



Shaping the future of mobility through Cellular-V2X

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Learn more at WWW.5GAA.ORG

Agenda

1. About 5GAA
2. C-V2X Technology Explained
3. 5G Capabilities for Connected and Automated Driving
4. Use Case Examples



About 5GAA

Connected mobility for people, vehicles and transport infrastructure

5GAA bridges the automotive and telecommunication industries in order to address society's connected mobility needs bringing inclusive access to smarter, safer and environmentally sustainable services and solutions, integrated into intelligent road transportation and traffic management



AUTOMOTIVE INDUSTRY

Vehicle Platform, Hardware
and Software Solutions



TELECOMMUNICATIONS

Connectivity and Networking
Systems, Devices & Technologies



5GAA: A Global Cross Industry Association

13 of the top 15 OEMs

9 of the top 10 MNOs

3 top smartphone vendors



Today, 5GAA unites **121 members** from around the world working together on all aspects of C-V2X

In September 2016, **8 companies** teamed to create the 5G Automotive Association (5GAA) to help develop, test, and promote 5G standards



**SEPT
2016**

Q2 2021

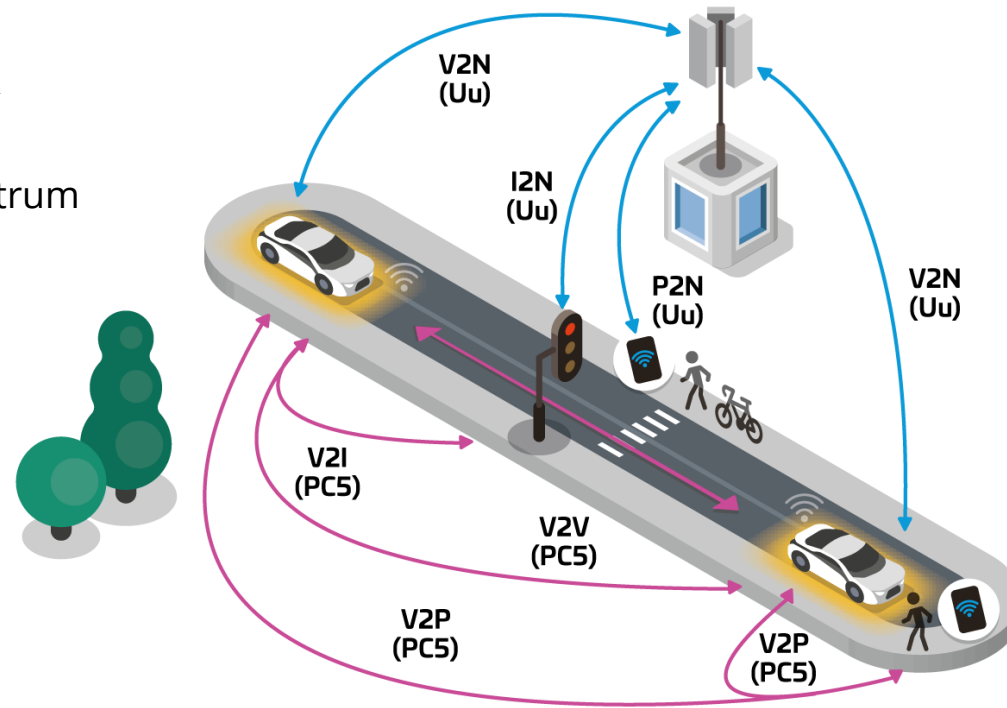


C-V2X Technology Explained

C-V2X has two complementary communication modes

C-V2X Mobile Network Communications (Uu)

V2N/I2N/P2N in licensed spectrum bands designated for mobile network communication



C-V2X Direct Communications (PC5)

V2V, V2I, and V2P operating in ITS bands (e.g. 5.9 GHz) independent of cellular network

C-V2X
Mobile Network
Communications
(Uu)

+

C-V2X
Direct
Communications
(PC5)

