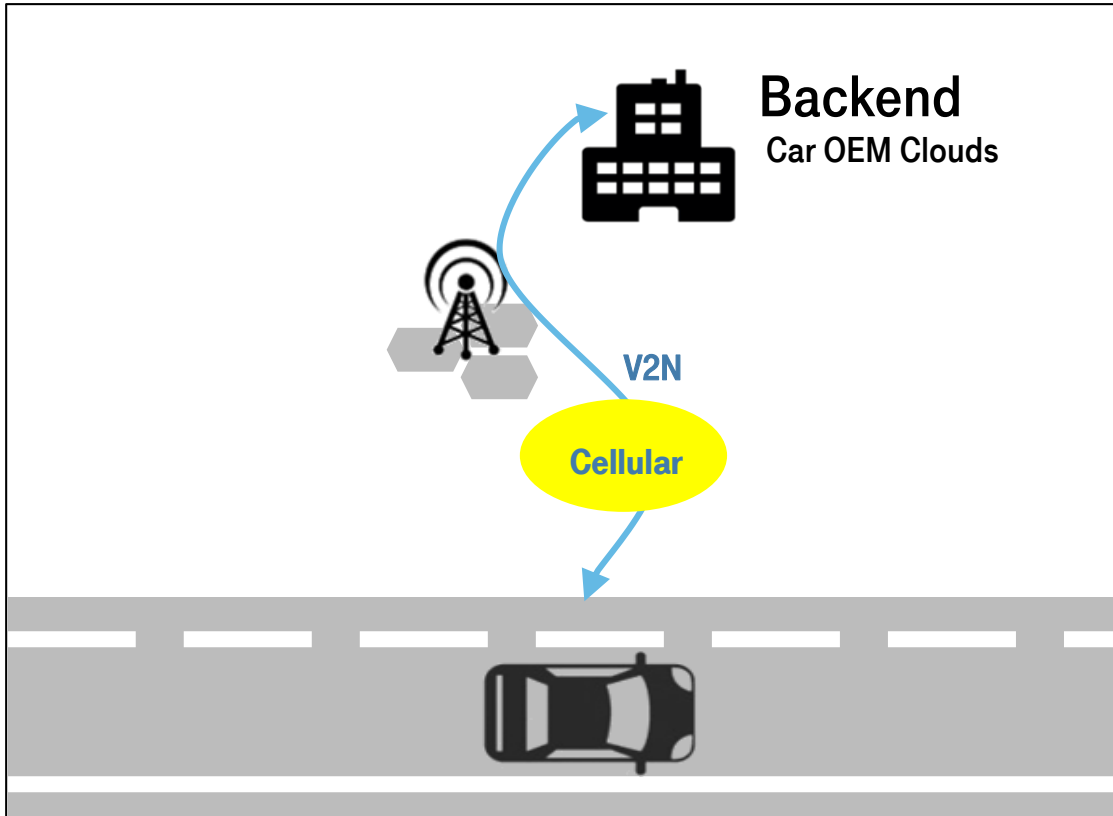


LIFE IS FOR SHARING.

ELEMENTS OF HYBRID COMMUNICATION IN C-ITS

#1: Cellular Communication

Vehicle Telematics Services - commercial since the late Nineties



Connectivity: Cellular

- from 2G (GSM, CdmaOne, PDC)
- over 3G (UMTS/HSPA, CDMA2000/EV-DO)
- to latest 4G (LTE/LTE-A/LTE-A Pro)
- with an evolution path to 5G

