

Coexistence of C-V2X and 802.11p at 5.9 GHz

POSITION PAPER | 12 June 2017

1 Summary

Today the European market has interest in two distinct technologies for Intelligent Transport Systems (ITS) and the provision of vehicle to vehicle communications; namely 3GPP LTE-V2X and IEEE 802.11p.

The technology neutral nature of spectrum regulations in Europe means that both LTE-V2X¹ and 802.11p have equal rights to operate in the 5.9 GHz band, subject to compliance with the relevant regulatory technical conditions.

It is not the objective of this paper to compare and contrast the relative merits of these two technologies, although the 5GAA is a proponent of LTE-V2X as today's realisation of Cellular V2X (C-V2X), and as a platform to evolve towards 5G technologies.

Instead, in this paper we address the issue of co-channel coexistence between the two technologies at 5.9 GHz. We note that this is a critically important issue for the ITS industry, and that it is beneficial for all stakeholders to arrive at a proportionate, fair, and pragmatic solution to resolve this matter, and allow the market to proceed with the deployment of ITS equipment.

To this end, we propose a solution – to be agreed among the stakeholders – to be implemented in up to three steps. In all steps, each of C-V2X and 802.11p can operate safety-related ITS services free from co-channel interference from the other technology. The difference between the distinct steps lies in the overall usage efficiency of the spectrum resource: In the short-term, we propose to allocate distinct 10 MHz channels at 5875-5905 MHz to each of the two technologies, while the final configuration will apply full sharing of all available channels across the two technologies. The latter will require further studies on appropriate sharing mechanisms and thus cannot be provided from the beginning.

We further explain how such a first step *partitioning* of 5875-5905 MHz might be complemented by additional technical mechanisms which would – where needed – allow each of C-V2X and 802.11p to access the remaining 20 MHz in a fair manner, with a reduced risk of harmful co-channel interference.

We believe that the proposed approach would greatly facilitate the coexistence of C-V2X and 802.11p at 5.9 GHz, and we would encourage stakeholders to further develop this proposal and come to a speedy agreement on this for the benefit of the European ITS industry as a whole.

¹ LTE-V2X encompasses two interfaces: (a) The wide area network LTE interface (Uu) that connects end-user devices and vehicles to base stations (eNBs) and the core network, to provide vehicle to network (V2N) services. LTE-V2N can be supported by spectrum harmonised and designated for mobile communication networks; (b) The direct communications interface (PC5) that connects vehicles to vehicles (V2V), to roadside infrastructure (V2I) and to pedestrians (V2P), for the provision of low-latency and high-reliability V2V/I/P services independently of any MNO relationship and cellular network availability. LTE-V2V/I/P can be supported by spectrum that is harmonised for ITS, namely 5.9 GHz in Europe. The direct communication mode does not require coverage by a cellular network, or a V2N connection.

2 Regulatory framework in Europe

The band 5855-5925 MHz is subject to the following harmonisation measures in Europe:

- The European Commission has harmonised the band 5875-5905 MHz for safety-related applications of Intelligent Transport Systems in the European Union via the legally binding Commission Decision 2008/671/EC.
- The same harmonisation is applied by the ECC via ECC Decision (08)01, which additionally indicates that CEPT administrations shall consider within a future review of this Decision the designation of the frequency sub-band 5905-5925 MHz for an extension of ITS spectrum.
- ECC also recommends, via ECC Recommendation (08)01, that CEPT administrations should make the frequency band 5855-5875 MHz available for ITS non-safety applications.

The above regulatory measures all refer to the ETSI Harmonized Standard EN 302 571, which is developed by ETSI TC ERM TG37, and defines requirements for operation of ITS equipment in 5855-5925 MHz, covering the essential requirements of article 3.2 of the Radio Equipment Directive (2014/53/EU). According to ECC DEC (08)01 and ECC REC (08)01, ITS equipment complying with EN 302 571 are exempt from individual licensing for operating in this band.

It should be emphasised that the principle of technology neutrality in the European spectrum regulations implies that any radio technology which can demonstrate conformance with the essential requirements of the Radio Equipment Directive (e.g. through compliance with EN 302 571) can operate in 5855-5925 MHz.

3 Proposed partitioning framework

C-V2X and 802.11p use different physical layers and medium access control protocols. As such, the operation of the two technologies in the 5.9 GHz band and in the same geographic area without an agreed coexistence solution would result in mutually harmful co-channel interference.

Such interference can be mitigated in the short term by allocating so-called *safe harbour* channels to C-V2X and 802.11p in the 5875-5905 MHz band. An example of this is shown in Figure (1) below, where the two technologies are referred to as Technology A and Technology B. In this example, Technology A and Technology B equipment is tuned to operate at 5875-5885 and 5895-5905 MHz, respectively, thereby avoiding any co-channel interference between the two V2X technologies.

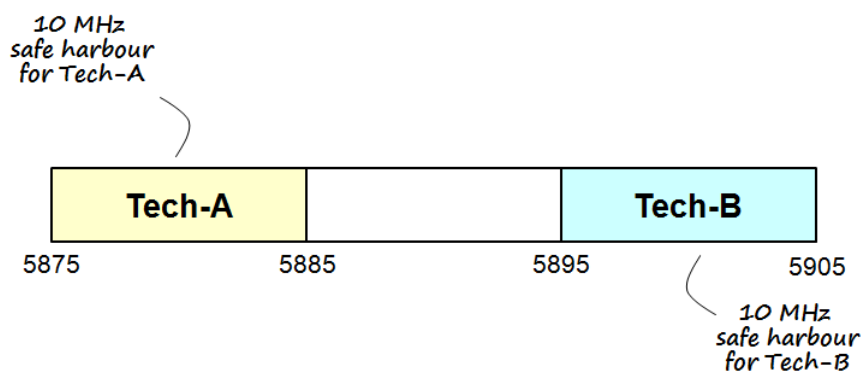


Figure 1. Step-1: Partitioning of 5.9 GHz.