=

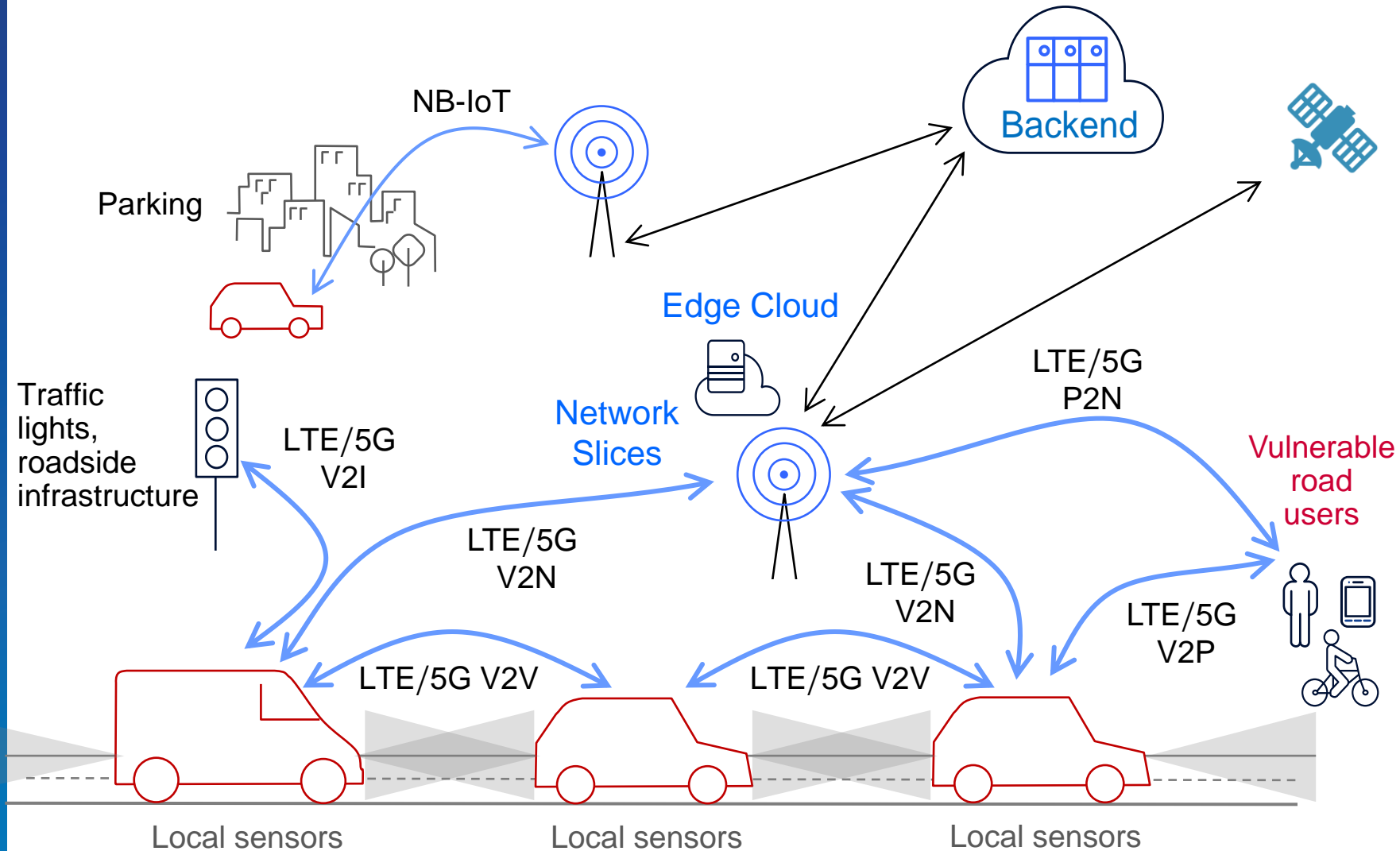
Improved
mobility
ecosystem

Automotive Connectivity Landscape

C-V2X is a unified technology platform which integrates:

- C-V2X* **direct communications** mode (or "C-V2X PC5")
- C-V2X* **mobile network communications** (or "C-V2X Uu")

