

## 5GAA live demos show C-V2X as a market reality

**Turin, 14 November 2019 - Smart mobility technology is a reality today, with 'Cellular Vehicle-to-Everything' (C-V2X) allowing connected vehicles to communicate with the cloud, directly with each other and their surroundings. Deployment plans are primarily sustained by the global trend in the automotive industry to adopt 4G LTE cellular technology, followed by the emerging 5G high-speed low latency communications. Beyond infotainment, C-V2X will capitalize on vehicular and smartphone connectivity to contribute to better safety, less congestion and reduced emissions.**

During a live demo event in Turin, the 5G Automotive Association (5GAA) showcased ready to deploy use cases in the streets of the city and a sneak preview of what the future has in store on the renowned Lingotto rooftop test track.

Prominent members and partners of the 5GAA including **Audi, Continental, Ericsson, Fiat Chrysler Automobiles, Harman Samsung, Marelli, Pirelli, Qualcomm, TIM and Vodafone** demonstrated the current state of C-V2X and the road to future, Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), and Vehicle-to-Network (V2N) applications based on 4G LTE and 5G.

*"Connected mobility is a market reality."* says 5GAA Chief Technology Officer, Dr. Maxime Flament. *"The use cases demonstrated in the streets of Turin are planned for deployment with a huge industry momentum based on the evolution path to 5G capabilities."*

Using both direct short-range communications and mobile networks, the open-road demonstrations showcased the extensive capabilities of today's C-V2X technology, ready for deployment. To name a few:

- Protecting vulnerable road users, for instance, by alerting drivers about a pedestrian at a crossing using LTE-connected infrastructure.
- Smoothing traffic by allowing public authorities and road operators to provide real-time warnings to drivers in urban environments concerning roadworks or speed limits, via the network.
- Preventing incidents at dangerous intersections or in the event of unexpected braking, thanks to C-V2X direct-short range communications between vehicles.

The track demonstrations at Lingotto underlined the enhanced safety benefits that can be expected thanks to the versatility of 5G and the wide range of services it enables. To name a few:

- Vehicles will geo-tag dangerous areas for the following cars or provide 'see-through' functions to avoid dangerous overtaking.
- Pedestrians will be detected directly via their smartphones and surrounding vehicles will be warned.
- In case of accidents, emergency services will be able to visualize the situation live using on-board cameras of surrounding vehicles, improving response times and providing emergency responders situational awareness prior to arriving at the crash scene.

Furthermore, **Intel** showcased an "In Vehicle Entertainment" demo at the Museum, in collaboration with **Marelli, TerraNet** and **Equinix**, showing how Multi-Access Edge Computing (MEC) can support immersive high-definition (HD) entertainment for all occupants of a moving vehicle, including video streaming, gaming, virtual reality (VR), office work, online education, advertisement.

## **A short summary on each of the 5GAA C-V2X use cases, demonstrated today in Turin**

### Demo 1 "Vulnerable Road Users": open road demos on safety

In this trial - which is part of Torino Smart Roads Initiative patronized by the Municipality of Turin - **TIM, Links Foundation** and **Luxoft** showed how the communication between the various actors moving along the roads can help in detecting potentially dangerous situations. The goal of the demos was to demonstrate how the 5G mobile network facilitates the protection of Vulnerable Road Users: pedestrians ("Presence of a pedestrian on a crosswalk") and cyclists ("Presence of a connected bike on the road"). In the case of a pedestrian approaching a crosswalk, a Roadside Unit connected to the mobile network, equipped with a camera able to detect the event, sent a warning message to the nearby connected vehicles (I2V communication). In the case of a connected bike and a connected vehicle that are approaching each other, the two vehicles received a warning message about their presence when a risk of collision is detected.