The above proposed positioning solution is naturally in line with the fact that the initial deployment of any V2X technology in 5875-5905 MHz requires a preselected 10 MHz channel for exchanging safety-related information. As the deployment of the two technologies matures, technical solutions such as *mutual detect-and-vacate* can be put in place to enable access to the remaining parts of 5875-5905 MHz band and eventually to the entire 5855-5925 MHz band by the two technologies in a fair-manner, with a reduced likelihood of harmful co-channel interference.

Figure (2) illustrates an example of such a detect-and-vacate solution for C-V2X and 802.11p coexistence at 5.9 GHz. Once again, the two technologies are referred to as Technology A and Technology B. Here, Technology A equipment would operate without any special measures in 5875-5885 MHz. If Technology A equipment wished to transmit in 5885-5895 MHz, then they would need to monitor activity on the relevant channel, and proceed with transmissions if and only if Technology B transmissions are not detected in the said channel. A symmetrical procedure would apply to Technology B. In other words, Technology B equipment would operate without any special measures in 5895-5905 MHz. If Technology B equipment wished to transmit in 5885-5895 MHz, then they would need to monitor activity on the relevant channel, and proceed with transmissions if and only if Technology A transmissions are not detected in the said channel.

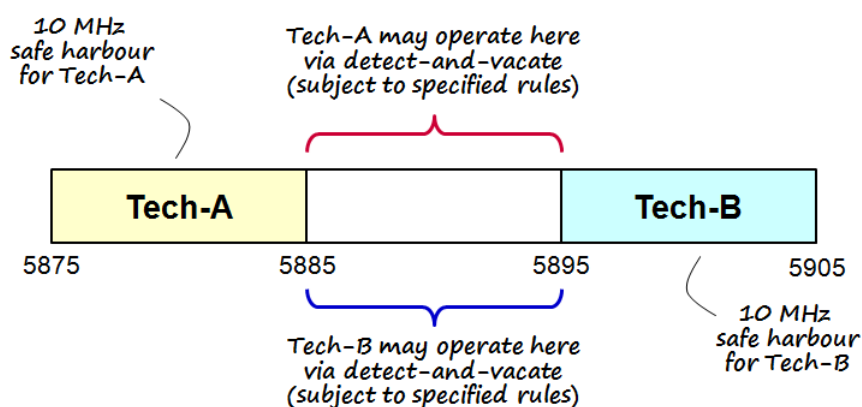


Figure 2. Step-2: Partitioning of 5.9 GHz, complemented by mutual detect-and vacate in the middle 10 MHz channel.

Figure (3) illustrates an example of an *extended* detect-and-vacate solution for C-V2X and 802.11p coexistence at 5.9 GHz. Once again, the two technologies are referred to as Technology A and Technology B. Here, Technology A equipment would operate without any special measures in 5875-5885 MHz. If Technology A equipment wished to transmit in 5885-5905 MHz, then they would need to monitor activity on the relevant channel, and proceed with transmissions if and only if Technology B transmissions are not detected in the said channel. A symmetrical procedure would apply to Technology B. In other words, Technology B equipment would operate without any special measures in 5895-5905 MHz. If Technology B equipment wished to transmit in 5875-5895 MHz, then they would need to monitor activity on the relevant channel, and proceed with transmissions if and only if Technology A transmissions are not detected in the said channel.

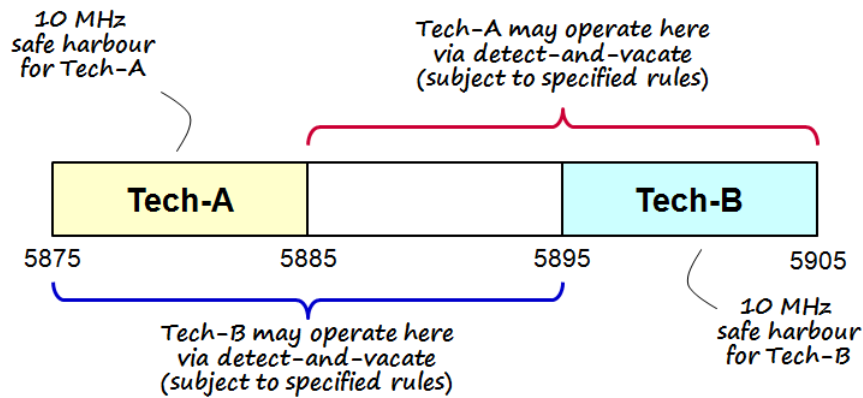


Figure 3. Step-3: Partitioning of 5.9 GHz, complemented by mutual detect-and vacate extended to the lower and upper 10 MHz (safe harbour) channels.

Once the technology matures, a full sharing of the entire 5855-5925 MHz band can be envisaged.

Suitable sharing mechanisms could be specified in ETSI EN 302 571 on the basis of the results of studies to be undertaken at ETSI, and as captured in a relevant ETSI technical report (TR). There are precedents in Europe for use of such mechanisms to manage the risk of interference in licence exempt spectrum.²

4 Conclusion

It would be greatly beneficial for the ITS industry to rapidly converge on a pragmatic solution to the issue of co-channel interference at 5.9 GHz between the two leading technologies for vehicle-to-vehicle communications, namely LTE-V2X and 802.11p.

We emphasize that technology neutral spectrum regulations in Europe means that both technologies can operate at 5.9 GHz subject to compliance with the relevant regulatory technical conditions.

We propose a solution based on partitioning of the 5875-5905 MHz band between C-V2X and 802.11p for initial deployments, with each technology having access to a distinct 10 MHz of bandwidth. This solution might be complemented in the longer term with a stepwise approach by introducing suitable mutual detect-and-vacate mechanisms to enable fair access to the whole of 5875-5905 MHz with a reduced risk of harmful co-channel interference.