**(C-V2X can be substituted by LTE-V2X, 5G-V2X as appropriate)*

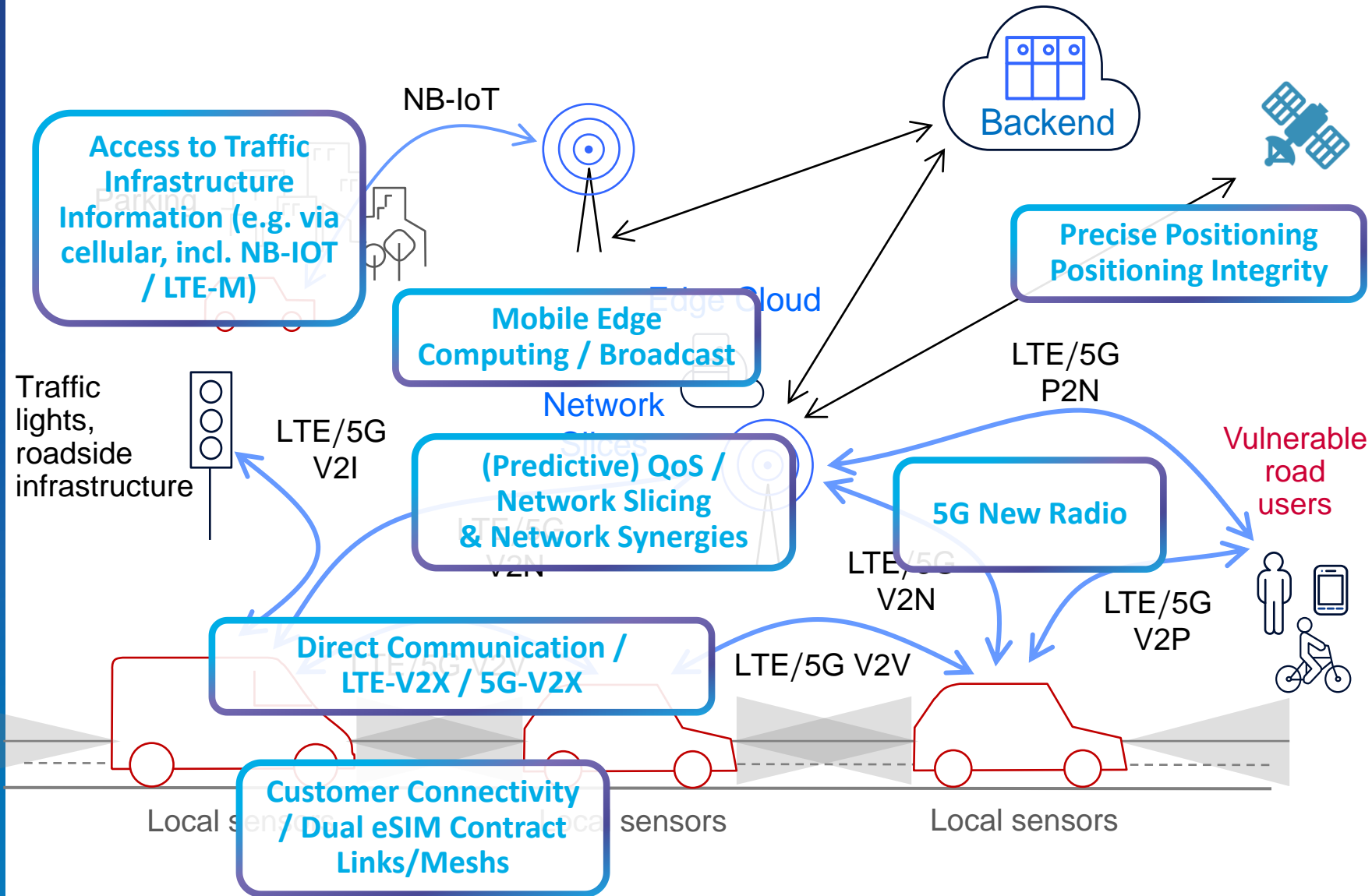


