

CAT Coalition Technical Resources Working Group Quarterly Meeting

November 4, 2020
11:00-12:30 (Eastern)

Agenda

- 11:00-11:05 Welcome and Introductions
- 11:05-11:15 Outreach and Knowledge Transfer, Resources Recap
- 11:15-11:30 Partner Reports (USDOT, ITS America, ITE)
- 11:30-11:50 IOO/OEM Forum Product Review: Preliminary Verification Resource – Overall Testing Approach
- 11:50-12:25 NCHRP 08-120: Deployment of CV Technologies on Rural Corridors
- 12:25-12:30 2021 Webinars, Member Updates, Closing

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

Faisal Saleem

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

- CV Deployment Environment
 - Since last webinar, this resource has also been:
 - ❖ Posted to the CAT Coalition Resources and Resources WG pages:
<https://transportationops.org/CATCoalition/resources>
 - ❖ Presented to the Peer Exchange & Outreach WG
 - ❖ Received additional feedback to include more C-V2X information
 - Additional feedback and lessons learned are welcome!

Resources WG Recap

- IOO/OEM Forum Work Plan Product Review: Clarifications for Consistent Implementation
- Partner Reports
 - USDOT Update on Support Services
 - ITE RSU Standards Update
 - ITS America Update on 5.9 GHz Spectrum NPRM

Partner Reports from USDOT, ITSA, ITE



IOO-OEM Work Plan Product Review: Preliminary Verification Resource – Overall Testing Approach

Blaine Leonard, Utah DOT

Enabling Connected Intersections

- Rationale for the project:
 - Majority of SPaT/MAP broadcasts today are received by fleet vehicles (e.g. transit, snowplows) or after-market on-board units
 - ❖ No verification of message receipt by independent party
 - Formal announcement from one OEM that production vehicles will have on-board safety applications starting in 2022
 - Outside of the communications uncertainties that exist, there are **data related actions** needed to “enable” and verify this connectivity to production vehicles

Enabling Connected Intersections

Seven (7) Primary Actions

Action #1: Create and reach consensus on minimum requirements for intersection broadcasts of SPaT & MAP.

Action #2: Summarize Industry Approach(es) to SCMS and develop IOO Guidelines

Action #3: Connected Intersections Overall Testing Approach

Action #4: Reference Implementation and Functional Safety Assessment

Action #5: Develop and Execute the Enabling Connected Intersections Outreach and Expansion Strategy