### Demo 2 "Urban Georeferenced Alerting" in open roads

**TIM, FCA, Links Foundation, City of Turin** with **5T**, and **Politecnico di Torino** showed how the Local Traffic Authority in Turin intends to notify drivers in real time of possible dangers and special situations on the road (traffic jam, road works warning, dynamic speed limit, etc.). A standard geo-referenced warning message was dispatched to a TIM AMQP broker" at the edge of the 5G mobile network and only the involved vehicles received the geo-localized message from the AMQP Broker using the TIM 5G Network. The warning was read and displayed in an FCA vehicle through the on-board HMI and can for instance notify the driver of upcoming speed reduction. The aim of the trial was to demonstrate how the TIM 5G Network is suitable for realizing smart roads services for connected cars. The solution is compliant with the standards so it can be applied in other locations covered with mobile networks.

### Demo 3 Intersection Movement Assist (IMA), Forward collision Warning (FCW)

**FCA** and **Harman Samsung** showcased two Vehicle to Vehicle (V2V) demos, by integrating C-V2X direct-short range communication into Maserati Levante and Quattroporte. The vehicles, through a direct radio link (network-less radio link), anonymously communicated basic information such as their position and related direction.

The Forward Collision Warning (FCW), detected possible frontal collision and warned the driver accordingly. The Intersection Movement Assist (IMA), assisted the driver at the cross junctions to avoid a possible lateral collision with an oncoming vehicle.

### Demo 4 Emergency Electronic Brake Light (EEBL), Stationary Vehicle Warning (SVW)

**FCA, Continental**, and **Qualcomm** demonstrated fast and reliable information exchange between vehicles in emergency situations. The two demos are based on C-V2X direct-short range technology, enabling Vehicle-to-Vehicle (V2V) communication between two Jeep Renegade. There were two portions to this demo:

- "Stationary Vehicle Warning" (SVW): when the hazard lights are activated, the application broadcasted a message to all nearby vehicles so that approaching vehicles could be informed even if the hazard was not visible.
- "Emergency Electronic Brake Light warning" (EEBL): in the event of a sudden braking, the application broadcasted a message to following vehicles, such that approaching vehicles were notified of the potentially dangerous situation.

### Demo 5 See-through

**Vodafone, FCA, Vodafone Automotive, Marelli** and **Altran** revealed the 'See Through' that uses C-V2X long-range cellular network communication to exchange streamed video in real time between vehicles, extending the driver's visual range under obstructed visibility scenarios and to prevent accidents, especially those that may occur in an overtaking phase. The two involved Jeep Renegades vehicles were equipped

with a connectivity solution (Marelli) and high frame-rate cameras (Marelli Motorsport) to detect the road lanes.

A real time tracking system and a space mapping algorithm of the vehicles, specifically developed by Vodafone Automotive, allowed Vodafone's Multi-access Edge Computing (MEC) to dynamically manage and route the video flows on the basis of the vehicles' relative positions and to ensure minimal end-to-end latency in the interest of drivers' safety. Vodafone 5G ultra-low latency and high reliability were paramount to ensure the flow and synchrony of the real-time video exchange between vehicles, also under high traffic and cell saturation conditions.

#### Demo 6 World-first 5G-enhanced ADAS services

**Audi, Ericsson, Italdesign, KTH, Pirelli, Qualcomm, TIM and Tobii** showed how smart cars, commercial 5G smartphones and 5G networks jointly improve comfort, safety and efficiency. This unique collaboration combined the power of eye-tracking glasses, intelligent tires, in-vehicle augmented reality and 5G phones to work together over a live 5G network. With its high capacity and low latency, cellular 5G connectivity is ready to enable instantaneous cooperation between vehicles, the IoT ecosystem and more advanced driver assistance services. The live demonstrations at the Turin Lingotto test track were based on TIM's commercial 5G network delivered in Turin in partnership with Ericsson. Audi cars, equipped with Pirelli Cyber Tyre, and embedded 5G modems provided by Qualcomm and available 5G smartphones were utilized to enhance pedestrian's safety.

## **About 5GAA**

The 5G Automotive Association (5GAA) is a global, cross-industry organisation of over 130 members comprised of leading global automakers, Tier-1 suppliers, mobile operators, semiconductor companies and test equipment vendors. It works together to develop end-to-end solutions for future mobility and transport services. 5GAA is committed to helping define and develop the next generation of connected mobility, automated vehicle and intelligent transport solutions based on C-V2X.

Learn more on the 5GAA website and follow us on [Twitter](#) and [LinkedIn](#).

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