

CAT Coalition Technical Resources Working Group Quarterly Meeting

February 10, 2021
11:00-12:30 (Eastern)

Agenda

- 11:00-11:05 Welcome and Introductions, Outreach and Knowledge Transfer
- 11:05-11:10 Resources Recap
- 11:10-11:25 CAT Coalition Updates and SPaT Resource
- 11:25-11:40 C-V2X Standards Updates
- 11:40-12:00 Update on USDOT/ITE Connected Intersections and RSU Standard Development Efforts
- 12:00-12:15 Overview of Mobility as a Service and Mobility on Demand
- 12:15-12:25 Partner Reports (USDOT, ITS America, ITE, Other Partners)
- 12:25 WG Meeting Schedule, Member Updates, Closing

Ongoing Commitment to Outreach & Knowledge Transfer

- Suggestions from WG Members on Ways to Enhance Impact:
 - Proposed new WG Members
 - Communications with/involvement in other initiatives
 - Knowledge resources to include on CAT Coalition website
 - ❖ SPaT deployment, related to the full V diagram
 - ❖ OBU deployment documentation for Connected Fleet Challenge
 - ❖ Cybersecurity and network security resources
 - ❖ New or planned SPaT deployments, or updates

Resources WG Recap

Jeremy Schroeder, Athey Creek

Resources WG Recap

- IOO-OEM Work Plan Product Review: Preliminary Verification Resource – Overall Testing Approach
 - Five phases of testing and verification for messages broadcast by IOOs and used by IOO vehicles
 - Leverages and coordinates with other parallel activities, followed by outreach to distribute the testing plan
 - Expected to be released early next year
 - This activity leads to additional actions: a tracking approach for reporting the verification of connected intersections over time and the operational approach that IOOs should take during disruptions

Resources WG Recap

- NCHRP 08-120: Deployment of CV Technologies on Rural Corridors
 - Systems engineering approach to examine CV technologies to improve safety, mobility, and efficiency in rural settings.
 - Outcome is model concept of operations and model system requirements documents, expected around January 2021.
 - Next steps for this effort include continued outreach and publication, which was recommended to be in a web-only format.
 - NCHRP has funds for implementation, which agencies can request.

CAT Coalition Updates & SPaT Resource

Faisal Saleem, MCDOT

Blaine Leonard, UDOT

CAT Coalition Update

- The work plan activities of the CAT Coalition working groups and regular meetings of the working groups will conclude in November 2021.
- The working groups are asked to continue to focus on bringing their products to conclusion and wrapping up other work plan activities by November 2021.
- A compendium of the CAT Coalition products and narrative of the coalition will be completed, with efforts starting this year and concluding in 2022.
- Association leaders are in conversation about what kind of coalition might follow the CAT Coalition

Resources WG Activities – Completed

- ✓ #22: Hosted presentations on Cellular V2X (C-V2X) to enable discussions around technical deployments.
- ✓ #23: Identified resource gaps within primary CAT focus areas on signalized and unsignalized intersections, work zones, curve warnings, and end of queue, as well as general CAT issues. These were added to the list of other gaps identified during monthly webinars.
- ✓ #24: White Paper on CAT Resources and Lessons Learned

Resources WG Activities – Ongoing

- #25: Introduction of MaaS/MOD and facilitated discussion with invited speakers and members surrounding the increasing role of MaaS/MOD in CAT
 - On today's agenda
- #26: Review, input, and analysis of developed CAT documentation, tools, products, and resources
 - Ongoing
- #27: CV Deployment Environment Resource
 - Initial draft finalized and posted online; to be updated

Proposed New Resource – Reallocation of the 5.9 GHz Band – Information for SPaT Challenge Sites

Blaine Leonard

Since the Challenge Started.....

Developed a set of SPaT Challenge Resources

- Licensing information
- Implementation support
- Corridor-selection
- FAQs
- Many more...

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RESOURCES

The following resources have been compiled or created by members of the V2I Deployment Coalition and are available or will soon be available.

