5GAA MRP report to PCG#46e
April 2021

Mobile World Congress Shanghai 2021

5GAA Presented Latest Developments on C-V2X in China to Boost Automated Driving Revolution:

- 8 presentations from 5GAA members
- 1 presentation from the Ministry of Public Security of PRC
- Opening and closing recorded messages from 5GAA

1,300	online participants
125	In person participants (incl. 5 speakers)
270+	news items generated
25,812	impressions on social media (28 posts)

Global State of Play on C-V2X

Status in China: 8 C-V2X Enabled Vehicles Commercially Launched

In 2019, 15 OEMs announced mass production of C-V2X cars as of 2020

C-V2X commercial launch time: 2020H2 to 2021H1, OEMs have made the V2X launch plan.

8 C-V2X enabled vehicles already launched in China

OEM	Model	Launch Time
BYD	Han	2020
GAC	V Aion	2020
FAW	E-HS9 Hongqi	2020
GM/SAIC	GL6 BUICK	2020
GM/SAIC	GL8 BUICK	2020
Ford	Mustang Mach-E	2021
Ford	Explorer	2021
Ford	Edge Plus	2021
Ford	EVOS	2021
BJEV	Arcfox	2021
Weltmeister	W6	2021
Great Wall	WEY Mocca	2021
Human Horizons	HiPhi X	2021
NIO	ET7	2022

Status in Europe

BMW and Samsung to offer 5G in the iNEXT as soon as 2021

"BMW Group has set itself the goal of having the largest over-the-air upgradeable fleet of any manufacturer in the world by the end of 2021. By that time, a total of over 2.5 million vehicles from the BMW brand will be able to receive Remote Software Upgrades."

Source: BMW Group, Jan 2020 and BMW Group, March 2021

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

Source: Audi, 2019 and Audi, 2020

ANAS deploys dual-mode C-V2X / ITS-G5 RSUs in Italy on 80 Km of the 51 Road

Source: Le Strade dell'Informazione, Feb 2021

Bosch's wrong-way driver warning system now a feature in ŠKODA vehicles and deployed in NL with via Talking Traffic

2.5 million unique active users per month already in Europe

Source: Bosch, August 2020 & Bosch, Feb 2021

"The FCA Uconnect system will use 5G technology"

Source: La Repubblica, Nov 2019

Telefónica, APM Terminals to deploy 5G and C-V2X at Port of Barcelona

Source: APM Terminals, March 2021

"Local Hazard Information technology is being rolled out across more than 80% of Ford's passenger vehicle line-up by the end of [2020]."

Source: Ford, 2020

Continental continues its successful course in 5G connectivity with first order for commercial vehicles

"As of 2023, Continental will supply two European vehicle manufacturers with intelligent antenna modules and 5G telematics units."

"Continental has won a serial order from a leading European commercial vehicle manufacturer to equip its vehicles with the 5G V2X telematics platform."

Source: Continental, July 2020 & Continental, April 2021

US ITS Regulatory Update

The US FCC 5.9 GHz ruling points to C-V2X as technology of choice:

- Allows C-V2X in upper 30 MHz after expedited waiver process
- DSRC will move to lower 10 MHz until end of phasing out period (2 years)
- FCC puts spotlight on OEMs to bring V2X to the finish line

December 2019	November 2020	2021…
FCC Releases 5.9 GHz NPRM	FCC adopted 5.9 GHz First Report and Order (R&O) and FNPRM	Awaiting R&O and FNPRM publication in Federal Register

Status in the US

Ford commits to deploy C-V2X in all new vehicle models in the US beginning in 2022

source: Ford, Jan 2019

Audi of America, Virginia DOT and Qualcomm Announce Initial C-V2X Deployment in Virginia

source: Audi USA, Jan 2020

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

source: Blue Bird, March 2021

Auto Industry Unites Behind Safety Technology by Committing at least 5 Million V2X Radios and Devices by the End of 2025

source:
Alliance for Automotive Innovation, April 2020

General Motors and Qualcomm extend long-standing relationship to transform next generation vehicles

