

6 challenges to the introduction of Connected Vehicles

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5G Automotive Association



Driving Connected Mobility Forward

5GAA brings together automotive, technology and telecommunications companies to work closely together to develop end-to-end connectivity solutions for future mobility and transportation services



AUTOMOTIVE INDUSTRY

Vehicle Platform, Hardware
and Software Solutions



TELECOMMUNICATIONS

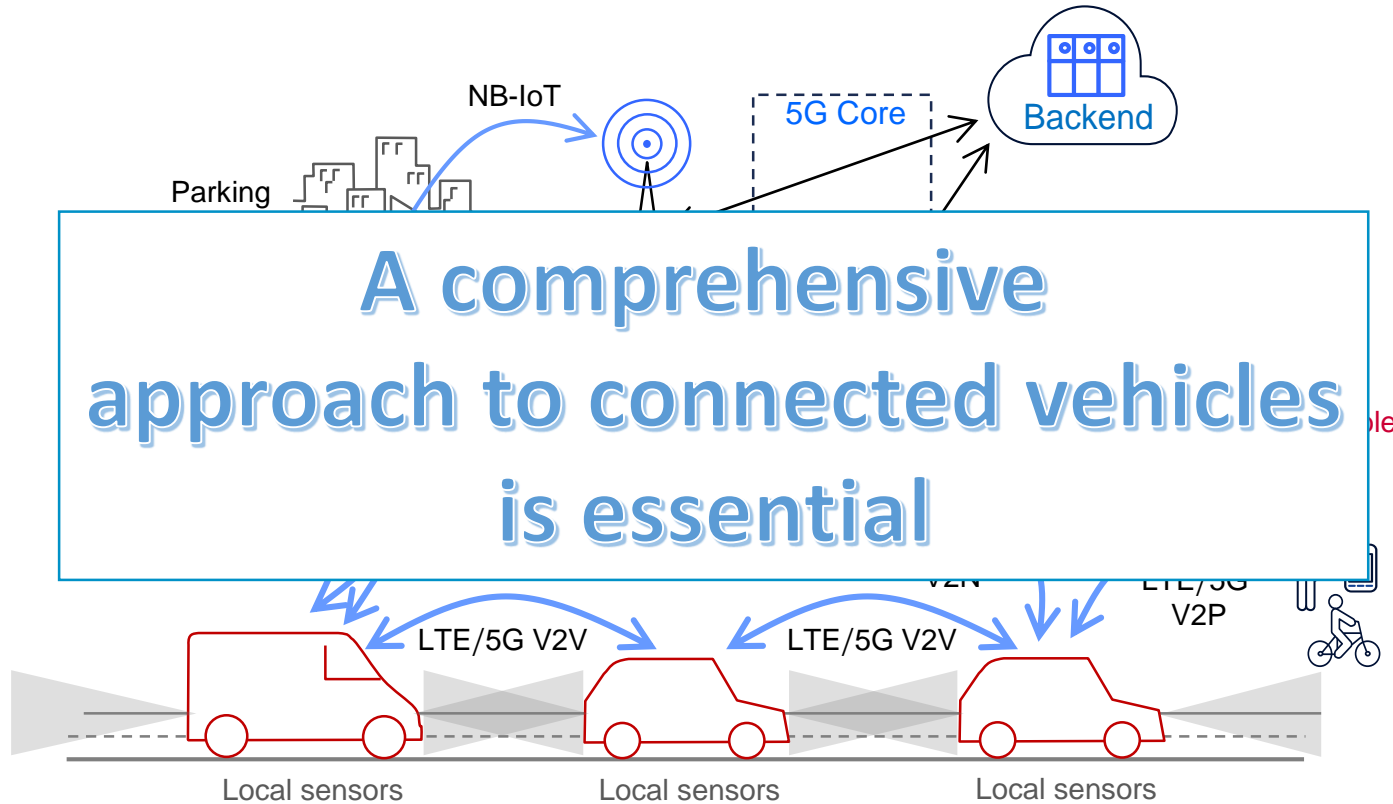
Connectivity and Networking
Systems, Devices and
Technologies