Automotive Connectivity Landscape

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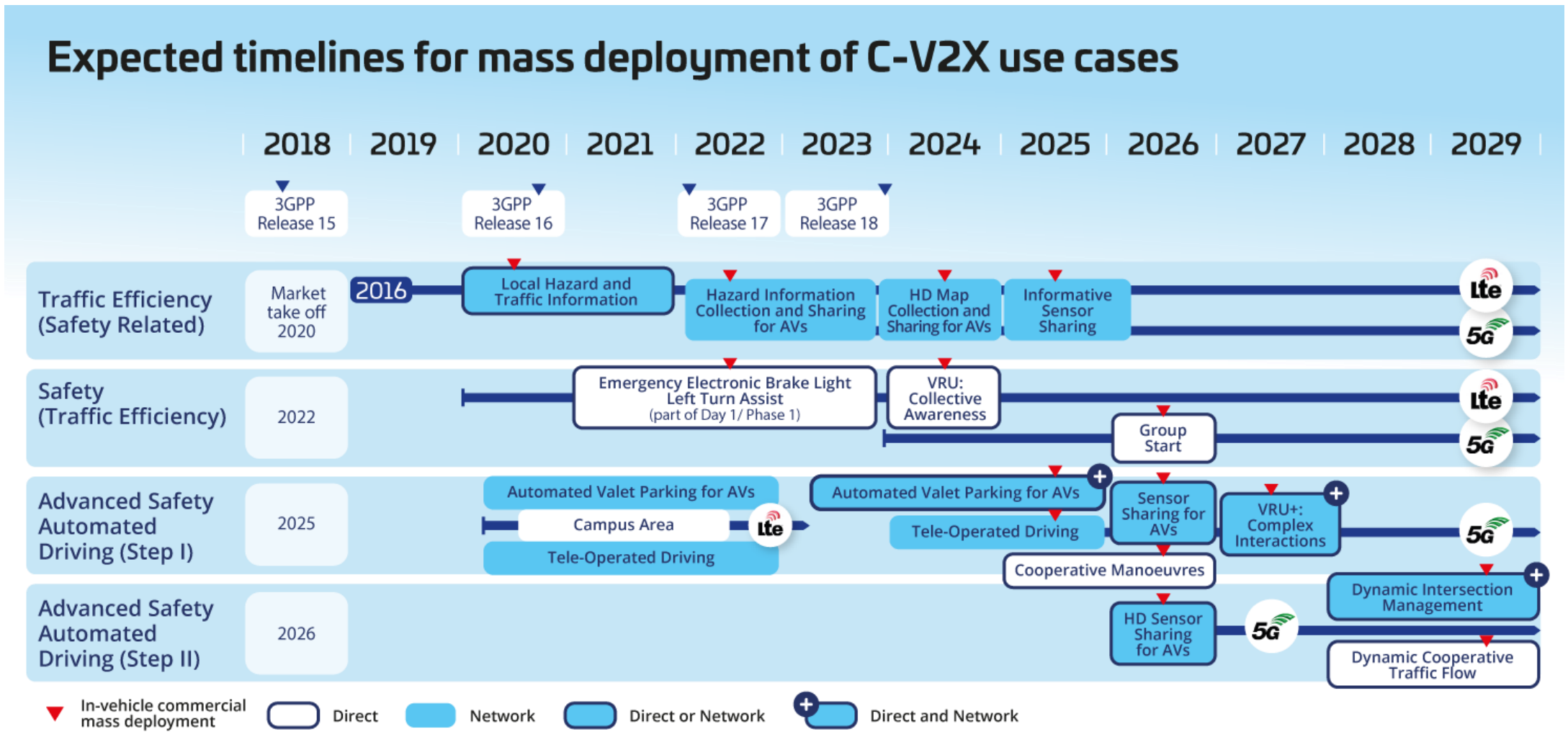