Action #6: Deployment Tracking ←

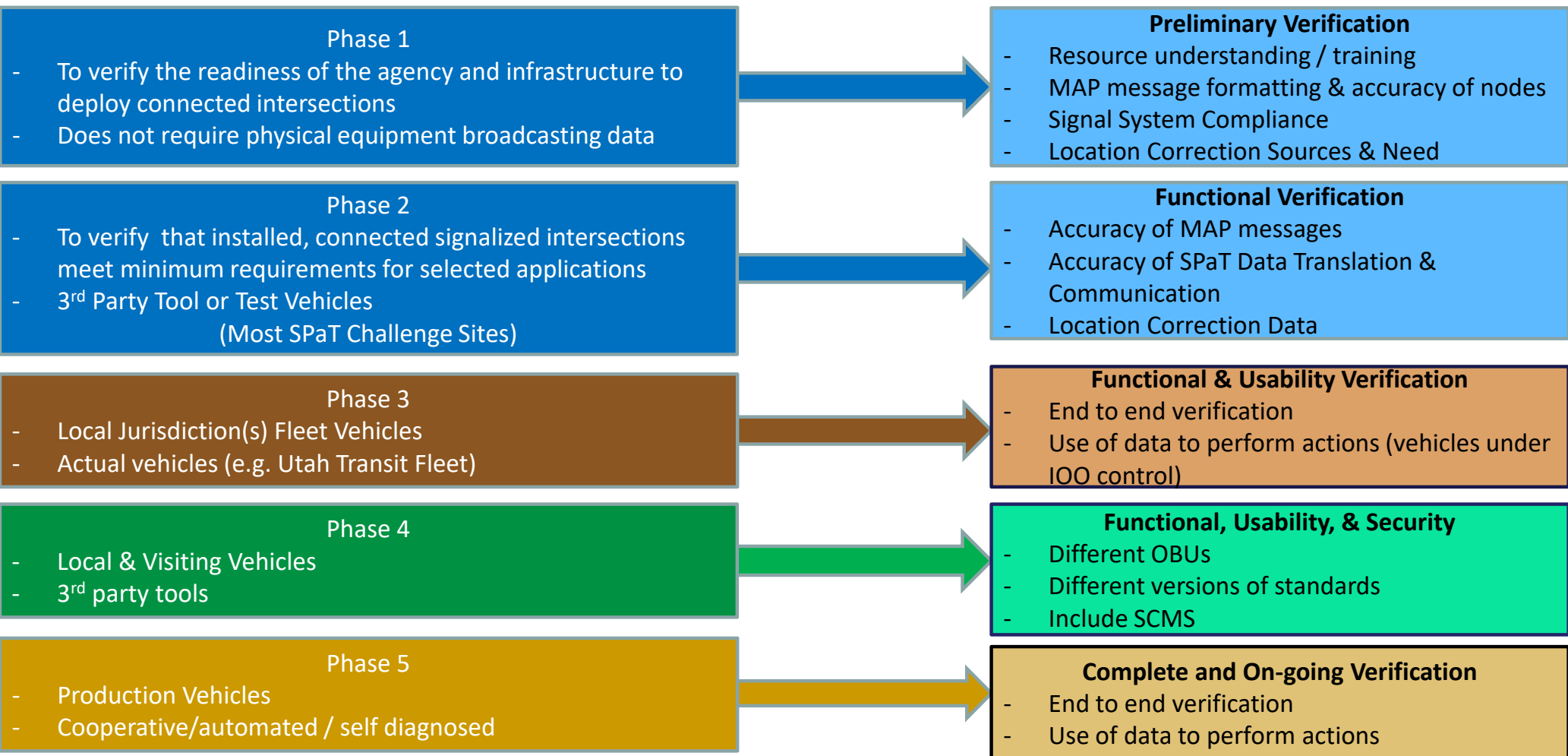
Action #7: O&M Approach ←

Connected Intersections Testing Plan

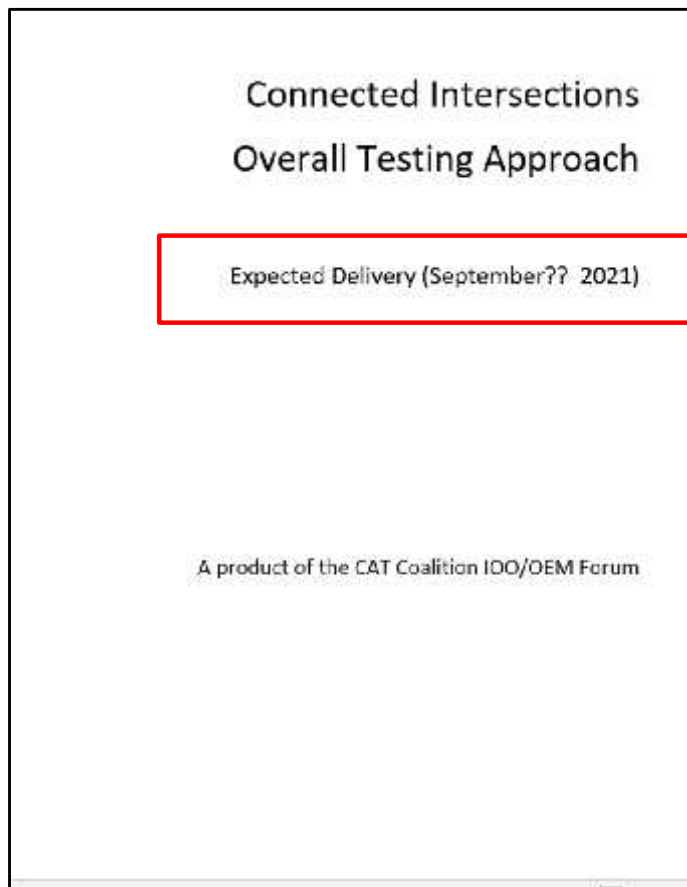
Background –

- **Five** phases of testing / verification
 - Suited for the maturity of the IOO's deployments
 - Incremental steps toward full verification for/by production vehicles
- Leverage / coordinate with other parallel activities
 - M-City / UMTRI / CAMP / CV-PFS project in Michigan
 - USDOT / ITE Connected Intersections Guidance Document (Based on CCI)
 - CV-PFS MAP Creation Guidance Document
- Followed by **Outreach** to get the testing plan into people's hands