Specifically, the steps would involve the following:

- 1) Safe harbour channels for C-V2X and 802.11p (with each of the 5875-5885 and 5895-5905 MHz channels paired with one of either C-V2X or 802.11p).
- 2) Shared use of the middle channel (5885-5895 MHz).
- 3) Shared use of all channels.

We encourage the ITS industry to consider, further develop, and agree on this partitioning approach, with a view to expedite the successful deployment of C-V2X and 802.11p in the 5.9 GHz band. ■

² An example is coexistence between RLANs and meteorological radar at 5 GHz (EN 301 893).

5GAA welcomes AT&T, Jaguar Land Rover, NTT DOCOMO and Samsung Electronics as elected Board members

The 5G Automotive Association announced today the election of its new Board members following the General Assembly held on May 11, 2017. Continuing members AUDI AG, BMW Group, China Mobile, Daimler AG, Ericsson, Ford, Huawei, Intel, Nokia, SAIC Motor, Vodafone Group and Qualcomm Incorporated will be joined by AT&T, Jaguar Land Rover, NTT DOCOMO and Samsung Electronics.

The election of AT&T, Jaguar Land Rover, NTT DOCOMO and Samsung Electronics as Board members will strengthen the position of 5GAA as a global, cross-industry association of automotive, technology and telecommunications companies. It reflects the diversity of 5GAA's membership, both in terms of geographical spread and expertise.

The Chairperson, is Christoph Voigt (Audi) and the Vice Chairperson is Thierry Klein (Nokia), both elected to their second term. The Board of the Association renewed the mandate of the outgoing Executive Committee: Dino Flore (Qualcomm) will continue to serve as Director General, Markus Dillinger (Huawei) as Secretary, and Fathi Arafat Husein El-Dwaik (BMW) as Treasurer. The Board also confirmed the appointment of elected Working Groups Chairs and Vice-Chairs.

"We are very pleased that AT&T, Jaguar Land Rover, NTT DOCOMO and Samsung Electronics have joined the 5GAA Board," said Christoph Voigt, Chairman of the 5GAA Board. "With their global footprint and diverse expertise, they will contribute to further connect communication and automotive industry to develop end-to-end solutions for future mobility and transportation services."

5GAA joins 3GPP

The 5G Automotive Association has become a Market Representation Partner (MRP) in 3GPP, bringing in the influence and expertise of vehicle manufacturers and a variety of important companies from the automotive sector, to the 3GPP environment. Dino Flore, Director General of 5GAA, was present at the 3GPP Organizational Partner's meeting in West Palm Beach on April 26, to complete the signing of the Partnership Agreement.

The 5GAA application for 3GPP MRP status stated "It is important to connect the telecom industry and vehicle manufacturers, to develop end-to-end solutions for future mobility and transportation services" Dino Flore told the 3GPP OP meeting "The access part is vitally important and we will work on that with 3GPP. In addition to that, we will look at the other pieces required – including the work on upper layers (SDOs including ETSI-ITS, ISO, SAE and IEEE) and security aspects - to develop the system as a whole."

The work is on-going in 3GPP, with an initial version of the V2X access specifications in Release 14 and active discussions to define next generation V2X capabilities on-going. Susan Miller (3GPP OP Chair, ATIS President and CEO) welcomed 5GAA as a partner and noted the positive effect that Dino Flore's vast experience in the 3GPP leadership, most recently as the RAN Chairman, will have for the successful integration of the 5GAA in to the 3GPP family. Ms. Miller said "5GAA is bringing in the needs of a key vertical at an important time for the project."



"5G will be much more than mobile broadband connectivity, it will cover a variety of use-cases and industries" Dino Flore, DG 5GAA.

5GAA submitted comments to the National Highway Traffic Safety Administration

The 5G Automotive Association (5GAA) submitted comments to the National Highway Traffic Safety Administration (NHTSA) notice of proposed rulemaking (NPRM), "Federal Motor Vehicle Safety Standards; V2V Communications." The proposed rule is to mandate new light-duty vehicles to be equipped with dedicated short range communications (DSRC).

5GAA is a new global cross-industry association of automotive, technology and telecommunications companies and includes 42 members, of which 8 are founding members (AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia, Qualcomm). Our mission is to enable communications solutions that address society's connected mobility and road safety needs.

[In our submission](#), 5GAA applauds the concept behind the rule, as V2V safety is important to our technology deployment mission. 5GAA urges NHTSA to not consider just the best technology of today, but also to consider the best technologies of tomorrow. Such an approach will promote innovation and competitive market-based outcomes, ensuring that American drivers and passengers benefit from the best and most advanced safety solutions available as technology evolves. Rigid technology mandates such as specifying DSRC, whether direct or de facto, freeze technology solutions to a past point in time. NS will significantly impede the innovation and evolution path for Vehicle-to-Vehicle (V2V) safety, and positions the US to lag behind the rest of the world in V2V communications specifically as well as V2X broadly. 5GAA elaborates on the following points:

Similar to DSRC, Cellular-V2X technology for V2V safety can transmit BSM in an ad hoc manner without cellular network coverage.

Cellular-V2X technology for V2V safety communications can operate without a SIM card and offers the tools to adopt, evolve or innovate any privacy-preserving security management system including SCRM.

Cellular-V2X technology for V2V safety benefits from a significantly larger link budget than DSRC (e.g., 8 dB at high speeds), corresponding to twice the range of DSRC and higher reliability.

Cellular-V2X technology for V2V safety can support up to 50 messages per second with less than 20 msec latency.

Cellular-V2X enables V2V, and for that matter Vehicle-to-Infrastructure (V2I), Vehicle-to-Pedestrian (V2P) and Vehicle-to-Network (V2N), safety applications to take advantage of the widespread cellular network coverage in the US.

5GAA notes also that the impending launch of 5G will only widen the performance gap between Cellular-V2X and DSRC.

