



UPDATE ON V2X COMMUNICATIONS DEPLOYMENT IN NORTH AMERICA

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US regional update: OEM perspective

Ford to deploy CV2X beginning in 2022 in all new models

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Ford Breaks With Auto Rivals By Committing To C-V2X Vehicle Communications Tech



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Transportation

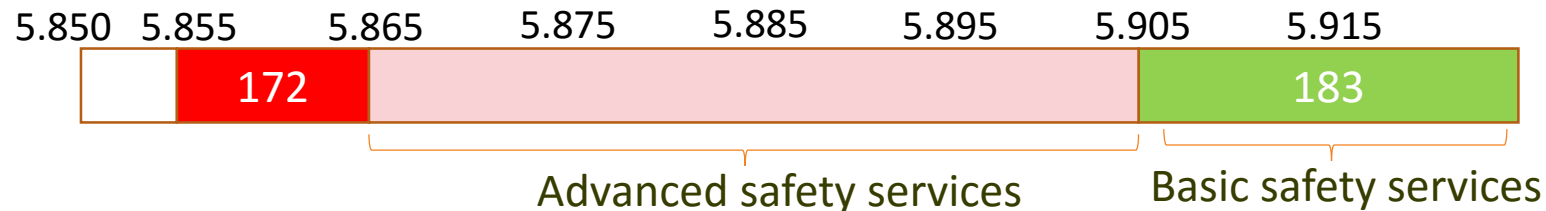
A lifetime in the car business, first engineering, now communicating



- C-V2X provides improvements in reliability of reception in realistic road situations including NLOS conditions and resiliency to WiFi interference.
- C-V2X provides an improved radio interface with a minimal change to the V2X applications stack. Many years of V2X research can be used to deploy rapidly without delay.
- As a result of almost 100% new-vehicle penetration of cellular V2N-capable chipsets the integrated C-V2X capability represents an incremental feature that can provide significant efficiencies
- C-V2X has a clear evolutionary path to 5G which ensures future versions will remain functionally backwards compatible while benefiting from future advancements in wireless technologies.
- By being part of a large ecosystem of today's 4G and tomorrow's 5G mobile devices and network infrastructure offers potential for improved functionality and reliability at reduced societal cost

5GAA working towards creating a regulatory environment to support C-V2X deployment as soon as possible

- The Federal Communication Commission (FCC) adopted rules mandating the use of DSRC radios in the 5.9 GHz band in 2003
 - Under these rules C-V2X operations are not permitted in the band
 - 5GAA is prosecuting a petition to waive and change these rules



- FCC's to adopt a Notice of Proposed Rulemaking on WiFi, DSRC and CV2X in the band
- The USDOT proposed a rule that would advance the deployment of connected vehicle technologies (DSRC) in 2016
 - Proposal dormant. USDOT “not in the business of picking technologies for the industry”
 - 5GAA initiated engagement with DSRC and unlicensed community and other stakeholders (e.g. road operators) to facilitate a constructive dialogue about the band plan

US regional update: infrastructure perspective

US Connected Vehicle Infrastructure Deployment

Uncertainty

- There are about 10,000 towns, cities, counties and states that buy, operate and maintain traffic infrastructure equipment in the USA. The Federal Government provides funding but does not own any infrastructure.
- There are about 2,000 DSRC radios deployed in the USA out of 350,000 intersections, mainly in pilot schemes. About 25,000 4G devices between TSS (Audi) and Applied Information (TravelSafely smartphone OBU)
- BUT
- The FCC's NPRM is causing uncertainty in the connected vehicle infrastructure market
- Toyota's cancellation of their commitment to deploy DSRC on their vehicles in the USA (while still being supportive of DSRC) causing further uncertainty in the Infrastructure market
- SO WHAT IS BEING DONE?

Industry is not waiting for regulation

- The standards association in surface transportation traffic control devices is NEMA.
 - The newly-formed Connected Vehicle Infrastructure Technical Committee will produce a roadside standard that the local traffic agencies can use to support Connected Vehicles in this period of uncertainty. This includes multiple radio support, over-the-air software update capability, maintainability, upgradability, etc.
 - <https://www.nema.org/news/Pages/NEMA-to-Develop-Standards-for-Vehicle-to-Infrastructure-Communications.aspx>
- The Ford announcement and commitment to C-V2X at CES in January continues to resonate throughout the CV Infrastructure community in the USA. It is driving the discussion forward very quickly, and is acknowledged as Ford and Qualcomm private sector leadership in the CV space in the USA.
- The early adopter agencies (cities and some states) are ready to deploy C-V2X
- There is a general sense among most traffic agencies, including USDOT, that the industry needs to move beyond DSRC to a collection of cellular compatible radios – such as C-V2X, 5G etc. Industry realizes that the time for action is now.

Diving into Standards

- Aforementioned NEMA multi-radio standardization activity will include “dual mode, dual active” RSU
 - Enables road operators to not take sides at this time...
 - But offers a path for C-V2X to enter (and take over) the market
 - Draft specification written; final standard in < 1 year.
- Automotive standards and certification (a complement to NEMA)
 - SAE C-V2X and Advanced Applications Technical Committees (TC)
 - SAE J3161 – a profile for V2V communication in the US
 - Advanced Applications TC: Open for business for Rel-16 5G NR
 - New SAE paradigm: Current application standards are to be media independent.
 - C-V2X certification activity underway at OmniAir Consortium
 - Plugfests with C-V2X already conducted

Holistic look at US infrastructure owner-operators

- Mainstreaming with:
 - USDOT (see earlier comment on their technology-neutral stance), ITSA (V2X Task Force) and AASHTO and local agencies
 - Connected and Automated Vehicle Coalition
 - CAV Coalition is comprised of primary ITS/road institutions (AASHTO, ITE, ITSA) + USDOT
 - Other OEMs
- Initial Deployments. Essential point understood by many in the US - *experience from DSRC pilots and model deployments almost entirely transferrable because Day 1 C-V2X use case applications are the same.*
 - Colorado (100 C-V2X RSU and 500 vehicles)...just a start. Utah just announced
 - More deployments to come with increasing cadence.
 - At least 10 potential deployments under discussion
 - Some include cooperation with MNOs/neutral hosts

We are paving the way for widespread deployment to match 2022 target date for 1st mass vehicle deployment of C-V2X in the US