Five Phases of CI Testing/Verification



Connected Intersections Overall Testing Approach Document



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Connected Intersections Overall Testing Approach Document

Connected Intersections Overall Testing Approach

Phase 1

- To verify the readiness of the agency and infrastructure to deploy connected intersections
- Does not require physical equipment broadcasting data

Preliminary Verification Resource

A product of the IOO/OEM Forum SPaT / RLVW Group

Initial Version being review by five volunteers:

- Val Rader, AKDOT&PF;
- Lee Smith, TnDOT;
- Carole Delion, MDDOT;
- Susan Catlett, NJDOT;
- Jianming Ma, TxDOT

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Preliminary Verification Resources

Activities that IOOs can perform before they begin Connected Intersections deployments

Emphasis is on an Organizational Readiness Checklist

Content is arranged by:

- Institutional Understanding and Readiness
- Signal System Compliance with Standards
- MAP Message Formatting and Accuracy
- Position Correction Sources and Need

Provides links to relevant resources

ENABLING CONNECTED INTERSECTIONS: PRELIMINARY VERIFICATION RESOURCES

Version 4.0 - 08/10/2020

1. INTRODUCTION AND OVERVIEW

Connected Intersections

The Enabling Connected Intersections effort is intended to support infrastructure owner-operators (IOOs) in their goal to broadcast SPaT and MAP messages that are interoperable with production vehicles to support vehicle-to-infrastructure (V2I) applications. A connected intersection facilitates reliable and consistent interaction between vehicles and roadway infrastructure to perform various safety, efficiency, and convenience functions. The Enabling Connected Intersections effort is being developed by the Cooperative Automated Transportation (CAT) Coalition, through its Infrastructure Owner Operator / Original Equipment Manufacturer (IOO/OEM) Forum.