5GAA unites 118 members* from around the world working together on all aspects of C-V2X including technology, standards, spectrum, policy, regulations, testing, business models and go-to-market

Automotive Connectivity Landscape

C-V2X is a unified technology platform which integrates:

- **Short-range**, network-less, direct communications (LTE-V2X **PC5** today)
- **Long-range** cellular network communications (LTE-V2X **Uu** today)



AT&T Connected Car by the Numbers

24M
connected cars

We have nearly 24 million connected cars on the AT&T network as of 3Q18

1M+ subscribers on retail Wi-Fi plans*



*Already included in our existing postpaid and prepaid subscriber bases

3M+
fleet vehicles

We have more than 3 million connected fleet vehicles on our network as of 3Q18

Our global SIM provides IoT connectivity across **500** carriers

and **200+** countries & territories 

+45,000,000 GB
unlimited data usage

Our subscribers used more than 45 million GB of data between March 2017 and September 2018 – *enough for more than 100 million hours of streaming video*

29  global brands

We have relationships with 29 of the top global vehicle brands

Globally: ~1b veh

EU: ~298m veh

17.5m veh/Year

(Source: ACEA, 2018)

Predicted 150m veh will be connected in 2020

(Source: Gartner, 2016)

14 car makers will deploy C-V2X from H2-2020 in China

All Ford will be C-V2X enabled by 2022 in US

(Source: FORD, 2019)

\$USD 253bn by 2025

(Machina Research, 2017)

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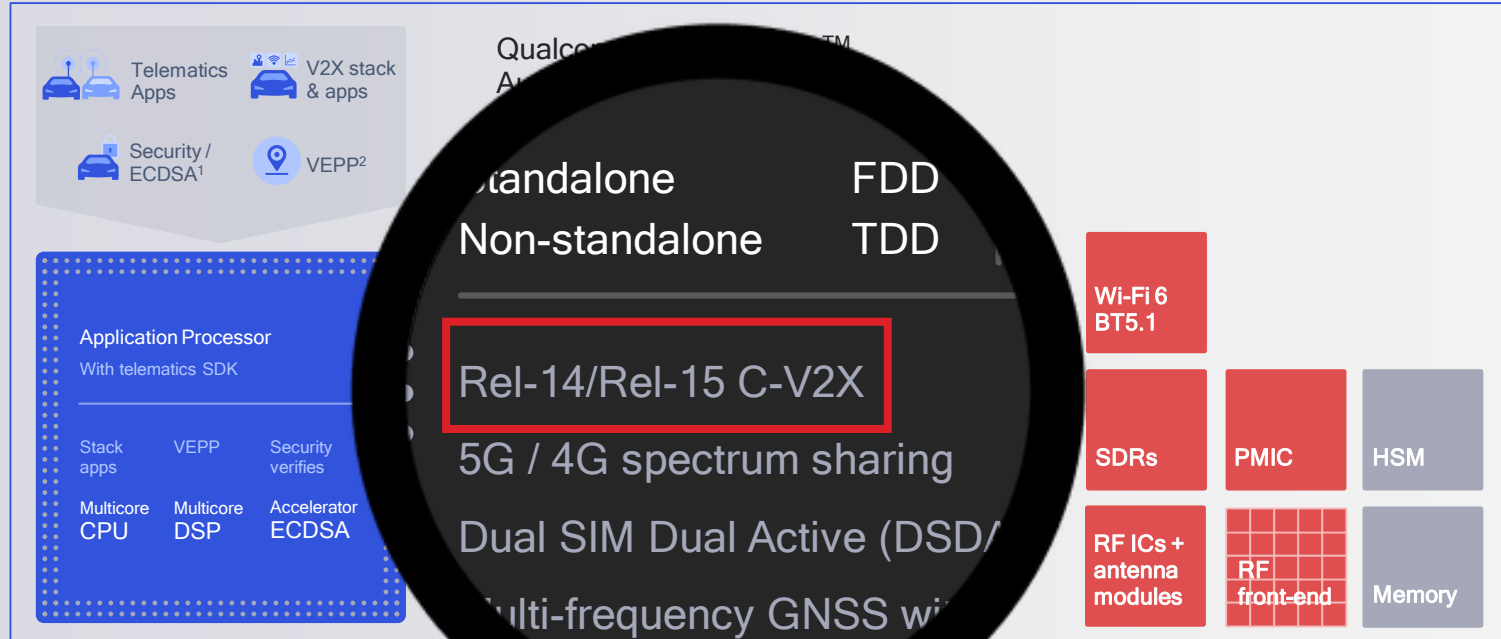


