


# 5G V2X

The automotive use-case for 5G



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## WHO IS 5GAA?

5GAA connects the telecom and automotive industries to facilitate the development of end-to-end solutions for future mobility and transportation services

 <p><b>AUTOMOTIVE INDUSTRY</b> Vehicle Platform, Hardware and Software Solutions</p>	 <p><b>TELECOMMUNICATIONS</b> Connectivity and Networking Systems, Devices and Technologies</p>
<p>End to end solutions for intelligent transportation, mobility systems and smart cities</p>	


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## MEMBERS (OCT 2017)



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## ABOUT 5GAA

- Founded September 2016, in less than a year, 5GAA grew from 8 members to over 60+ global member companies
- Our members include some of the biggest players in the automotive and telecom industries with a **strong European foothold** e.g. Audi, BMW, Ford, JLR, Ericsson, Nokia, Vodafone, Deutsche Telekom etc.
- 5GAA is a proponent of **Cellular-V2X** (C-V2X), and its current realisation LTE-V2X, as a **platform for evolution towards 5G technologies**
- **Innovation and Safety are priorities:** 5GAA is committed to developing, testing and promoting communications solutions to address society's connected mobility and road safety needs.
- New cellular standards have stepped up technology capabilities for vehicle applications, including safety applications that show tremendous promise.

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## WHAT IS C-V2X?

- C-V2X has been codified in the released update to the cellular standard (3GPP Revision 14, June 2017)
- C-V2X provides **one solution** for integrated V2V, V2I and V2P operation with V2N by leveraging existing cellular network infrastructure:
  - C-V2X is synergistic with existing automotive cellular connectivity platform e.g. eCall
  - C-V2X can operate in several modes including direct communication between two devices (e.g. vehicles, RSUs, etc.) without any infrastructure support while utilising the ITS band
  - C-V2X supports low-latency needs to meet and/or surpass V2V latency, reliability, range and other requirements even without network support
  - C-V2X can operate without sim-cards enabling anonymity



## HOW DOES THIS CHANGE THINGS?

BEFORE	Now
Devices using cellular technology required infrastructure support.	Cellular V2X devices can communicate directly without any network support.
Low latency communication was not possible with cellular solutions.	Cellular V2X technology supports low-latency needs for V2V.
Cellular solutions required use of (costly) licensed spectrum.	Cellular V2X technology can operate in the ITS 5.9Ghz band.
Cellular solutions lacked mechanisms to address privacy issues.	Cellular V2X operates w/out SIM cards and enables anonymity on par to 802.11p
Challenges to deploying interoperable V2V ubiquitously in an economical manner.	Cost effective means to accomplish the same objectives
802.11p was the only technology available to support V2V.	Cellular technology is a viable alternative to meet or exceed V2V requirements.



## C-V2X TESTING & DEPLOYMENT

- Collaboration across automotive and telecom industry groups to validate this technology:
  - An aggressive validation testing schedule is already underway
  - 10+ trials including 9 taking place in Europe (see next slide)
  - 5GAA WG3 working on large scale trial roadmap
- C-V2X is real and ready with commercial **chipsets set for 2018** e.g., [Qualcomm](#) and [Continental](#) press releases.
- **Start of in-vehicle commercial deployment** (i.e. type-approved vehicles) foreseen for **2020/2021** globally

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## C-V2X TRIALS

Name, Place	Companies
RACC track, MWC 2017	Audi, Vodafone, Huawei
ConVeX (A9), Germany	Audi, Ericsson, Qualcomm, Swarco, Kaiserslautern Univ.
C-V2X Paris Trial, France	PSA, Qualcomm
Mobilifunk (A9), Germany	Vodafone, Bosch and Huawei
UK CITE, UK	Jaguar Land Rover, Vodafone, et al
DT (A9), Germany	Audi, Deutsche Telekom, Huawei, Toyota
Car2MEC at A9, Germany	Continental, DT/T-Systems, Nokia, Fraunhofer
5G-ConnectedMobility (A9), Germany	BMW Group, Deutsche Bahn, Deutsche Telekom, Ericsson, Telefónica Deutschland, Vodafone TU Dresden 5G Lab Germany
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
Michigan, US -V2V C-V2X radio performance tests	Ford, Qualcomm
Korea, 5G and cellular communication showcase trials	LGE, Qualcomm

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## WHAT IS AT STAKE?

- We know that DG Move has just launched a consultation (running until 05 January 2018) in relation to specifications for C-ITS and the 5GAA and we will engage fully with this process. The regulation is expected to be finalised in Q3/Q4 2018.
- 5GAA is however concerned that DG MOVE maybe preparing a **delegated regulation on C-ITS** that will mandate that where Day 1/1.5 C-ITS services are to be rolled out, they must be provided by 802.11p, a technology with some merits but nearly 10+ year-old and with no realistic path to 5G.
- This concern is exacerbated by the fact that the C-ITS Platform, which has developed the recommendations which have informed DG MOVE policy, has not included a broader set of industry representatives (e.g. from the cellular industry).
- **802.11p is no "incumbent" technology**: no commercial deployment to date, RSU deployment limited and easy to match in the short-term without any extensive public funding.



## 5GAA PROPOSED APPROACH TO REGULATION

- In today's fast-paced technological environment:
  - Regulatory policies for not only the technology of today, but also for the **best technologies of tomorrow**
  - This approach will promote innovation and competitive market-based outcomes, ensuring that European drivers and passengers benefit from the best and most advanced safety solutions available as technology evolves.
- 5GAA made a proposal to **share the ITS band** (5.9 GHz spectrum) between C-V2X and 802.11p for initial deployments, without harmful interference, and including a migration path.
- No consensus reached because 802.11p community refuses to work on **any win-win** scenario which would include co-existence of both technologies in 5.9 GHz band.



## 5GAA POSITION

<b>5G for all verticals</b>	<p>The whole world, Industry 4.0, medicine, smart cities, smart homes etc. are going to adopt 5G, and the sooner the better.</p> <p><b>5GAA recommendation:</b> Do not introduce in the automotive sector an old standard aimed for only for short range transportation applications instead of using the same technology as the other verticals. This would go against the long-term public interest.</p>
<b>V2V/P</b>	<p>LTE-V2X PC5 is ready and offers a clear path to 5G (performance, penetration growth).</p> <p><b>5GAA recommendation:</b> Do not rush to promote a 10+ year old technology (802.11p) that from the start is not as effective and with few prospects to become better just because it might be available 1-2 years earlier. This is not cost-beneficial and will result in less fatalities and severe injuries being prevented.</p>
<b>V2I</b>	<p>LTE-V2X Uu offers greater economic synergies than 802.11p (coverage, performance, penetration growth).</p> <p><b>5GAA recommendation:</b> Do not expend funds to invest in infrastructure (802.11p) that will not be economically sustainable in an area where mobile networks can deliver a better service. Are governments willing to pay 500M Euros every 5 years to deploy and manage 11p-V2I networks when a more cost-beneficial solution exist?</p>