- [Resource #1: DSRC licensing information](#)
- [Resource #2: Implementation guidance](#)
- Resource #3: Estimated costs (install & maintenance) - *Coming Soon*
- Resource #4: Sample SPaT documentation - *Coming Soon*
- [Resource #5: Guidelines for selecting corridors](#)
- Resource #6: Procurement Guidance - *Coming Soon*
- Resource #7: Identifying existing funding sources to consider - *Coming Soon*
- [Resource #8: Frequently Asked Questions \(FAQs\)](#)
- Webinar Schedule and Recordings - *Coming Soon*
- [Additional Links](#)

> SPaT Home

> Resources

- > Resource #1: DSRC licensing information
- > Resource #2: Implementation guidance
- > Resource #5: Guidelines for selecting corridors
- > Resource #8: Frequency Asked Questions (FAQs)
- > Additional Links

> Contact Us

Since the Challenge Started.....

Conducted 13 SPaT Challenge Webinars

- Introduced key concepts
- Tutorials on all aspects of deploying SPaT systems
- Peer sharing of their experiences
- All webinars recorded and available at <http://transportationops.org/spatchallenge>

Since the Challenge Started.....

Observed and supported many deployments



Five years of progress:
47 Corridors
26 States



SPaT deployment underway



SPaT deployment operational

SPaT Challenge Possible Resource

Reacting to the FCC Reallocation of the 5.9 GHz Band

Information to Benefit SPaT Challenge Sites

Discussion on the January 28, 2021 Strategic Initiatives WG webinar:

- Is a resource needed to support the SPaT Challenge sites given the recent FCC reallocation of 5.9 GHz band? – **Agreement – Yes!**
- Is another group already developing a similar resource? – **None identified**
- Should this working group take this on? – **Agreement – Yes!**
 - Possibly in partnership with the CAT Coalition Technical Resources WG? – **Today's discussion**
 - **Joe Averkamp (Co-Chair of the Strategic Initiatives WG agreed to lead the effort)**

Preliminary Outline

1. Introduction

<Recap the FCC reallocation, include links to resources with background information>

2. Technology Impacts of the Reallocation

<Describe the hardware and software changes that are needed. Note the applicability of J2735 and aspects that do not change with C-V2X>

<Description of the potential complementary roles of C-V2X RSUs and cellular network communications.>

<Describe any RSU deployment changes (e.g., can C-V2X RSUs be spaced further apart or is the range similar to that of DSRC? etc.)>

3. Policy Impacts of the Reallocation

<A description of changes to the licensing process for RSUs and if existing licenses transfer. Describe any operational costs that may be incurred, either by the RSU or OBUs.>

4. Timeframe and Key Dates

<Describe the schedule for transition once published by the FCC and other information to help IOOs plan their path for transition.>

5. Next Steps to Consider – Preparing for Connected Intersections

<Identify any available resources for IOOs to use in the transition (e.g., ITE/RSU and ITE/CI standards implementation and interpretation documents)>

<Suggest IOOs use this as an opportunity to ensure their deployments are compliant with standards, that MAP messages are current, that position correction is available. Describe and link to industry resources available (e.g., ITE/CI, ITE/RSU, CV PFS MAP Guidance document)>

6. Resources Available

<Include a summary table of resources with links to the resources>

Any Volunteers?