Some 5GAA challenges which will accelerate deployment of C-ITS services

1. Make cutting-edge technology available globally
2. Exploit fully the current mobile networks
3. Enable complex interaction Use Cases
4. Predict and Guarantee Quality of Service
5. Guarantee cross-border continuity of services
6. Test and Certify Cellular-V2X
7. Include Pedestrians, Cyclists, Riders, and others

1. Make cutting-edge technology available globally

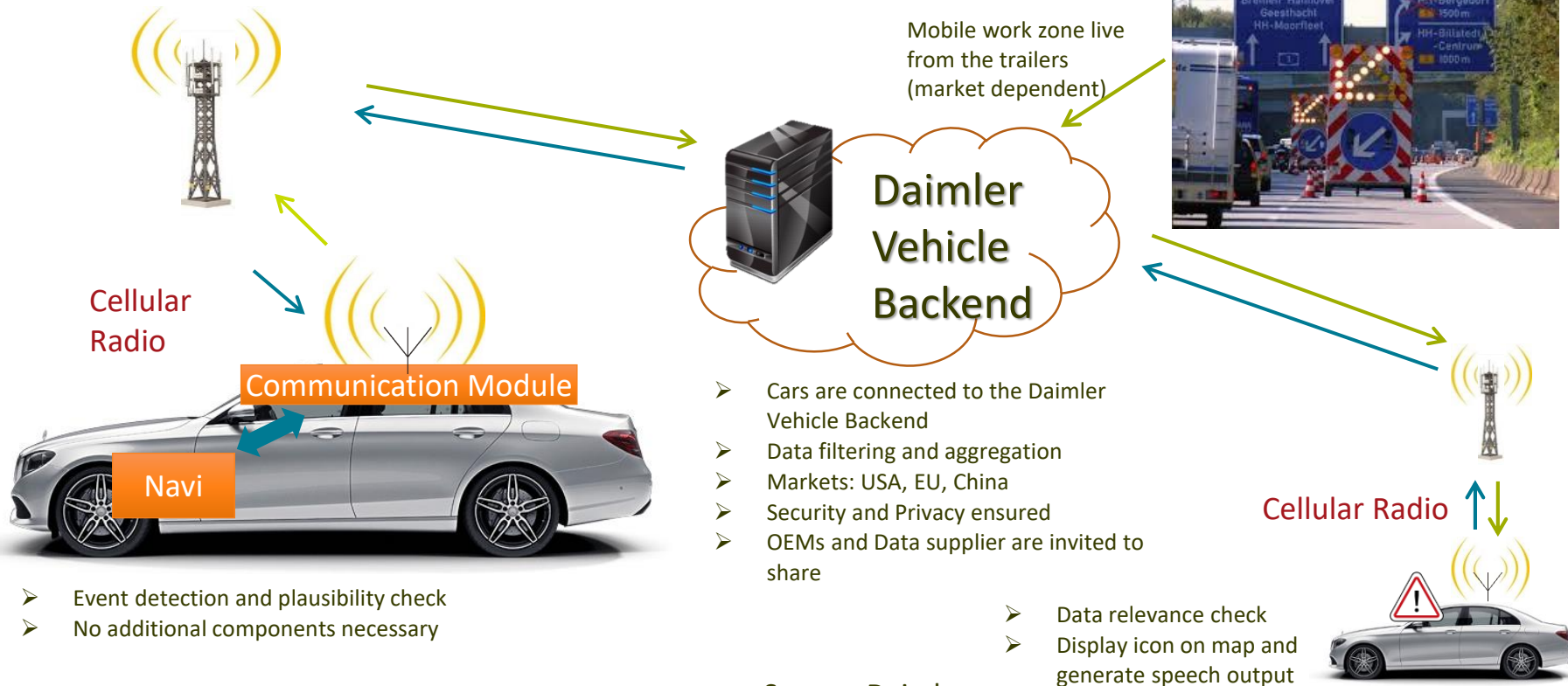
Qualcomm® Connected Car Reference Design, Gen 2



