

# CAT Coalition Technical Resources Working Group Quarterly Meeting

August 11, 2020

11:00-12:30 (Eastern)

# Agenda

- 11:00-11:05 Welcome and Introductions
- 11:05-11:15 Outreach and Knowledge Transfer, Resources Recap
- 11:15-11:35 IOO-OEM Forum Work Plan Product Review: Clarifications for Consistent Implementation
- 11:35-12:05 Partner Reports
- ITE: RSU Standards Update
  - USDOT: Update on Support Services
  - ITS America: Update on 5.9 GHz Spectrum NPRM
  - Other updates from all partners
- 12:05-12:25 CV Deployment Environment
- 12:25-12:30 Next Webinar, Member Updates, Closing

# Outreach and Knowledge Transfer, Resources Recap, IOO/OEM Forum Work Plan and Linkages to Resources WG

Faisal Saleem, Tom Kern, and Jeremy Schroeder

# 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

- IOO/OEM Forum Work Plan

		2020			2021			
		Apr-Jun	Jul – Sep	Oct - Dec	Jan - Mar	Apr-Jun	Jul – Sep	Oct - Dec
<b>Resources WG</b>	1. React to draft SPaT/MAP requirements & CCI Clarifications	5/6	8/12					
	2. React to Connected Intersections Test Plan	I		11/11				
	3. Receive briefing / provide reactions to approach for operating and maintaining connected Intersections							

I Introduce IOO/OEM Forum Linkage      5/6 Planned webinar & date

- SPaT Implementation Fact Sheet and Chart

- Being developed for USDOT with input and support from members of this community
- Still a work in progress, and feedback was requested
- Resources will be made available and be posted when completed (likely linked at NOCoE)

# Resources WG Recap

- FHWA Roadway Automation Concept of Operations
  - Stakeholder engagement to understand IOO and industry perspectives and needs
  - Definitional document to delineate the “what” in preparing for automation readiness
  - Not a traditional ConOps but a plan for integration, implementation, and sustained coordination

- Integration Cases – ConOps Focus Areas**
- Freight and Packages**
- Automated Long-Haul Freight
  - Automated Local Freight Delivery
  - Automated Home Package and Goods Delivery
- Transit**
- Automated Fixed Route Transit
  - Automated On Demand Transit
- Individual Commuting & Travel**
- Automated Ride for Hire
  - Automated Personal Vehicles
- Agency Operations**
- Automation of Fleet Vehicles

# **IOO-OEM Work Plan Product Review: Clarifications for Consistent Implementations (CCIs) Connected Signalized Intersections**

Created by the CAT Coalition's IOO/OEM Forum (SPaT/RLVW Work Group)

# Clarifications for Consistent Implementations (CCIs) Connected Signalized Intersections

## Why Was This Document Created?

- There is inherent and intended flexibility in the standards and system architecture documents that V2I data exchanges are based on.
- IOOs want to deploy intersection systems that successfully communicate with every production vehicle that is eventually equipped with on-board units
- ***IOOs and OEMs must agree on concise interpretations and clarifications on known ambiguities that might prevent national interoperability for V2I data exchange.***

Cooperative Automated Transportation  
Clarifications for Consistent Implementations (CCIs)

To Ensure National Interoperability

**Connected Signalized Intersections**

DRAFT Version 1.9.5

June 2020

Note: This is a partial draft version of this document, circulated for discussion about approach, formatting, and content. Not a completed document.



# Clarifications for Consistent Implementations (CCIs) Connected Signalized Intersections

## A Resource Document Focus is on Ambiguities

- Not a “one-stop-shop” document
- Readers are referred to other sources. E.g. the SPaT Challenge Verification Document, and national V2I Standards/resources
- Text from the document: *“It is anticipated that future versions of standards may clarify some or all of the ambiguities described in this document. At such time, ambiguities clarified in the standards will be removed from this document.”*

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# Clarifications for Consistent Implementations (CCIs)

## Communications Agnostic

- **Some ambiguity clarifications will benefit all Signalized Intersection V2I systems:**
  - *DSRC Roadside communications*
  - *Cellular V2X Roadside communications*
  - *Wide Network Communications of SPaT/MAP*
- **Some clarifications are application specific (RLVW)**
  - **Placeholders for other applications**
- **Some clarifications are communications specific (DSRC)**
  - **Placeholders for other communications**

# Example Clarification

## *Approach to node point latitude/longitude representation*

### ***Need:***

As specified in the J2735 standards document, the node points representing lane geometry in the MAP message can be specified using various options. One option is absolute lat/lon positions. Another option is reference node point(s) and offset values. OBU applications need consistency in representation of node points in order to interpret data from all intersections uniformly.