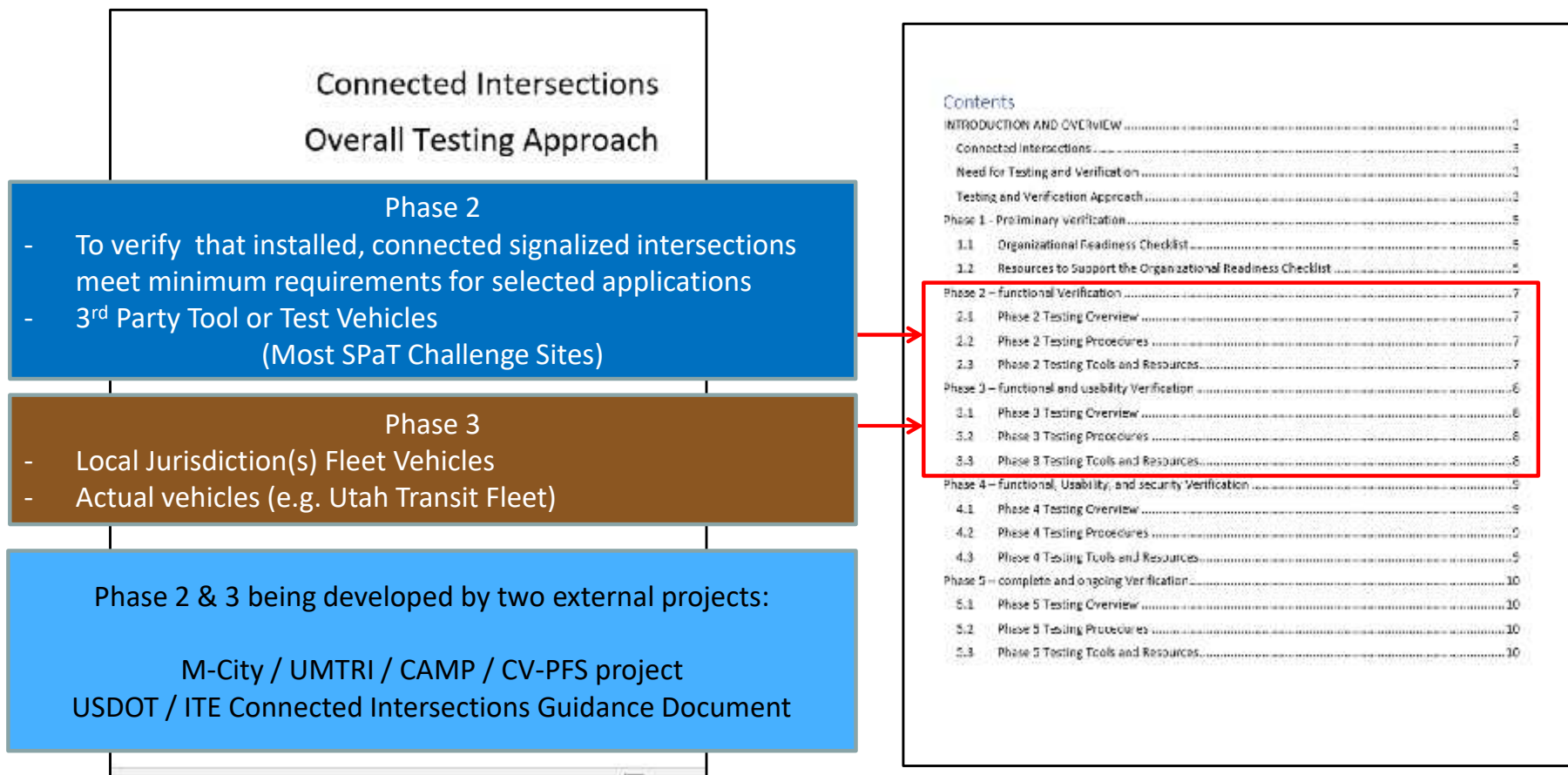
Need for Testing and Verification

Although there have been many SPaT/MAP deployments, testing and verification of the data accuracy and standards conformance of the infrastructure broadcasts has been limited and has not been coordinated. Similarly, there has been very little reporting of the locations where testing has occurred. Original equipment manufacturers (OEMs) of vehicles need assurance that the infrastructure messages received by their vehicles will be reliable and accurate enough to allow their vehicles to make safety-critical decisions based on those messages. IOOs have a similar need for testing and verification to ensure that the SPaT and MAP data they broadcast can be consistently and reliably used by vehicles produced among OEMs. To meet these needs, a proven-effective, reproducible, turnkey approach to testing and verifying the broadcasts of SPaT and MAP data that can be consistently and reliably implemented by IOOs throughout the United States needs to be developed. The Enabling Connected Intersections effort is building a multi-step testing process to meet these needs, building on the efforts of several other organizations.

Testing and Verification Approach

The roadway infrastructure broadcast of data must be tested to verify that it occurs accurately and in conformance to standards such that it can be used by OEMs to support one or more applications. Verification is simply the process of ensuring the correct operation of the hardware, software and communication elements that are used to create a connected intersection. This prompts the need for a well-defined testing process which can be applied in sequential steps (e.g. what can IOOs begin testing now vs. what must wait for later deployment) to accommodate the various stages of IOO deployment. The

Connected Intersections Overall Testing Approach Document



Enabling Connected Intersections

Action #6: Deployment Tracking

- An approach to tracking / reporting the verification of connected intersections over time
 - A national database / repository? (Would need a standard numbering convention)
 - Maintained by an existing or a new entity?
 - How to track intersection status?
 - ❖ Role for vehicles passing through (like misbehavior reporting)
 - ❖ Use of Malfunction Monitor (or similar device) – need to engage manufacturers
 - ❖ Video monitoring
 - ❖ Periodic re-testing at some interval

Action #7: O&M Approach

- How to manage operations of connected intersections during disruptions?
 - Maintenance changes
 - Manual operation
 - Temporary closures
 - Operational outages (power outage, etc.)

NCHRP 08-120: Deployment of CV Technologies on Rural Corridors

Barbara Staples, Noblis

Closing Remarks

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

Any other closing comments or questions?

2021 Resources WG Meetings

February 10, May 12, August 11, November 10
11:00-12:30 (Eastern)