C-V2X Standards Updates

Jim Misener, Qualcomm

February 10, 2021

CAT Coalition Technical Resources Working Group



C-V2X Standards Updates

Jim Misener

Sr. Director, Product Management

Global V2X Ecosystem Lead

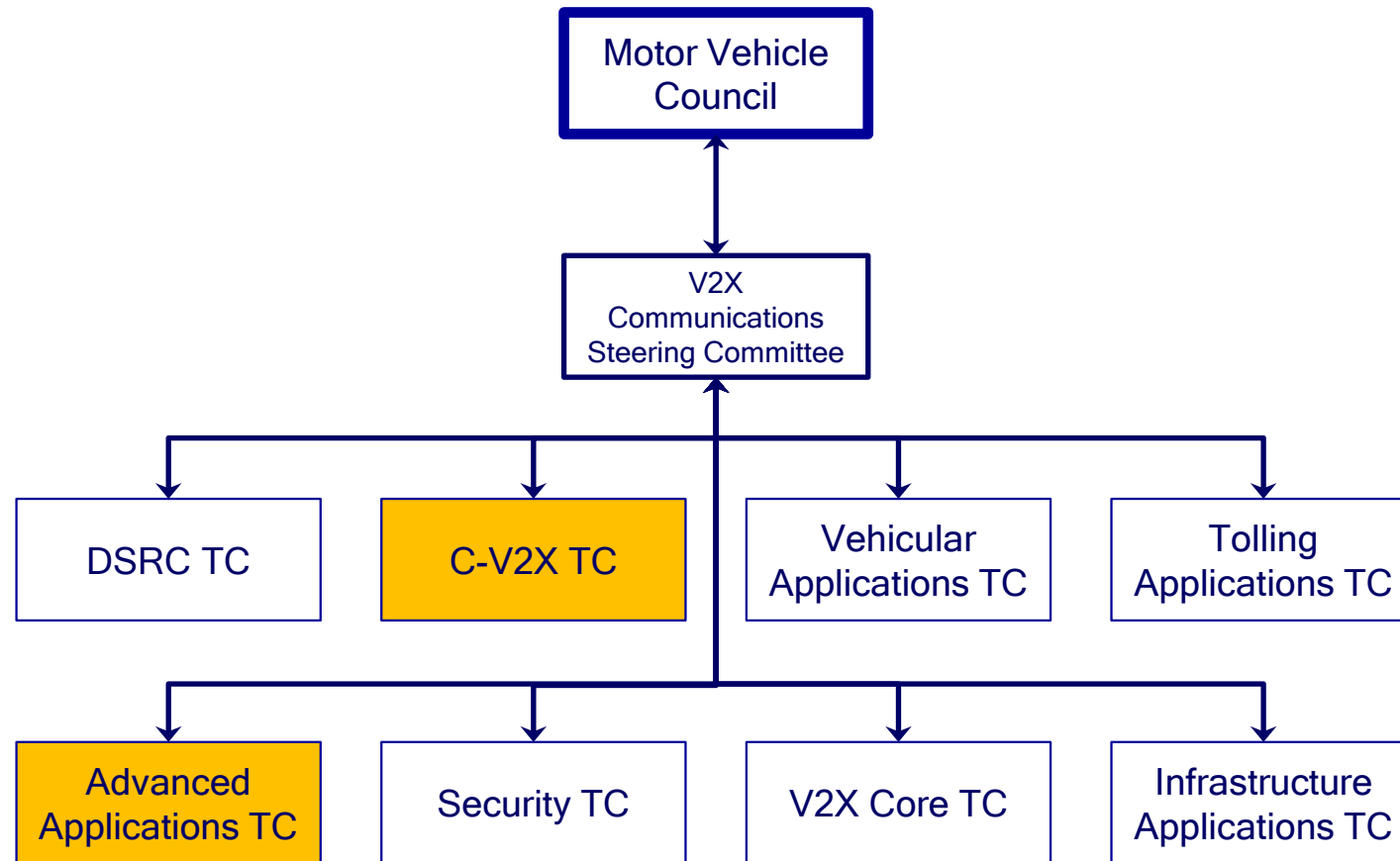
Qualcomm Technologies, Inc.

Agenda

- C-V2X Standards Development
- RSU Standard (NEMA TS-10)
- OmniAir Certification
- Projecting Ahead

SAE International Committee Structure

New Committee Outside of Communications Steering Committee: Connected and Automated Driving (CAD)



C-V2X Technical Committee

Three WIPs

1. Primary: “On-Board System Requirements for LTE-V2X V2V Safety Communications” - J3161/1
 - Final affirmation ballot approved by the committee
 - At Motor Vehicle Council for final ratification and publishing
2. “C-V2X Deployment Profiles” - J3161(/0) - *will describe later*
 - V2I/I2V profile
 - Initial ballot passed - just completed second ballot to resolve remaining comments
3. “Vehicle-Level Validation Test Procedures for LTE-V2X V2V Safety Communications” - J3161/1A
 - Test specification standard - analogous to J2945/1A test spec
 - Initial ballot passed - just completed second ballot to resolve remaining comments