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1. Elliptic Curve Digital Signature Algorithm, 2. Vision Enhanced Positioning

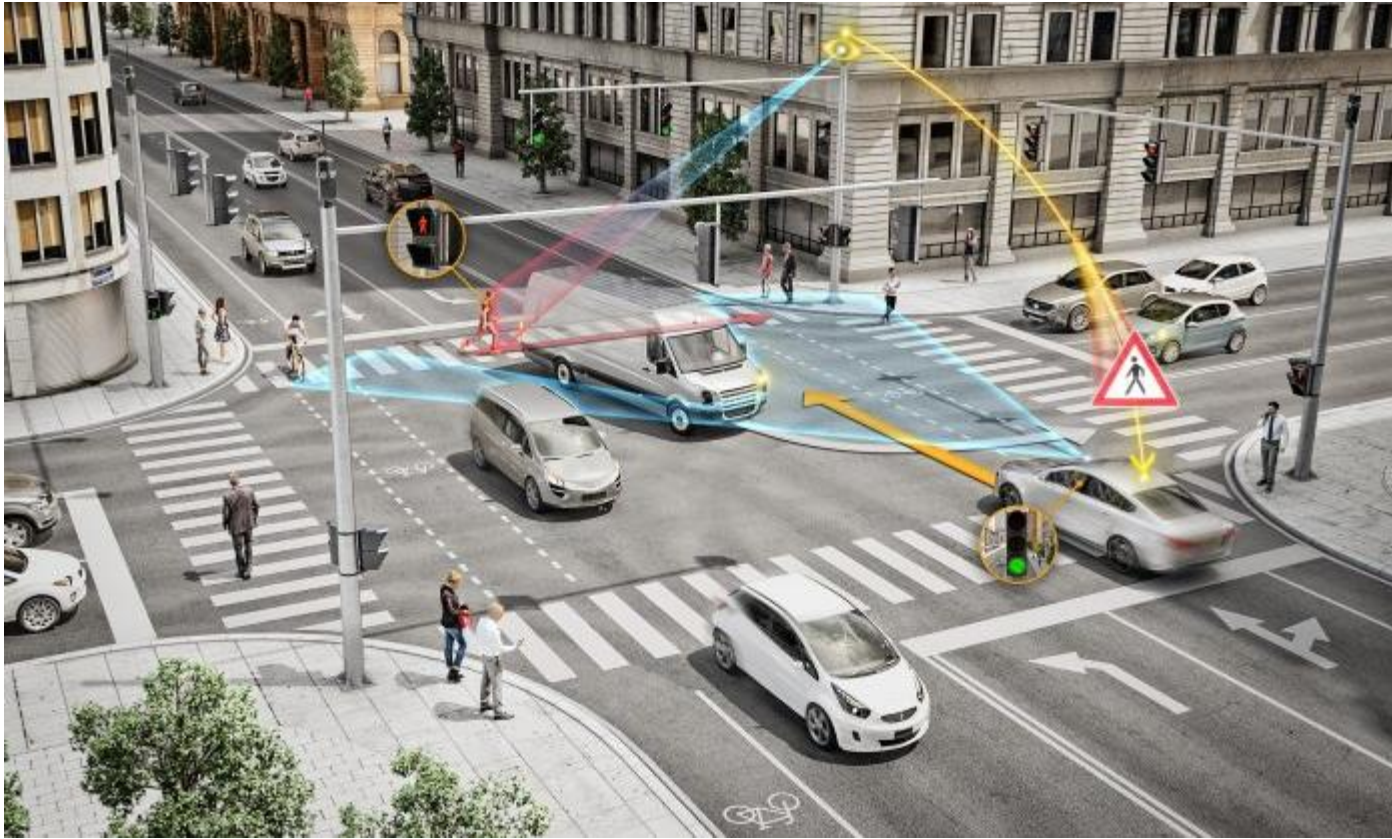
Source: Qualcomm,
Announced at the MWC2019, Barcelona