One challenge that IOOs face in creating the MAP message is file size, and therefore offsets offer an advantage, while absolute lat/lon provide advantages in automating MAP message creation.

### ***Clarification/Requirement:***

For consistent and unambiguous representation and interpretation, OBU Applications need signalized intersection infrastructure systems to represent lane geometry node points using the following approach:

- The Center of the Intersection (reference point) is represented as an absolute lat/lon position with minimum of six decimal places for better than 0.11132m accuracy
- The stop bar and subsequent node points for the lane geometry are represented by NodeOffsetPointXY using Node-XY-32b to represent X and Y offsets from the previous node point in 16bit value to provide maximum value of X and Y offset of 327.67m

# CCI Document - Clarifications

- 15 Clarifications in the current CCI Document
- Written with background information and then a “Clarification/Requirement” statement

<b>2</b>	<b>Clarifications of Known Ambiguities.....</b>	<b>6</b>
2.1	Cross-cutting Ambiguities – Applicable to Multiple OBU Applications.....	6
2.1.1	Time accuracy and synchronization.....	6
2.1.2	Minimum SPaT Message TIME MARK data elements .....	6
2.1.3	Approach to node point latitude/longitude Representation.....	8
2.1.4	Situations where SCMS message certification is not available .....	8
2.1.5	Channel Utilization – DSRC Deployments .....	9
2.1.6	Configuration of turn lanes .....	9
2.1.7	SPaT Message content related to flashing yellow arrows.....	10
2.1.8	Linking egress lanes to ingress lanes of downstream intersections.....	11
2.1.9	Use of Intersection ID .....	12
2.1.10	Uniform assignment of enumeration values for all possible signal states .....	12
2.1.11	Inclusion of vehicle position correction data .....	12
2.2	RLVW Specific Clarifications.....	14
2.2.1	SPaT message frequency of transmission.....	14
2.2.2	Signal State Frequency of Output from the signal controller .....	14
2.2.3	MAP message frequency of transmission.....	15
2.2.4	RLVW vehicle position correction data exchange clarification .....	15
2.3	Signal Priority Application Specific Clarifications .....	16
2.4	Pedestrian in Signalized Crosswalk Conflict Warning Application Specific Clarifications .....	16
2.5	Other Application Specific Clarifications.....	16

# What have we learned?

## **These are not simple ambiguities to solve:**

- Some clarifications in the current version are left as “open questions remain”

## **Benefits will come from input from as many deployments as possible:**

- Efforts to date have been a “Strawman” document to demonstrate viability
- We believe there is already benefit to clarifying these ambiguities, but more exist

## **It was recognized that a “process” was needed:**

- The FHWA ITE Connected Intersections Effort is now underway. The initiative’s approach to standards guidance will address and resolve as many of these as possible
- When appropriate, updates to standards might be considered

# Our Request for Today

- **Download the latest version of the CCI document from the CAT Coalition website**
  - [https://transportationops.org/CATCoalition/IOO OEM Forum](https://transportationops.org/CATCoalition/IOO_OEM_Forum)
- **Review and consider:**
  - Do you have any input to offer to any of the clarifications?
  - Are you aware of any additional ambiguities regarding connected intersections that should be added?
- **Share any feedback through the Technical Resources WG:**
  - We will consider it for any future versions of the CCI document and
  - We will also share any feedback with the ITE Connected Intersections initiative

# Partner Reports from USDOT, ITSA, ITE

# Partner Reports

- ITE: RSU Standards Update
  - Blaine Leonard
- USDOT: Update on Support Services
  - Deb Curtis & Leidos
- ITS America: Update on 5.9 GHz Spectrum NPRM
  - Tim Drake
- Other updates from all partners





U.S. Department of Transportation

The logo for ITE (Intelligent Transportation Engineers), consisting of the lowercase letters "ite" in a bold, white, sans-serif font, followed by three horizontal white lines of varying lengths, all set against a dark blue rectangular background.