C-V2X in Other Technical Committees

- **Advanced Applications**
 - **J3224** - V2X Sensor-Sharing for Cooperative & Automated Driving
 - Expected to go out for ballot soon
 - **J3186** - Application Protocol and Requirements for Maneuver Sharing and Coordinating Service
 - Expected to go out for ballot soon
- **Security** - (“Service Specific Permissions and Security Guidelines for Connected Vehicle Applications”)
 - Working on Standards Harmonization and SCMS management
- **Tolling Applications** Work continues on tolling using C-V2X (J3217).
- **Core**
 - J3242 - Systems Engineering process for V2X - draft expected in Q2
 - J2945/7 - enhanced positioning draft in development

V2X in Other Technical Committees

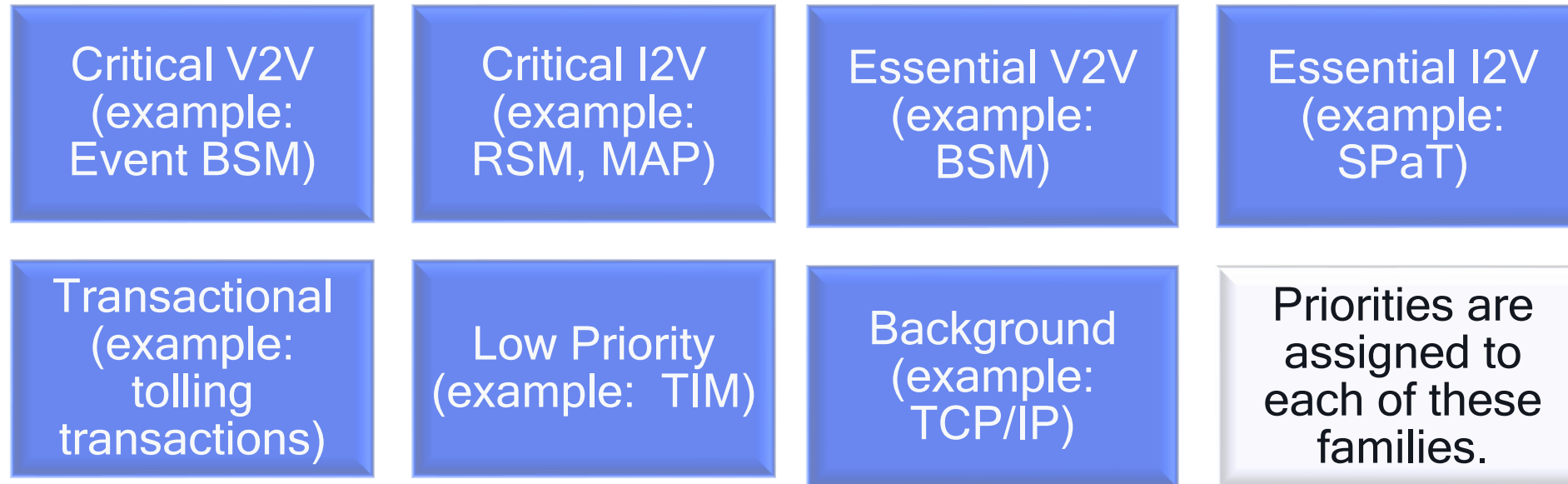
- **Infrastructure/Traffic Signal Applications**
 - J2945/4 Road Safety Applications
 - J2945/A Lane-Level and Road Furniture Mapping for Infrastructure-based V2X Applications
 - J2945/B Recommended Practices for Signalized Intersection Applications
 - J2945/C Traffic Probe Use and Operation
 - J3238 Infrastructure Applications Testing for Interoperability
- **Vehicular Applications**
 - J2945/6 - Performance Requirements for Cooperative Adaptive Cruise Control and Platooning - out for ballot
 - J2945/8 - Cooperative Perception System - in process
 - J2945/D - Road user-to-Road User Courteous Communication - in process
- **On Road Automated Driving (ORAD) Task Force**
 - J3164 - Taxonomy for AV - ongoing
 - Other WID in process
- **Cooperative Automated Driving (CDA) - new committee**
 - Partial USDOT funding
 - Four Task Forces:
 - Architecture and Interfaces TF
 - Cooperative Intersection and Traffic Management TF
 - Cooperative Perception TF
 - Security TF