V2X via Mobile Network: E-Class 2016



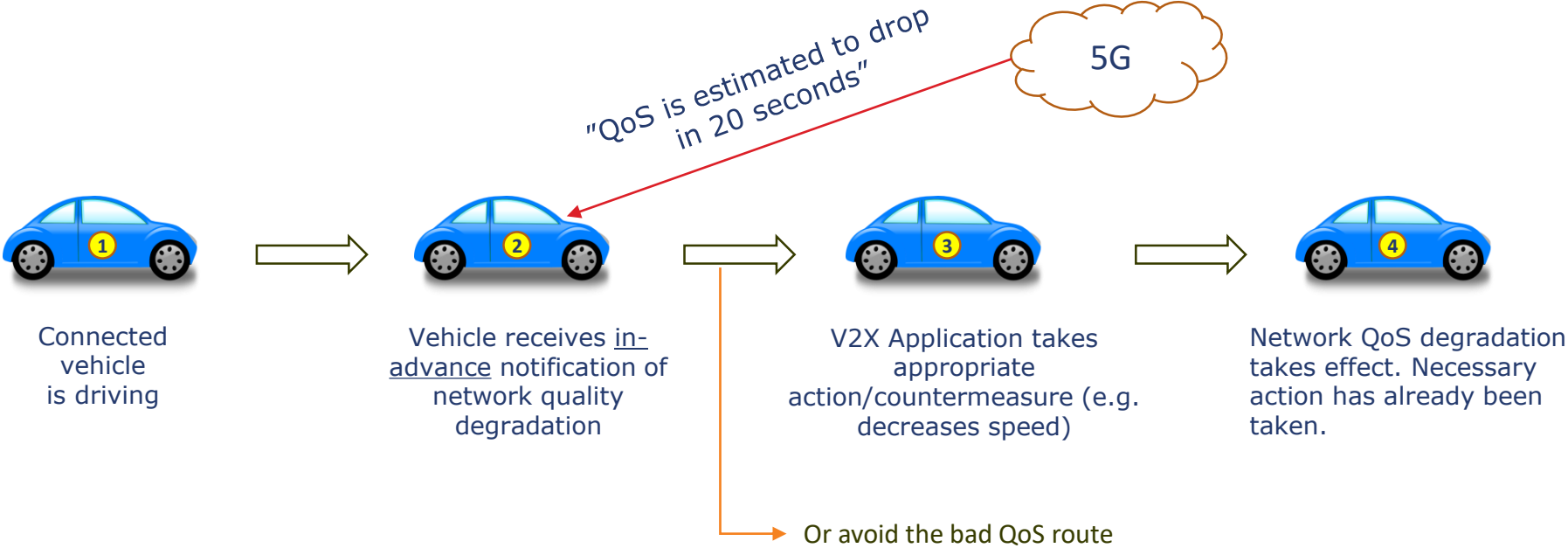
Source: Daimler

3. Enable complex interaction Use Cases (perception, negotiation, multi-lateral agreements)



Source: Continental

C-V2X supported by Predictive QoS



5. Cross border continuity of services



Cross border connection interruption
(change of Mobile Network Operator)