5GAA believes that Rather than moving forward with the proposed regulation, NHTSA should instead undertake an updated, comprehensive technology neutral analysis of V2V solutions, including DSRC and Cellular-V2X, against the performance requirements in the NPRM. If this review indicates that regulatory action is necessary, the U.S. Department of Transportation should move forward with a technology neutral regulation that sets forth minimum V2V safety performance requirements only.

5G Automotive Association and European Automotive Telecom Alliance sign a partnership MoU

(Barcelona, February 27, 2017). The 5G Automotive Association (5GAA) and the European Automotive Telecom Alliance (EATA) have signed a Memorandum of Understanding. Aim of this partnership is to foster cooperation in the field of connected and autonomous driving solutions as well as standardisation, spectrum and related use cases.

5GAA and EATA are dedicated to prioritising the use cases identified by the two organisations in order to identify the technical requirements that need to be addressed, both in the short and in the long term. In order to better support standards for connected and automated driving, standardisation prioritisation for standards bodies such as ETSI, 3GPP and SAE is necessary as well. It's beyond dispute that promoting spectrum-related issues (V2X), agreement on usage modalities of certain bands, security and privacy, as well as vehicle safety requirements to be supported by both mobile network operators (MNOs) and vehicle manufacturers (OEMs) will need to be addressed jointly. Last but not least, agreement between MNOs and OEMs is also key to developing business models and aligning the timelines of both industries.

5GAA includes 33 members, of which 8 are founding members (AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia and Qualcomm Incorporated). 5GAA is a multi-industry association to develop, test and promote communications solutions, initiate their standardization and accelerate their commercial availability and global market penetration to address societal need. Focus areas are the development, testing and promotion of communications solutions, the initiation of their standardization and the acceleration of their commercial availability and global market penetration to address society's connected mobility and road safety needs with applications such as autonomous driving, ubiquitous access to services and integration into smart city and intelligent transportation.

EATA is comprised of six leading associations and 38 companies at present, including telecom operators, vendors, automobile manufacturers and suppliers for both cars and trucks. The main objective of the Alliance is to promote the wide deployment of hybrid connectivity for connected and automated driving in Europe. EATA's first concrete step is the advancement of a 'pre-deployment project' aimed at testing the performance of hybrid communication required for automated driving under real traffic situations. Furthermore, EATA seeks to identify and address service and technology roadmaps, safety and security needs, as well as regulatory and business issues. The project will tackle cross-border interoperability, including digital and physical infrastructure, as well as vehicle localisation issues.



Quotes

Christoph Voigt, Chairman of the 5GAA Board

"5GAA was created to connect telecom industry and vehicle manufacturers to develop end-to-end solutions for future mobility and transportation services. We look forward to working with EATA to define the requirements of C-V2X and to create a successful V2X ecosystem"

Erik Jonnaert, Chairman of the EATA Steering Committee

"The revolution that connected and automated driving is going to bring about at the societal level is already shaping Europe's automotive and telecoms sectors at a rapid pace. This Memorandum of Understanding with the 5GAA not only brings the different industry partners closer together, but also reinforces the European Commission's strategy on cooperative, connected and automated mobility that was launched at the end of 2016. Car connectivity and automation will require a mix of communications technologies, but it is clear that 5G technology can become a key enabler of Europe's digital highways. Together, EATA and 5GAA will contribute to reinventing the driving experience."

NGMN Alliance and 5GAA sign Co-operation Agreement

The 5G Automotive Alliance (5GAA) and the Next Generation Mobile Networks (NGMN) Alliance have announced to strengthen their relationship and to foster a closer co-operation in the area of 5G-based V2X solutions ([read more](#)).



Dr. Peter Meissner (NGMN) and Christoph Voigt (5GAA) after signing the memorandum of understanding.

GTI focuses on verticals with 5GAA deal

The Global TD-LTE Initiative (GTI) took a “concrete” step in its strategy to focus on vertical industries by signing an MoU with the 5G Automotive Association (5GAA) at the GTI Summit 2017 ([read more](#)).



5GAA chairperson Christoph Voigt and GTI chairman Craig Ehrlich shaking hands on stage.

Driving to the Future: The Case for Cellular in Automotive

On the February 9th members of the 5GAA Board traveled to Silicon Valley to introduce 5GAA and describe their joint vision of cellular communications for automotive applications. The objective of the event was to engage a diverse group representing Silicon Valley-based companies in discussion of how the 5GAA vision may match the culture and innovation of the local ecosystem.

On this occasion 5GAA hosted the event at the Four Season in Palo Alto, sponsored by Intel, with a panel on "Driving to the Future: The Case for Cellular in Automotive". Panelists included Jovan Zagajac (Ford), Luke Ibbetson (Vodafone Group), Walter Weigel (Huawei), Thierry Klein (Nokia) and Michael Faerber (Intel), and the discussion was moderated by Jim Misener (Qualcomm).

The audience included representatives from automotive OEMs and Tier 1 suppliers with offices in Silicon Valley, chipmakers, telecommunications research and development personnel, transportation providers, university researchers and several startups. The discussion was productive and covered a wide range of questions and answers which needed to be addressed. Also discussed was the value of cellular for the automotive and transportation value chain, 3GPP's release of 14 features and how they are able to transform them to 5G. Also explored in the meeting was how invention and innovation are part of both the panelist and the audience group. The event was well attended by over 40 people whom contributed to a very lively debate, it was the first event of its kind organized by 5GAA.



The 5GAA welcomes Elaine Chao as US Secretary of Transportation

Coincident with her confirmation, the 5GAA Board convened this week in California support the development and deployment of cellular V2X solutions that evolve into 5G.

These solutions enable vehicle connectivity, safety services and automated driving. The Board notes that our mission to enable safety and efficient travel meets the vision expressed by Secretary Chao. We congratulate the USDOT Secretary and are encouraged by her support of connected cars and autonomous vehicles.

5GAA was created to bridge automotive and communication industries in order to develop, test and promote connected mobility solutions, initiate their standardization and accelerate commercial availability and global market penetration.