IEEE 1609 Updates

- **1609.2 Security Services:** Revision cycle underway - expected publication date Q2/2022
- **1609.2.1 Certificate Management Interfaces:** Published
- **1609.3 Network Services:** Approved by IEEE RevCom and into pre-publication processing; likely publication date March 2021.
- **1609.13 Data distribution:** underway; expected publication date Q1/2022
- **1609.20 Underway;** expected publication date Q1/2022
- Published and not currently under revision
 - **1609.0 Guide**
 - **1609.4 Multi-Channel Operation** (not relevant to C-V2X)

Traffic Families

Defined in SAE J3161 WIP C-V2X Deployment Profiles



Communication profiles (# subchannels, data rate, retransmission) set for V2V, V2I and I2V

Source sample text

Allows V2V and V2I services to be delivered by one 20 MHz Radio*

* Opportunity for lower 10 MHz can be used for platooning or other apps

RSU Specifications (NEMA TS 10 and ITE)

ITE Draft Specification Just Released (and not covered here)

- **TS 10:** Designed for Agencies and other transportation infrastructure owner/operators to procure and deploy Connected Vehicle (CV) Roadside Units (RSU)
- Set of gaps covered by NEMA TS 10 specification:
 - Standardizing minimal set of messages via a uniform interpretation for safety applications
 - Standardizes RSU functions needed by vehicles and road users
 - Account for hardware, software, and communications capacity for future needs
 - Harmonizes communication protocols
 - Supports multiple radios
- Considers a minimum level of functionality requirements to support safety applications in a common message format
- NEMA TS10 RSU expected to be published in Q1/2021
- Integrated with OmniAir C-V2X certification program by adding additional RSU tests from NEMA TS10

Overview: OmniAir is Ready to Begin C-V2X Certification

Test Specs, Test Labs, Test Equipment, Standards, and Regulatory in Final Stages

- Certification Operating Council (COC) developed DSRC test specs almost 5 years ago
 - OmniAir inherited all COC test specifications
 - Only organization that does DSRC certification
- Upper layers of DSRC are common with C-V2X
 - e.g., Message sets (J2735), security (1609.2) are the same...as are many others
 - Minimal rewrite required
- Some new tests were needed for the PC5 sidelink radio
 - 3GPP had already written lower level radio tests
 - Needed a few tests for J3161/1, J3161/1A, new Test Controller Interface
 - OmniAir C-V2X sub-WG assembled the suite in about a year
 - >170 tests (RSU & OBU) available for Fall 2020 plugfest

OmniAir has used existing tests from SAE and 3GPP + developed new tests to launch a just-announced C-V2X certification program

Projecting Ahead

5G V2X builds on C-V2X

with advanced use cases

Safety use cases

Advanced use cases

Upper layers

Mapping use cases to transport profile

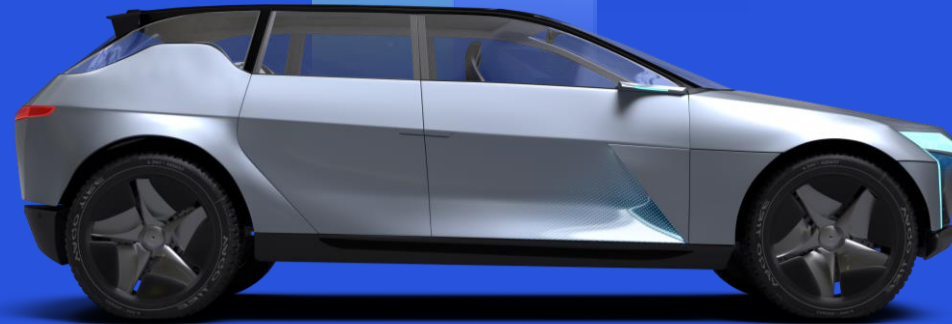


C-V2X

Rel 14/15 sidelink
Broadcast messages

5G V2X





Rel 16+ sidelink
Multicast messages



5G V2X sidelink



Thank you

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Update on USDOT/ITE Connected Intersections and RSU Standard Development Efforts

Siva Narla, ITE

Overview of Mobility as a Service and Mobility on Demand

Sara Davidson, ITS America

Partner Reports from USDOT, ITSA, ITE

Closing Remarks

Any deployment updates or lessons learned to share with the group?

Any other closing comments or questions?

2021 Resources WG Meetings

May 12, August 11, and November 10

11:00-12:30 (Eastern)