# USDOT / ITE Roadside Unit (RSU) Standardization Project

Blaine Leonard, P.E.

Utah DOT Transportation Technology Engineer

RSU Standard Project Working Group Co-chair

# Background

- Justification for a New Standard:
  - DSRC RSU Specification 4.1 is five years old (Oct 2016)
  - Spec is focused on DSRC only; need a broader spec
  - Hardware and CV practice has changed significantly
  - We now have significant deployment experience:
    - CV Pilots
    - SPaT Challenge sites
- Project Goals:
  - Deliver, approve, and publish a non-proprietary, industry based, consensus driven RSU Standard
  - Provide manufacturer input based on actual product development

# Background

- USDOT investments to date:
  - DSRC RSU Specification 4.1
  - NTCIP 1218 Object Definitions for Roadside Units
    - (National Transportation Communications for ITS Protocol )
  - Relevant requirements in these two documents will be retained
  - Real world experience from deployments like CV Pilots

# Project Leaders

- Contracting Officer's Representative (COR):
  - Steve Sill, ITS Architecture & Standards Program Manager, USDOT ITS Joint Program Office
  - Deb Curtis, Highway Research Engineer, USDOT Turner-Fairbank Highway Research Center

# Project Leaders

- Principal Investigator / Project Manager:
  - Siva Narla, Senior Director, Transportation Technology, ITE
  - Nicola Taveras, Technical Products Manager, ITE
- SDO Liaisons:
  - Jean Johnson (NEMA)
  - Venkat Nallamotheu (AASHTO)
  - Justin McNew (SAE)

# Project Team

- RSU Standard Working Group (WG)
  - 15 members
  - Experience relevant to RSU development and deployment
  - Balanced representation: AASHTO / ITE / NEMA / Road Users
  - Working Group Co-chairs:
    - Justin McNew, JMC Rota / Blaine Leonard, Utah DOT
- Subject Matter Experts (SME)
  - About 15 SMEs
  - Do the heavy lifting – drafting, review, document preparation
  - Primary Authors (so far):
    - Ralph Boaz (Pillar Inc), Patrick Chan (Consystec)