For more information on 5GAA, please visit: www.5gaa.org.

Ficosa, CMCC, Viavi, SAIC, Samsung, Rohde & Schwarz, ZTE, NTT DOCOMO, Continental, Danlaw join the 5G Automotive Association

5GAA welcomes Ficosa, CMCC, Viavi, SAIC, Samsung, Rohde & Schwarz, ZTE, NTT DOCOMO, Continental and Danlaw as new members of the association.

The new members significantly grow 5GAA membership base and diversity, both in term of geography and expertise. This will allow 5GAA to further connect communication and automotive industry to develop end-to-end solutions for future mobility and transportation services.

For more information on 5GAA, please visit: www.5gaa.org.

LG, Ford, Verizon, Denso and Gemalto join the 5G Automotive Association

5GAA (www.5gaa.org) welcomes LG, Ford, Verizon, Denso and Gemalto as new members of the association.

"We are very pleased that LG, Ford, Verizon, Denso and Gemalto have joined the association. With their global footprint and diverse expertise across the communications and automotive ecosystems, these companies will contribute to the definition and development of next generation connected mobility and automated vehicle solutions" Dino Flore, Director General of 5GAA, said.

Kookyeon Kwak, Executive Vice President, Head of LG's Advanced Standard R&D Lab, said, "Cellular communication will play a pivotal role to meet the requirement of safety, convenience and infotainment for future smart cars. The trend is now being accelerated by the completion of LTE-V2X, the first cellular-based vehicle-communication standard. As a manufacturer in mobile communication and vehicle component areas, LG Electronics would like to contribute to 5GAA for connecting communication and automotive industries".

"We are excited to work together with other automotive and technology providers to define a future that envisions new and empowering mobility services and solutions. We see the 5GAA as a key enabler to the development of a sustainable connected vehicle ecosystem." Don Butler, Executive Director of Connected Vehicle and Services at Ford Motor Company, said.

DENSO CTO for the European region, Masato (Max) Nakagawa, commented: "Extending DENSO's global efforts in the area of vehicular connectivity is strategically aligned to our policy 'Protecting Lives, Preserving the Planet, and Preparing a Bright Future for Generations to Come'. Reinforcing this direction, DENSO AUTOMOTIVE Deutschland GmbH has decided to join the 5GAA. We are proud to be accepted as 5GAA member and are looking forward to collaborating in the 5GAA. DENSO considers this engagement viable to complement our long term ongoing global support of 700MHz/5.9GHz V2X safety communication. 5GAA provides the environment for the cross-industry collaboration required to define corresponding future mobile communication systems. In collaboration with the 5GAA partners we plan to explore, define and develop multi-spectral connectivity to support future mobility demands, especially in the area of connected and automated driving."

"Gemalto is thrilled to join 5GAA and work within this prestigious group of global leaders to enable the world of new mobility that will revolutionize the automotive sector," says Frederic Vasnier, EVP Embedded Software and Products. "Gemalto has demonstrated its unrivalled expertise to ensure simple, seamless and ubiquitous connectivity with robust security mechanisms inside the vehicle, between vehicles and with the connected ecosystem of devices, pedestrians and the cloud."

5GAA was created to bridge automotive and communication industries in order to develop, test and promote connected mobility solutions, initiate their standardization and accelerate commercial availability and global market penetration.

Since its inception 5GAA has been experiencing rapid expansion to include key players with global footprint in the communication and automotive industries, including car manufacturers, tier-1 suppliers, chipset/communication system providers, mobile operators and infrastructure vendors.

To achieve its long-term goals, the association is creating five Working Groups to address the following areas of work: Use Cases and Technical Requirements; System Architecture and Solution Development; Evaluation, Testbeds and Pilots; Standard & Spectrum; Business Models and Go-To-Market Strategies. In addition, the board is planning the needed policy and advocacy efforts to join the relevant discussions in this space with different regulators, policymakers and administrations around the world.

Deutsche Telekom, Valeo and SK Telecom join the 5G Automotive Association

5GAA (www.5gaa.org) welcomes Deutsche Telekom, Valeo and SK Telecom as new members of the association.

"We are very pleased that Deutsche Telekom, Valeo and SK Telecom have joined the association. With their important expertise, they will contribute to the definition and development of next generation connected mobility solutions", Dino Flore, Director General of 5GAA, said.

Dr. Bruno Jacobfeuerborn, CTO, Deutsche Telekom AG, said: "Getting the connected car successfully on the road requires a common worldwide standard for 5G. Fragmentation and proprietary systems are obstacles to avoid on our way. Deutsche Telekom has been actively engaged with our partners in the automotive industry to trial and advance communications solutions for intelligent mobility. We now look forward to broadening this collaboration within the cross-industry 5GAA setup".

„Valeo being already a player in the autonomous driving field wants to extend this also to the connected car field. Therefore we are proud to be member of the new 5GAA Alliance to help creating new automotive standards for the 5G network and the connected car environment“, Marc Vrecko, Business Group President, Valeo Comfort & Driving Assistance Systems, said.

Alex Jinsung Choi, CTO & Head of Corporate R&D Center at SK Telecom, said: "We are designing 5G to inherently support connected cars and autonomous driving. 5G brings several outstanding values to automotive industries: augmented autonomous driving, worry-free car management and rich in-car services. I believe that 5GAA will play a key role in bringing new business possibility and opportunity for both the automotive and mobile communications industries."

Vodafone Group to join 5G Automotive Association

Vodafone Group has become the first telecommunications operator to join the 5G Automotive Association (5GAA), a new global cross-industry association of companies from telecommunications and automotive industries.

Vodafone has already started testing cellular vehicle to everything connectivity (C-V2X, which includes LTE-V2X) and will continue that work as part of the 5GAA. Vodafone is recognised as the world leader in Internet of Things connectivity and provides more connected car services, for more vehicle models, from more manufacturers, in more countries, than any other company.