Services

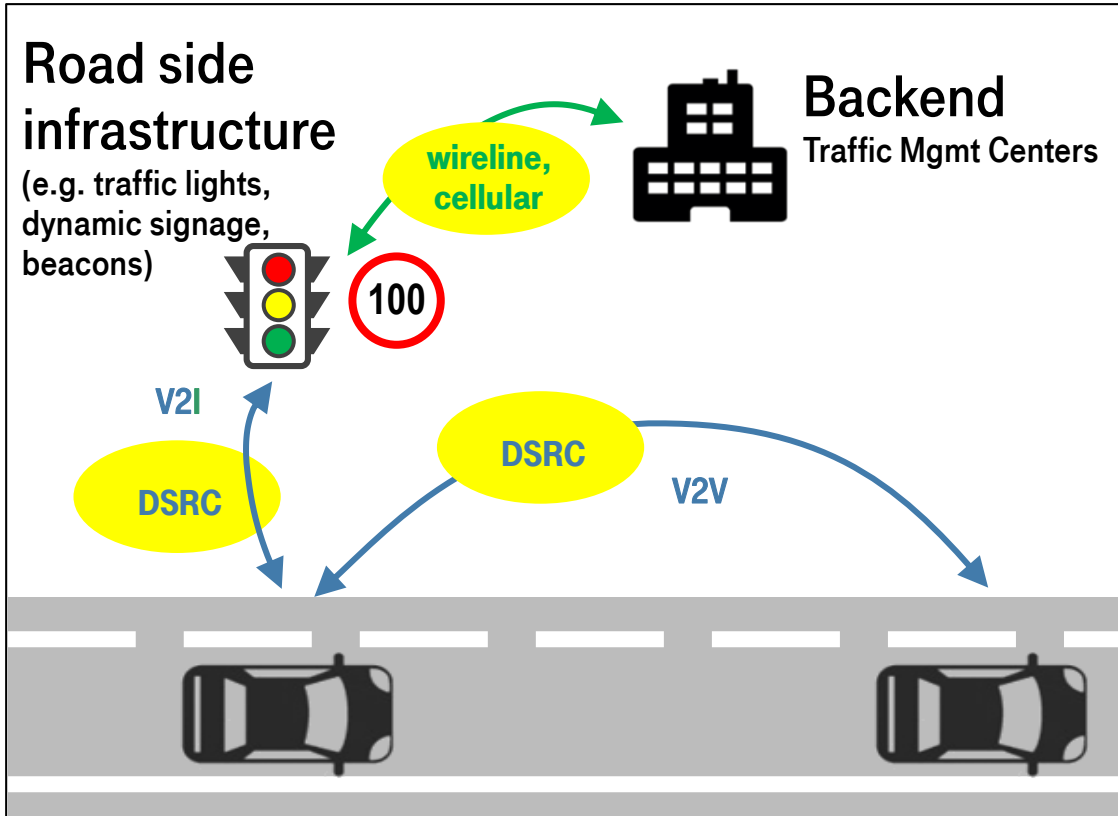
Emergency /Breakdown/Concierge Call
Real-Time Traffic (Flow) Information
Hazard Warning
Remote Vehicle Diagnostics /Services
Parking, Refueling/Charging, Maintenance
Infotainment, In-Car Hotspot ...

**Fully
standardized**

**similar per Car
OEM, but not
standardized**

#2: DSRC

ITS has been researched, developed and trialed for a long period



Connectivity: DSRC

- a) 802.11p
- b) New since March 2017: C-V2X
LTE-V PC5 with predefined scheduling (mode 4) or with scheduling coordinated by cellular (mode 3), both complemented by LTE-V uU (i.e. over cellular for V2N)