# Products

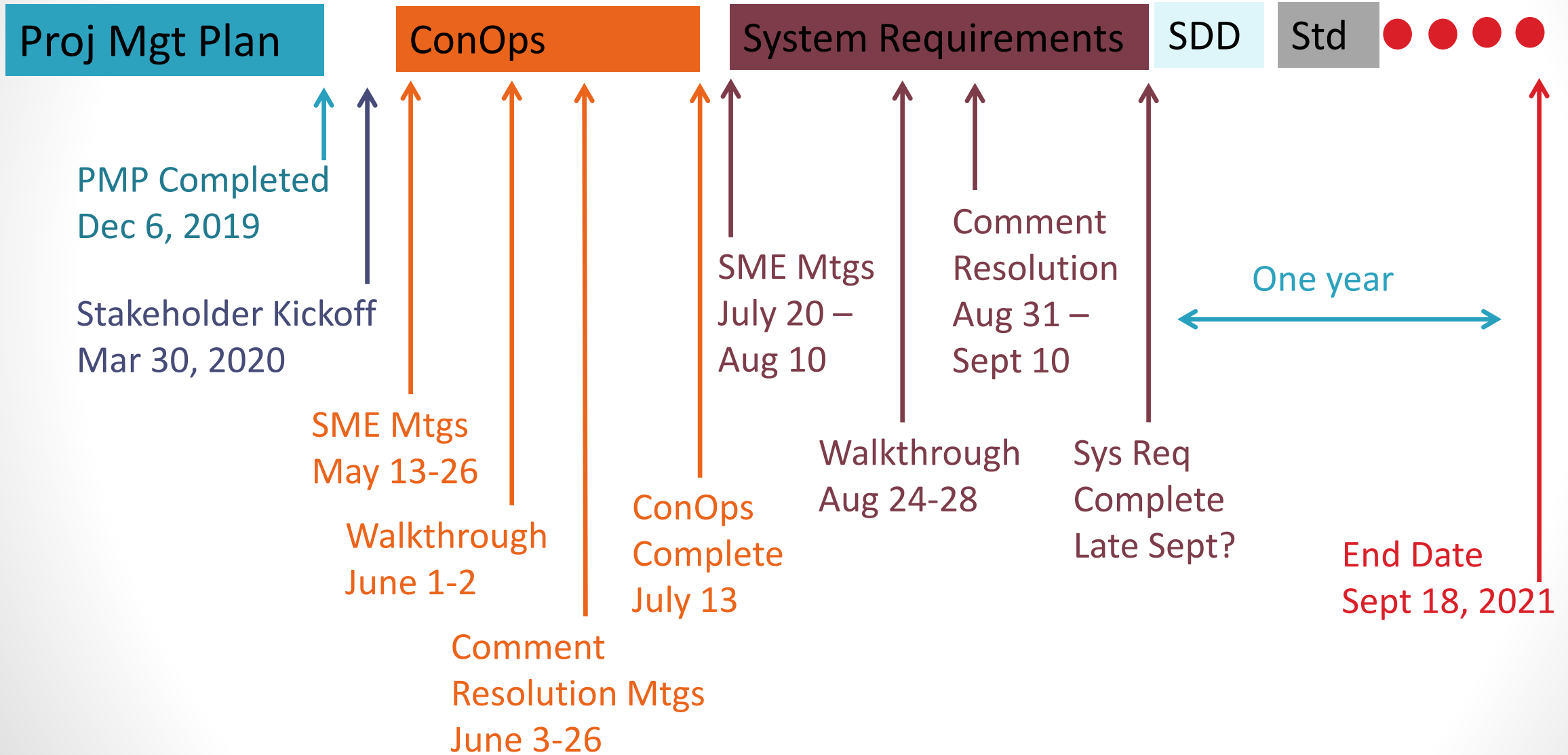
- Project Management Plan (Dec 2019)
- Concept of Operations (ConOps)
  - User need statements, with rationale for each need
  - Technical, environmental, institutional constraints for the system
  - Reference all other relevant specs (IEEE 802 & 1609, SAE J2735, etc)
- Systems Requirements Specifications (SRS)
  - Requirements to meet the stated needs
- Standard Design Details (Standard)
- Full traceability between user needs, requirements and design elements

# Process

- Multiple Steps of “Draft – Review – Update” process
- For each step:
  - Develop a draft document
  - Technical walkthrough with interested stakeholders, experts
  - Comment resolution report – resolve each comment
- Standard Design Details have 2nd iteration of comments
- Create and distribute an RSU Standard
- Develop RSU Standard Hardware Reference Implementation
  - Manufacturers build RSUs and provide feedback to process
- Ballot, approve, publish RSU Standard