Vodafone has become a Platinum member of the 5GAA and Luke Ibbetson, Vodafone's Group Head of Research & Development and Technology Strategy, will join the Board of the Association.

The 5GAA was established on 27 September 2016 and its founding members are AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia and Qualcomm Incorporated.

The Association will progress the development of connected and automated driving and the creation of intelligent transport systems.

5GAA activities will be organized along five working groups developing various aspects of the end-to-end ecosystem: use cases and technical requirements; system architecture and solution development; business models and go-to-market strategies; evaluation testbeds and pilots; and standards, policy, certification and regulatory aspects.

Luke Ibbetson, said: "The communication between vehicles, infrastructure and pedestrians using C-V2X will be fundamental to the creation of intelligent transport systems. The technology that the 5GAA develops can lead to major improvements in driving and road safety."

Dino Flore, Director General of the 5GAA, added: "Vodafone's industry leadership and cellular network operator's perspective is an important addition to the 5GAA, and it will significantly contribute to the successful development of the connected mobility ecosystem."

5GAA joins 3GPP

The 5G Automotive Association has become a Market Representation Partner (MRP) in 3GPP, bringing in the influence and expertise of vehicle manufacturers and a variety of important companies from the automotive sector, to the 3GPP environment. Dino Flore, Director General of 5GAA, was present at the 3GPP Organizational Partner's meeting in West Palm Beach on April 26, to complete the signing of the Partnership Agreement.

The 5GAA application for 3GPP MRP status stated "It is important to connect the telecom industry and vehicle manufacturers, to develop end-to-end solutions for future mobility and transportation services" Dino Flore told the 3GPP OP meeting "The access part is vitally important and we will work on that with 3GPP. In addition to that, we will look at the other pieces required – including the work on upper layers (SDOs including ETSI-ITS, ISO, SAE and IEEE) and security aspects - to develop the system as a whole."

The work is on-going in 3GPP, with an initial version of the V2X access specifications in Release 14 and active discussions to define next generation V2X capabilities on-going. Susan Miller (3GPP OP Chair, ATIS President and CEO) welcomed 5GAA as a partner and noted the positive effect that Dino Flore's vast experience in the 3GPP leadership, most recently as the RAN Chairman, will have for the successful integration of the 5GAA in to the 3GPP family. Ms. Miller said "5GAA is bringing in the needs of a key vertical at an important time for the project."



"5G will be much more than mobile broadband connectivity, it will cover a variety of use-cases and industries" Dino Flore, DG 5GAA.

5GAA submitted comments to the National Highway Traffic Safety Administration

The 5G Automotive Association (5GAA) submitted comments to the National Highway Traffic Safety Administration (NHTSA) notice of proposed rulemaking (NPRM), "Federal Motor Vehicle Safety Standards; V2V Communications." The proposed rule is to mandate new light-duty vehicles to be equipped with dedicated short range communications (DSRC).

5GAA is a new global cross-industry association of automotive, technology and telecommunications companies and includes 42 members, of which 8 are founding members (AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia, Qualcomm). Our mission is to enable communications solutions that address society's connected mobility and road safety needs.

[In our submission](#), 5GAA applauds the concept behind the rule, as V2V safety is important to our technology deployment mission. 5GAA urges NHTSA to not consider just the best technology of today, but also to consider the best technologies of tomorrow. Such an approach will promote innovation and competitive market-based outcomes, ensuring that American drivers and passengers benefit from the best and most advanced safety solutions available as technology evolves. Rigid technology mandates such as specifying DSRC, whether direct or de facto, freeze technology solutions to a past point in time. NS will significantly impede the innovation and evolution path for Vehicle-to-Vehicle (V2V) safety, and positions the US to lag behind the rest of the world in V2V communications specifically as well as V2X broadly. 5GAA elaborates on the following points:

Similar to DSRC, Cellular-V2X technology for V2V safety can transmit BSM in an ad hoc manner without cellular network coverage.

Cellular-V2X technology for V2V safety communications can operate without a SIM card and offers the tools to adopt, evolve or innovate any privacy-preserving security management system including SCRM.

Cellular-V2X technology for V2V safety benefits from a significantly larger link budget than DSRC (e.g., 8 dB at high speeds), corresponding to twice the range of DSRC and higher reliability.

Cellular-V2X technology for V2V safety can support up to 50 messages per second with less than 20 msec latency.

Cellular-V2X enables V2V, and for that matter Vehicle-to-Infrastructure (V2I), Vehicle-to-Pedestrian (V2P) and Vehicle-to-Network (V2N), safety applications to take advantage of the widespread cellular network coverage in the US.

5GAA notes also that the impending launch of 5G will only widen the performance gap between Cellular-V2X and DSRC.

5GAA believes that Rather than moving forward with the proposed regulation, NHTSA should instead undertake an updated, comprehensive technology neutral analysis of V2V solutions, including DSRC and Cellular-V2X, against the performance requirements in the NPRM. If this review indicates that regulatory action is necessary, the U.S. Department of Transportation should move forward with a technology neutral regulation that sets forth minimum V2V safety performance requirements only.

5G Automotive Association and European Automotive Telecom Alliance sign a partnership MoU

(Barcelona, February 27, 2017). The 5G Automotive Association (5GAA) and the European Automotive Telecom Alliance (EATA) have signed a Memorandum of Understanding. Aim of this partnership is to foster cooperation in the field of connected and autonomous driving solutions as well as standardisation, spectrum and related use cases.

5GAA and EATA are dedicated to prioritising the use cases identified by the two organisations in order to identify the technical requirements that need to be addressed, both in the short and in the long term. In order to better support standards for connected and automated driving, standardisation prioritisation for standards bodies such as ETSI, 3GPP and SAE is necessary as well. It's beyond dispute that promoting spectrum-related issues (V2X), agreement on usage modalities of certain bands, security and privacy, as well as vehicle safety requirements to be supported by both mobile network operators (MNOs) and vehicle manufacturers (OEMs) will need to be addressed jointly. Last but not least, agreement between MNOs and OEMs is also key to developing business models and aligning the timelines of both industries.