"As an extension of the relationship, GM worked with Qualcomm Technologies for C-V2X, which has launched with the Buick GL8 MPV now available in China."

source: Qualcomm, Jan 2021

Verizon & Honda test how 5G enhances safety for connected and autonomous vehicles

"Using Cellular Vehicle-to-Everything (C-V2X) communication, Honda SAFE SWARM™ enables vehicles to communicate with other road users and share key information such as location, speed, and vehicle sensor data"

Source: Verizon, April 2021

C-V2X devices and sample of dual-mode RSUs

List of C-V2X Devices (last update November 2020)

- This document intends to provide an overview of the C-V2X Devices which we understand are already publicly available on the market. This overview is based on publicly available information.
- The sources are referenced. 5GAA does not accept any liability for information provided by third parties. 5GAA has not verified whether the information provided by third parties is accurate. 5GAA does not in any way validate the information provided by third parties by including particular devices in this list. This document is only intended to provide an overview, the list of devices is not necessarily complete.
- This list does not necessarily include factory-fit telematics/V2X boxes directly under contract with automakers.

Kapsch RIS-9260 dual-mode C-V2X Roadside ITS Station

Source: Kapsch

Commsignia ITS-OB4 and ITS-RS4 (DSRC & C-V2X dual mode)

Source: Commsignia

LACROIX City Neavia V2I Station 4G integrated & scalable to 5G

Source: LACROIX City

Next generation 5G products

Alps Alpine Develops, Starts Shipping Samples of 5G NR Module for Automotive Use

"Newly developed UMNZ1 Series 5G NR Module for Automotive Use with C-V2X features, is compliant with 3GPP2 Release 15. Teaming up with a Chinese C-V2X chip supplier, Alps Alpine developed an All In One communication module with a built-in V2X protocol stack. Sample shipments began in March with aims to accelerate social implementation of 5G solutions for automobiles. The UMNZ1 Series is intended for global use outside China."

Source: Alps Alpine, March 2021

Samsung-Harman 5G-ready TCUs

5G-ready TCU	4G NADs capable of handling 5G protocol
	RF front-end limited to 2G, 3G and 4G bands
	"Re-farmed" channels will begin to come available for 5G by 2026
	5G may be activated via OTA
	Reduced price compared to full 5G-ready NAD (below)
Fully 5G-ready TCU	Hardware supports 5G bands n77, n78, n79 (sub-6 GHz)
	Purchase of 5G upgrade possible at any time at dealer or through e-commerce direct to consumer
	5G functionality can be activated via OTA
	Activation can be ordered by OEM, MNO or customer

Source: Samsung-Harman, 2021

Fibocom Launches 5G Smart Module SC161 Based on Qualcomm QCM6350

"Fibocom SC161 can be widely applied in IoT scenarios such as smart wireless payment, C-V2X, smart cities, smart home, robot, VR, AR, etc. It is an outstanding core system solution for global IoT applications. The mass production of Fibocom SC161 smart module is planned to start in Q3 2021."

Source: Fibocom, April 2021

Quectel announces Marelli collaboration and deals to supply European automotive OEMs

In addition, Marelli and Quectel have established a joint basis to advance work on 5G and C-V2X platforms. The two companies have also enabled evolved LTE connectivity utilizing the Quectel AG520R and AG55xQ platforms. The relationship, which is Quectel's first with an automotive industry customer outside China, enables both companies to be fully-prepared for requests for quotes (RFQs).