# Schedule

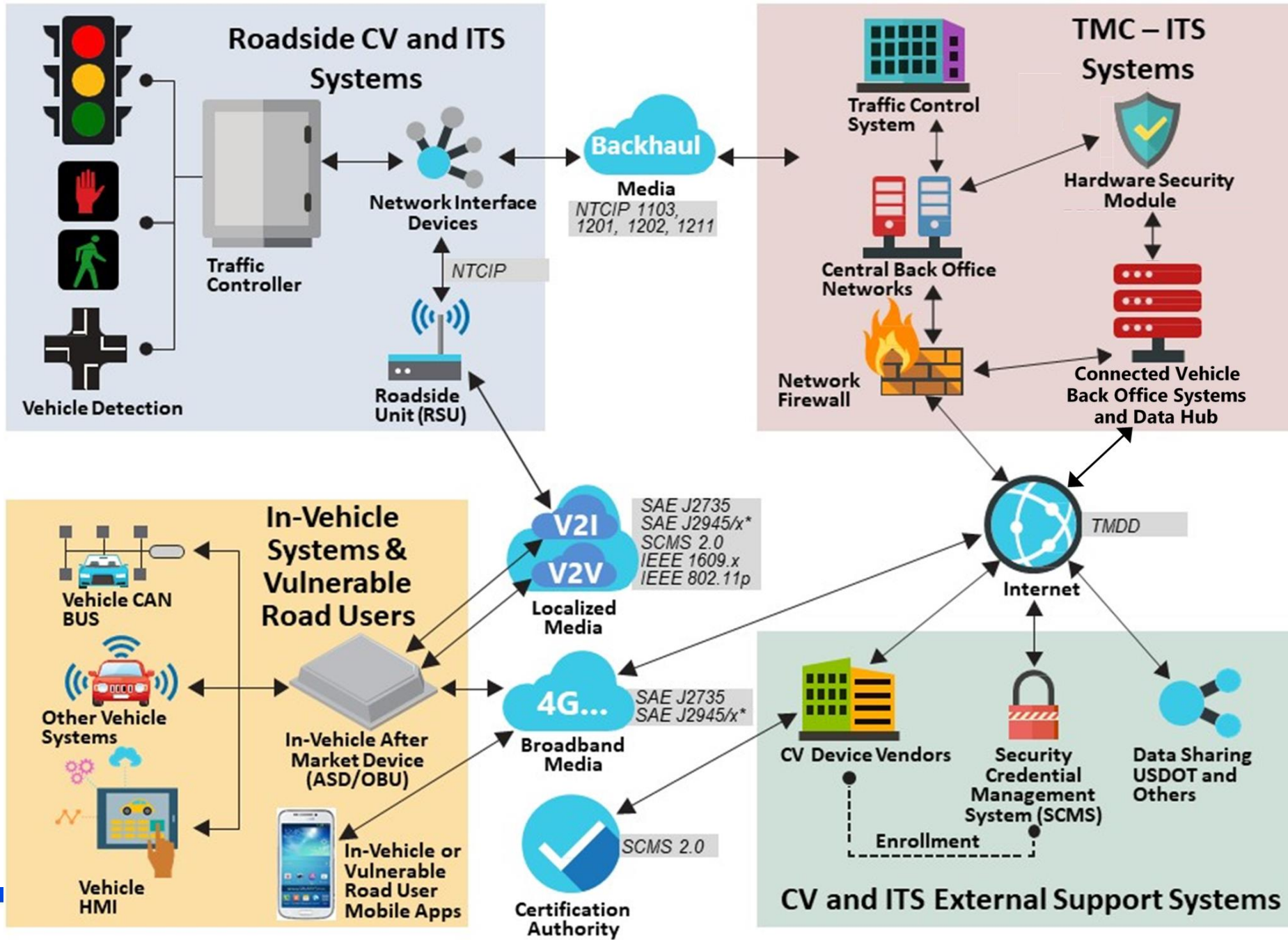


# CV Deployment Environment Discussion

Jeremy Schroeder, Athey Creek

# CV Deployment Environment

- Resource Objective
  - Provide a full-picture, high-level overview of the CV environment.
  - Leverage experiences from CV deployers to document what is needed for an interoperable CV deployment:
    - ❖ Systems, including lifecycle considerations
    - ❖ Connections
    - ❖ General considerations
    - ❖ Reference to standards and other resources, where possible



\*SAE J2945/1 and SAE J2945/2 are for V2V communications; SAE 2945/9 is for communications with vulnerable road users; SAE J2945/x includes cross-cutting information for communications

# CV Deployment Environment

- Status and next steps
  - **All sections** sent to small group for additional review and comments
  - Additional input is requested from all Resources WG members
    - ❖ Lessons learned and experiences
    - ❖ Considerations for deployment, implementation, operations, maintenance
    - ❖ Other additions, variations, nuances
  - This is a working document
    - ❖ Allows for new documentation as feedback and input is gathered

# Closing Remarks

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

*Any other closing comments or questions?*

## Next Resources WG Meeting

November 4, 2020

11:00-12:30 (Eastern)