5GAA includes 33 members, of which 8 are founding members (AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia and Qualcomm Incorporated). 5GAA is a multi-industry association to develop, test and promote communications solutions, initiate their standardization and accelerate their commercial availability and global market penetration to address societal need. Focus areas are the development, testing and promotion of communications solutions, the initiation of their standardization and the acceleration of their commercial availability and global market penetration to address society's connected mobility and road safety needs with applications such as autonomous driving, ubiquitous access to services and integration into smart city and intelligent transportation.

EATA is comprised of six leading associations and 38 companies at present, including telecom operators, vendors, automobile manufacturers and suppliers for both cars and trucks. The main objective of the Alliance is to promote the wide deployment of hybrid connectivity for connected and automated driving in Europe. EATA's first concrete step is the advancement of a 'pre-deployment project' aimed at testing the performance of hybrid communication required for automated driving under real traffic situations. Furthermore, EATA seeks to identify and address service and technology roadmaps, safety and security needs, as well as regulatory and business issues. The project will tackle cross-border interoperability, including digital and physical infrastructure, as well as vehicle localisation issues.



Quotes

Christoph Voigt, Chairman of the 5GAA Board

"5GAA was created to connect telecom industry and vehicle manufacturers to develop end-to-end solutions for future mobility and transportation services. We look forward to working with EATA to define the requirements of C-V2X and to create a successful V2X ecosystem"

Erik Jonnaert, Chairman of the EATA Steering Committee

"The revolution that connected and automated driving is going to bring about at the societal level is already shaping Europe's automotive and telecoms sectors at a rapid pace. This Memorandum of Understanding with the 5GAA not only brings the different industry partners closer together, but also reinforces the European Commission's strategy on cooperative, connected and automated mobility that was launched at the end of 2016. Car connectivity and automation will require a mix of communications technologies, but it is clear that 5G technology can become a key enabler of Europe's digital highways. Together, EATA and 5GAA will contribute to reinventing the driving experience."

NGMN Alliance and 5GAA sign Co-operation Agreement

The 5G Automotive Alliance (5GAA) and the Next Generation Mobile Networks (NGMN) Alliance have announced to strengthen their relationship and to foster a closer co-operation in the area of 5G-based V2X solutions ([read more](#)).



Dr. Peter Meissner (NGMN) and Christoph Voigt (5GAA) after signing the memorandum of understanding.

GTI focuses on verticals with 5GAA deal

The Global TD-LTE Initiative (GTI) took a “concrete” step in its strategy to focus on vertical industries by signing an MoU with the 5G Automotive Association (5GAA) at the GTI Summit 2017 ([read more](#)).



5GAA chairperson Christoph Voigt and GTI chairman Craig Ehrlich shaking hands on stage.

Driving to the Future: The Case for Cellular in Automotive

On the February 9th members of the 5GAA Board traveled to Silicon Valley to introduce 5GAA and describe their joint vision of cellular communications for automotive applications. The objective of the event was to engage a diverse group representing Silicon Valley-based companies in discussion of how the 5GAA vision may match the culture and innovation of the local ecosystem.

On this occasion 5GAA hosted the event at the Four Season in Palo Alto, sponsored by Intel, with a panel on "Driving to the Future: The Case for Cellular in Automotive". Panelists included Jovan Zagajac (Ford), Luke Ibbetson (Vodafone Group), Walter Weigel (Huawei), Thierry Klein (Nokia) and Michael Faerber (Intel), and the discussion was moderated by Jim Misener (Qualcomm).

The audience included representatives from automotive OEMs and Tier 1 suppliers with offices in Silicon Valley, chipmakers, telecommunications research and development personnel, transportation providers, university researchers and several startups. The discussion was productive and covered a wide range of questions and answers which needed to be addressed. Also discussed was the value of cellular for the automotive and transportation value chain, 3GPP's release of 14 features and how they are able to transform them to 5G. Also explored in the meeting was how invention and innovation are part of both the panelist and the audience group. The event was well attended by over 40 people whom contributed to a very lively debate, it was the first event of its kind organized by 5GAA.



The 5GAA welcomes Elaine Chao as US Secretary of Transportation

Coincident with her confirmation, the 5GAA Board convened this week in California support the development and deployment of cellular V2X solutions that evolve into 5G.

These solutions enable vehicle connectivity, safety services and automated driving. The Board notes that our mission to enable safety and efficient travel meets the vision expressed by Secretary Chao. We congratulate the USDOT Secretary and are encouraged by her support of connected cars and autonomous vehicles.

5GAA was created to bridge automotive and communication industries in order to develop, test and promote connected mobility solutions, initiate their standardization and accelerate commercial availability and global market penetration.

For more information on 5GAA, please visit: www.5gaa.org.

Ficosa, CMCC, Viavi, SAIC, Samsung, Rohde & Schwarz, ZTE, NTT DOCOMO, Continental, Danlaw join the 5G Automotive Association

5GAA welcomes Ficosa, CMCC, Viavi, SAIC, Samsung, Rohde & Schwarz, ZTE, NTT DOCOMO, Continental and Danlaw as new members of the association.

The new members significantly grow 5GAA membership base and diversity, both in term of geography and expertise. This will allow 5GAA to further connect communication and automotive industry to develop end-to-end solutions for future mobility and transportation services.

For more information on 5GAA, please visit: www.5gaa.org.

LG, Ford, Verizon, Denso and Gemalto join the 5G Automotive Association

5GAA (www.5gaa.org) welcomes LG, Ford, Verizon, Denso and Gemalto as new members of the association.