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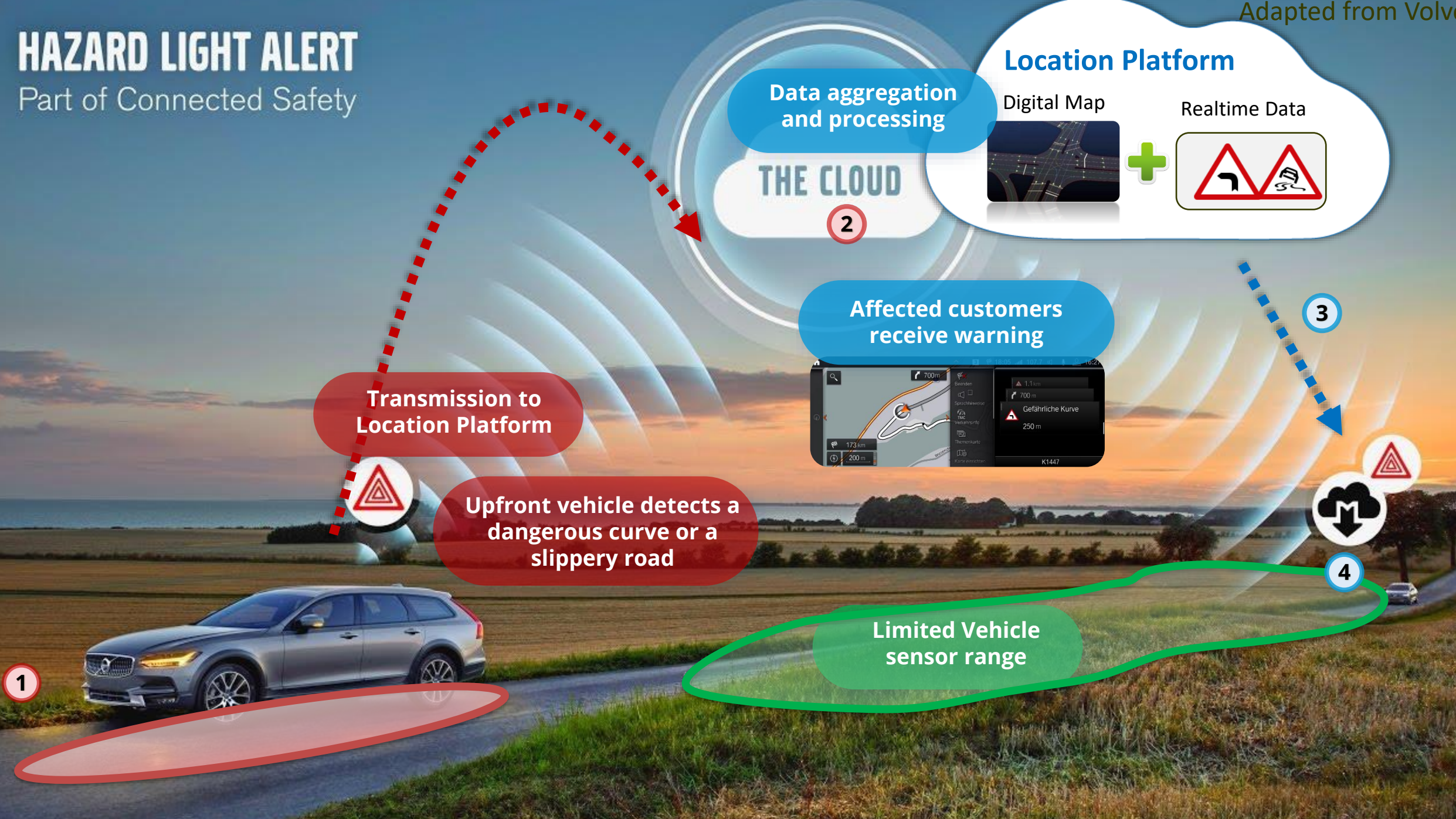
C-V2X Deployment