Fully standardized

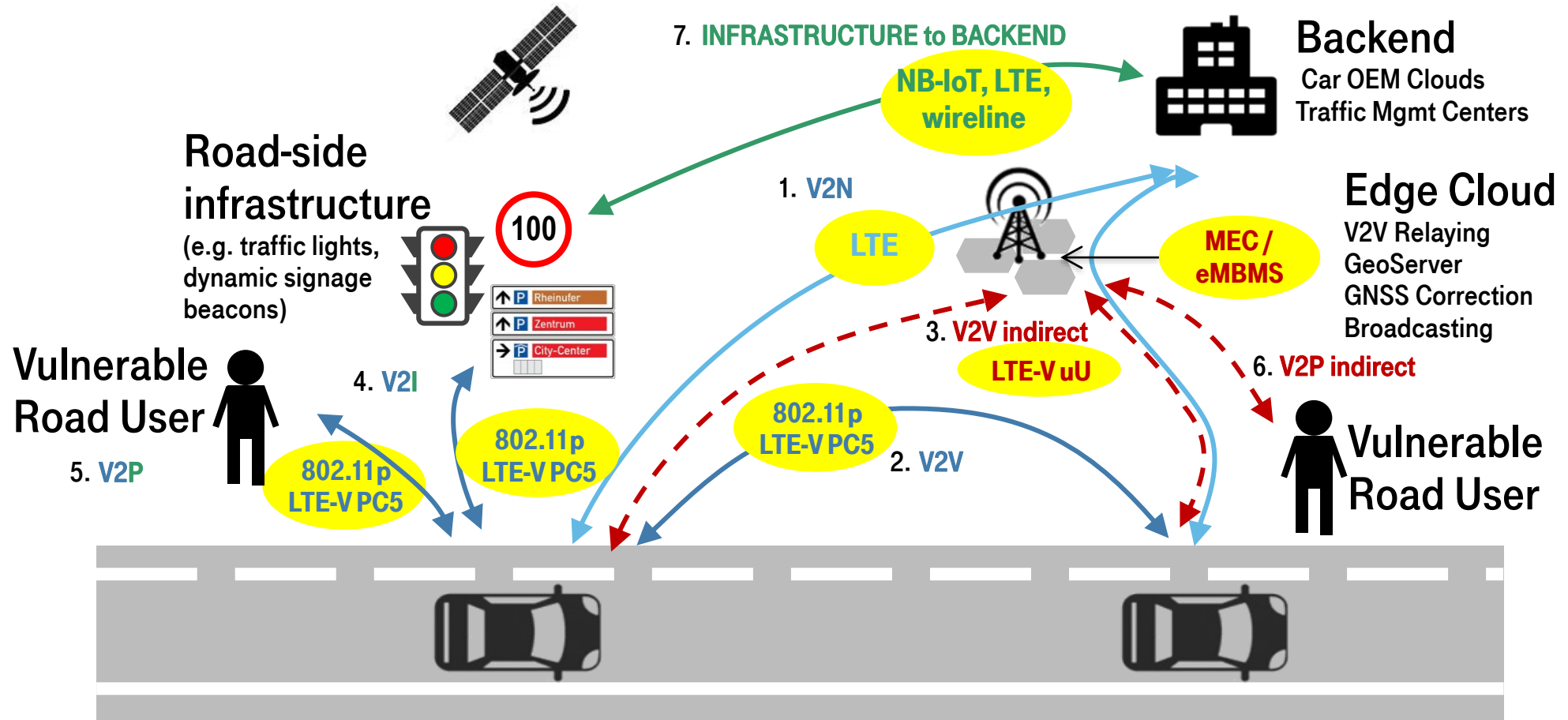
Services

Enablers for CAD, Road Safety, Transport Efficiency (e.g. Truck Platooning), ...

Fully standardized

...and in combination...

THE FULL PICTURE OF HYBRID COMMUNICATION IN C-ITS



ONLY HYBRID COMMUNICATION CAN MAKE ITS-G5 A FULL SUCCESS...

Cellular communication based on 4G and its further evolution enables adding crucial functionality to ITS, such as:

- OTA Management of the ITS-G5 credentials and certificate system
- GNSS correction service for mass-market, highly accurate positioning
- Crowdsourcing, aggregation, blending and sharing of ITS data between all contributing parties and authorities including redistribution to all ITS users (e.g. road conditions, traffic flow information, hazard detection and warning)
- A second, complementary communication path besides DSRC to provide partial system redundancy

...and certainly more as we move to pre-deployment and full deployment.





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