"We are very pleased that LG, Ford, Verizon, Denso and Gemalto have joined the association. With their global footprint and diverse expertise across the communications and automotive ecosystems, these companies will contribute to the definition and development of next generation connected mobility and automated vehicle solutions" Dino Flore, Director General of 5GAA, said.

Kookyeon Kwak, Executive Vice President, Head of LG's Advanced Standard R&D Lab, said, "Cellular communication will play a pivotal role to meet the requirement of safety, convenience and infotainment for future smart cars. The trend is now being accelerated by the completion of LTE-V2X, the first cellular-based vehicle-communication standard. As a manufacturer in mobile communication and vehicle component areas, LG Electronics would like to contribute to 5GAA for connecting communication and automotive industries".

"We are excited to work together with other automotive and technology providers to define a future that envisions new and empowering mobility services and solutions. We see the 5GAA as a key enabler to the development of a sustainable connected vehicle ecosystem." Don Butler, Executive Director of Connected Vehicle and Services at Ford Motor Company, said.

DENSO CTO for the European region, Masato (Max) Nakagawa, commented: "Extending DENSO's global efforts in the area of vehicular connectivity is strategically aligned to our policy 'Protecting Lives, Preserving the Planet, and Preparing a Bright Future for Generations to Come'. Reinforcing this direction, DENSO AUTOMOTIVE Deutschland GmbH has decided to join the 5GAA. We are proud to be accepted as 5GAA member and are looking forward to collaborating in the 5GAA. DENSO considers this engagement viable to complement our long term ongoing global support of 700MHz/5.9GHz V2X safety communication. 5GAA provides the environment for the cross-industry collaboration required to define corresponding future mobile communication systems. In collaboration with the 5GAA partners we plan to explore, define and develop multi-spectral connectivity to support future mobility demands, especially in the area of connected and automated driving."

"Gemalto is thrilled to join 5GAA and work within this prestigious group of global leaders to enable the world of new mobility that will revolutionize the automotive sector," says Frederic Vasnier, EVP Embedded Software and Products. "Gemalto has demonstrated its unrivalled expertise to ensure simple, seamless and ubiquitous connectivity with robust security mechanisms inside the vehicle, between vehicles and with the connected ecosystem of devices, pedestrians and the cloud."

5GAA was created to bridge automotive and communication industries in order to develop, test and promote connected mobility solutions, initiate their standardization and accelerate commercial availability and global market penetration.

Since its inception 5GAA has been experiencing rapid expansion to include key players with global footprint in the communication and automotive industries, including car manufacturers, tier-1 suppliers, chipset/communication system providers, mobile operators and infrastructure vendors.

To achieve its long-term goals, the association is creating five Working Groups to address the following areas of work: Use Cases and Technical Requirements; System Architecture and Solution Development; Evaluation, Testbeds and Pilots; Standard & Spectrum; Business Models and Go-To-Market Strategies. In addition, the board is planning the needed policy and advocacy efforts to join the relevant discussions in this space with different regulators, policymakers and administrations around the world.

Deutsche Telekom, Valeo and SK Telecom join the 5G Automotive Association

5GAA (www.5gaa.org) welcomes Deutsche Telekom, Valeo and SK Telecom as new members of the association.

"We are very pleased that Deutsche Telekom, Valeo and SK Telecom have joined the association. With their important expertise, they will contribute to the definition and development of next generation connected mobility solutions", Dino Flore, Director General of 5GAA, said.

Dr. Bruno Jacobfeuerborn, CTO, Deutsche Telekom AG, said: "Getting the connected car successfully on the road requires a common worldwide standard for 5G. Fragmentation and proprietary systems are obstacles to avoid on our way. Deutsche Telekom has been actively engaged with our partners in the automotive industry to trial and advance communications solutions for intelligent mobility. We now look forward to broadening this collaboration within the cross-industry 5GAA setup".

„Valeo being already a player in the autonomous driving field wants to extend this also to the connected car field. Therefore we are proud to be member of the new 5GAA Alliance to help creating new automotive standards for the 5G network and the connected car environment“, Marc Vrecko, Business Group President, Valeo Comfort & Driving Assistance Systems, said.

Alex Jinsung Choi, CTO & Head of Corporate R&D Center at SK Telecom, said: "We are designing 5G to inherently support connected cars and autonomous driving. 5G brings several outstanding values to automotive industries: augmented autonomous driving, worry-free car management and rich in-car services. I believe that 5GAA will play a key role in bringing new business possibility and opportunity for both the automotive and mobile communications industries."

Vodafone Group to join 5G Automotive Association

Vodafone Group has become the first telecommunications operator to join the 5G Automotive Association (5GAA), a new global cross-industry association of companies from telecommunications and automotive industries.

Vodafone has already started testing cellular vehicle to everything connectivity (C-V2X, which includes LTE-V2X) and will continue that work as part of the 5GAA. Vodafone is recognised as the world leader in Internet of Things connectivity and provides more connected car services, for more vehicle models, from more manufacturers, in more countries, than any other company.

Vodafone has become a Platinum member of the 5GAA and Luke Ibbetson, Vodafone's Group Head of Research & Development and Technology Strategy, will join the Board of the Association.

The 5GAA was established on 27 September 2016 and its founding members are AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia and Qualcomm Incorporated.

The Association will progress the development of connected and automated driving and the creation of intelligent transport systems.

5GAA activities will be organized along five working groups developing various aspects of the end-to-end ecosystem: use cases and technical requirements; system architecture and solution development; business models and go-to-market strategies; evaluation testbeds and pilots; and standards, policy, certification and regulatory aspects.

Luke Ibbetson, said: "The communication between vehicles, infrastructure and pedestrians using C-V2X will be fundamental to the creation of intelligent transport systems. The technology that the 5GAA develops can lead to major improvements in driving and road safety."

Dino Flore, Director General of the 5GAA, added: "Vodafone's industry leadership and cellular network operator's perspective is an important addition to the 5GAA, and it will significantly contribute to the successful development of the connected mobility ecosystem."