Source: Quectel, April 2021

LG Innotek Unveils 5G Communication Module for Automotive

5G w/ C-V2X Standalone Type	*Solution: Qualcomm 3GPP Release 15, 5.9GHz PC5 interface GNSS supported (L1 + L5)*

Source: LG Innotek, Oct 2019

5GAA Work Programme update

Work Items closed since WG Meeting Q1

- UCID - Use cases implementation specification
- UCM - Use Cases Maintenance and x-WI Convergence

Work items to be finalised during/after this WG Meeting

- MEC4AUTO - MEC technology to support automotive services (phase 1)
- NRI - V2X Network Reselection Improvements
- VATM - Vehicular Antenna Test Methodology
- STiCAD - Safety Treatment in Connected Automated Driving Functions
- ToD - Requirements and architecture for Tele-Operated Driving
- CASE - Conformance Assessment
- SPECTRCONFIG - ITS Band Configurations for Spectrum Use
- Tolling

Publications since last Virtual Meeting Week

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Work Items approved since WG Meeting Q1

- Use Case Maintenance Phase II (**UCM II**)
- Use Case Implementation Descriptions Phase II (**UCID II**)
- Accelerating VRU Protection on the road (**VRU-PRO**)
- Predictive QoS and V2X Service Adaptation (**PRESA**)
- Study on the trends and technologies for 5G evolution and beyond (**5GEB**)

WI ID	WI full name
VATM	Vehicular Antenna Test Methodology
MEC4AUTO	MEC technology to support automotive services
NRI	V2X Network Reselection Improvements
STiCAD	Safety Treatment in Connected Automated Driving Functions
ToD	Requirements and architecture for Tele-Operated Driving
CASE	Conformance Assessment
SPECTRCONFIG	ITS Band Configurations for Spectrum Use
TOLLING	Tolling
DAS	Distributed Antenna Systems
EU-ESPS	EU Regional V2X regulation alignment with ESPS
NRV2X Phase 2	Defining Complex V2X Interactions for 5GNR
DPR-V2X	Data Processing for V2X
ETSI-CEPT	ETSI/CEPT Inputs on NR-V2X
DevSecReq	Software and Hardware Security Requirements and Certification
NCAP	Global NCAP
SPECTRUMNDS	Spectrum Needs Study Rel. 2 for Advanced Use Cases
PPL	Precise Positioning
BRIDGE	Digital Roads
C-V2X RM II	C-V2X Roadmap
UCID II	Use cases implementation specification Phase II
MBD4V2X	Misbehaviour detection
DASHBOARD	C-V2X Market Dashboard
VRU-Pro	Accelerating VRU Protection on the road
gMEC4AUTO	MEC technology to support automotive services phase II
NFL	Joint report from IMT-2020 PG interoperability tests
UCM II	Use Cases Maintenance and x-WI Convergence Phase II
PRESA	Predictive QoS -Use Cases / network architecture
InterITS	Automotive and ITS Applications
5GEB	Study on the trends and evolution of beyond 5G technologies

New Draft Work Items under discussion

- New Four Layer - Joint 5GAA-IMT2020PG report from the Shanghai Four Layers Interoperability Test in Oct 2020 (**NFL**, WG3)
- MEC technology to support automotive services phase II **(gMEC4AUTO)** (WG2/WG3/WG7)
- Automated Valet Parking: Technology Assessment (**AVP**, WG1/WG2/WG3/WG5)
- Requirements and Solution Methodologies for Interoperability of Automotive and ITS Applications (**Inter-ITS**, WG2/WG3)
- Connected Powered Two Wheelers – Joint WI with CMC (**CPTW**, WG1/WG2/WG5)
- Market Pull (**PULL**, WG5)

Inputs to Rel. 18 under preparation for inputs at RAN#92e

PROCESS under way at 5GAA

1. Establish an understand what has been requested by 5GAA for RAN Rel-17 and what is in and what not
2. Identify what of the “not in” is still needed
3. Identify new topics for Rel-18 timeframe (remember Rel-18 will be final around end 2023/beginning 2024)
4. Priorities topics
5. Establish an understanding which vertical might have similar needs
6. Establish interaction with selected verticals
7. Individually or jointly address common needs to 3GPP

2021 / 2022 Upcoming Meetings

Date	City, Country
July 26 – August 2, 2021	Virtual Meeting Week
October 18 – 22, 2021	Virtual Meeting Week (most likely)
February 14 – 18, 2022	Málaga, Spain
May 9 -13, 2022	Atlanta, USA

Virtual: Registration opens approx. 1 month in advance
F2F: Registration opens approx. 3 months in advance

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Thank you!