Ericsson and Daimler have shown down to
100 ms handover time with IP address continuity
using standard cellular functionality*

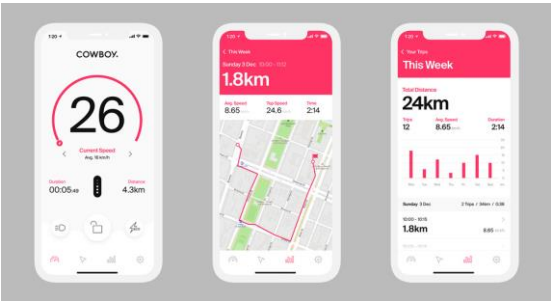
6. Test and Certify Cellular-V2X

Enabling Deployment: lift barriers and accelerate time-to-market

- 5GAA C-V2X testing event in Europe successfully demonstrated exceptional level of interoperability (April 2019, Germany)
- Memorandums of Understanding signed in 2019 with leading interoperability and certification organisations to accelerate deployment roadmap:



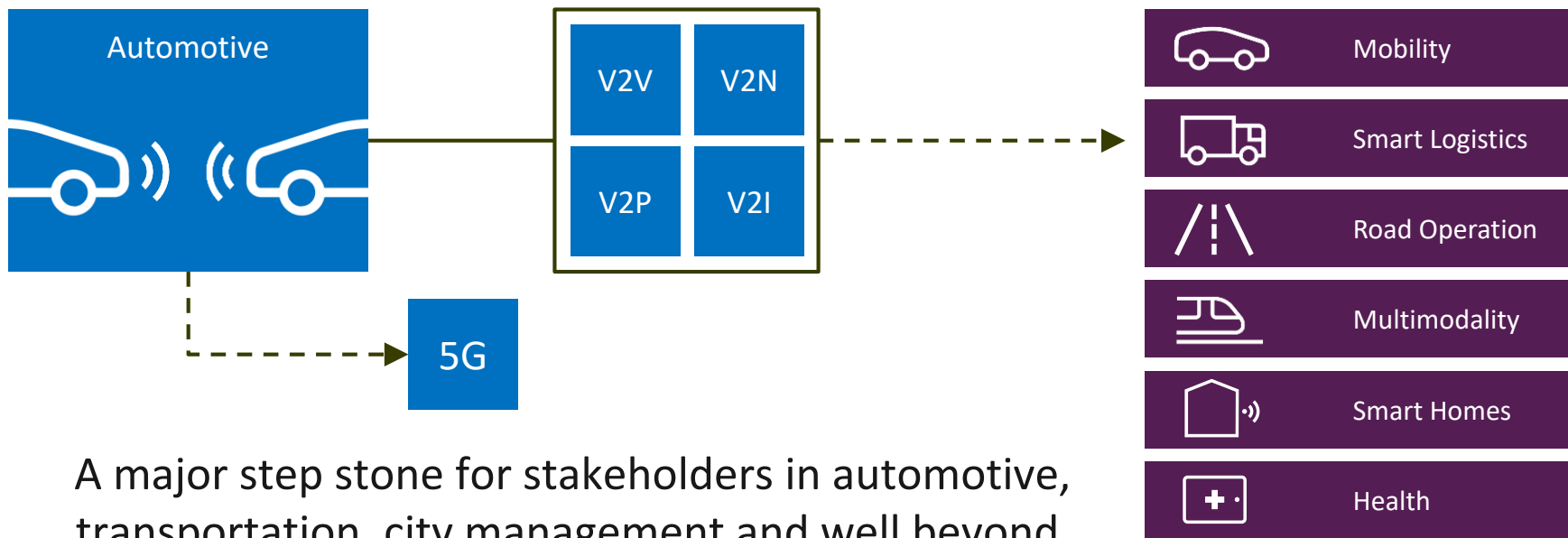
7. Include pedestrians and cyclists



Source: Bosch

Beyond Automotive

– Other 5G Automotive enabled applications



A major step stone for stakeholders in automotive, transportation, city management and well beyond