Expected timelines for C-V2X Use Cases



HAZARD LIGHT ALERT

Part of Connected Safety



1

Transmission to Location Platform

Upfront vehicle detects a dangerous curve or a slippery road

Data aggregation and processing
THE CLOUD
2

Location Platform
Digital Map + Realtime Data

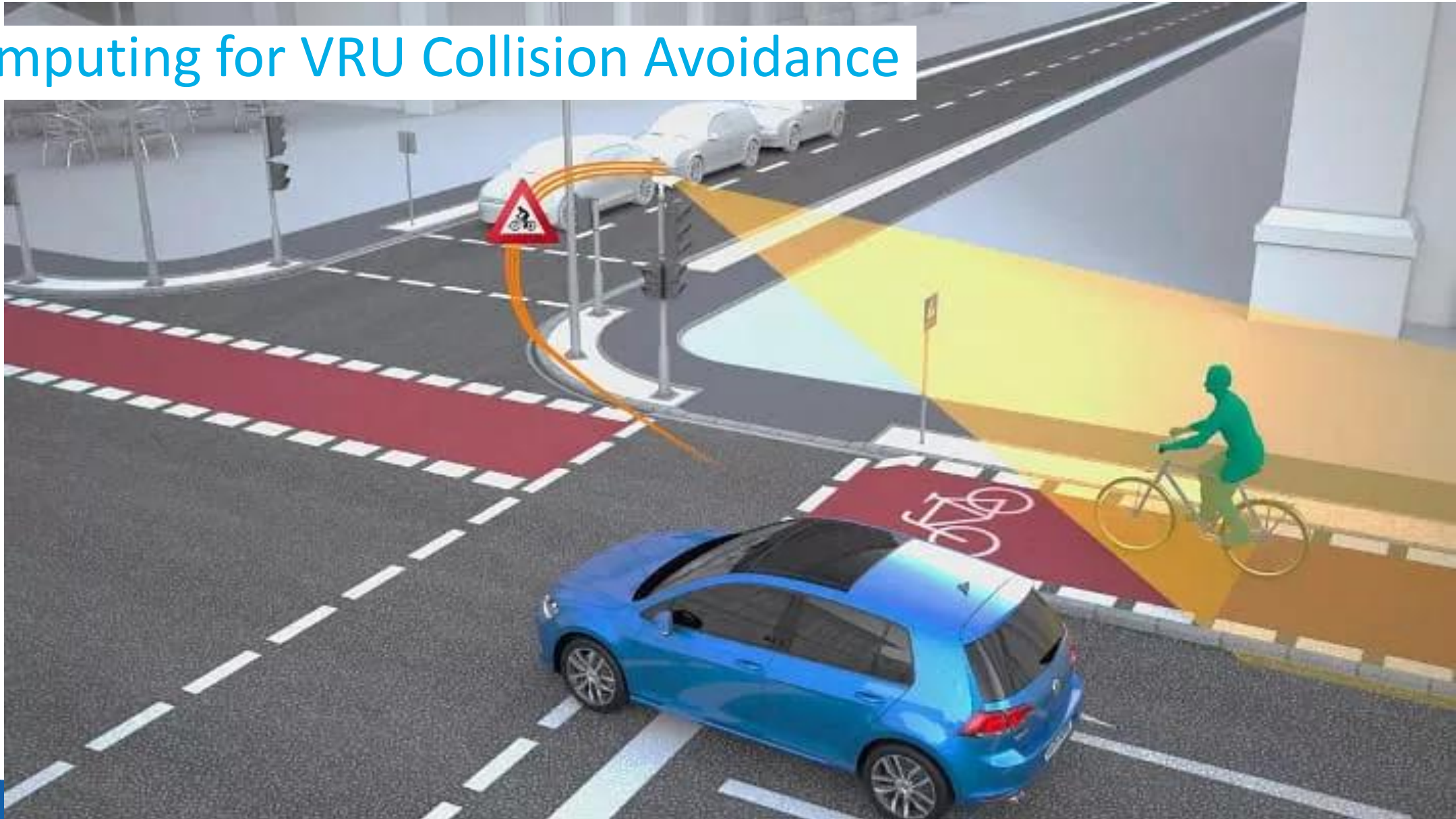
Affected customers receive warning

3

Limited Vehicle sensor range

4

Edge Computing for VRU Collision Avoidance



[Live Trial of 5G Connected Car Concept Launched in Turin, Italy, December 2021](#)

Edge Compute and Precise Positioning: Digital Guardian Angel for Cyclists



Continental and Deutsche Telekom develop connected collision warning for cyclists.



Quality of Service /
Quality on Demand





Direct Communication - School Bus Safety



source: Blue Bird, March 2021

Blue Bird join Audi, Applied Information on connected vehicle deployment to boost school bus and school zone safety

V2I / I2V communication (incl. V2N2I / I2N2V)



Audi is introducing the V2I service "Traffic Light Information" to US and Europe.

source: Audi USA, Jan 2020, Audi, 2019, and Audi, 2020

Integration of Customer Connectivity



source, [BMW Blog](#), September 2021



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