CAT Coalition
Strategic Initiatives Technical Working Group (TWG 1)
January 24, 2019 Webinar
Notes and Summary of Discussions

Summary of Action Items

- *Dean to arrange a webinar with Blaine Leonard and Joe Averkamp to discuss outreach to SPaT Challenge sites and to plan for upcoming webinars. Any others interested in joining the discussion, should email Dean.*
- *Dean to arrange a call with Greg Larson, Joe Averkamp, and those who have submitted resources to discuss the steps required to finalize resources to post on the website.*
- *Dean to contact Faisal Saleem to request involvement from the Technical Resources WG in the finalization of Fleet Challenge Resources.*
    a. *Dean to include the Connected Vehicle Pilot Deployment Program: Driving Towards Deployment Lessons Learned from the Design/Build/Test/Phase as one of the resources discussed with the Technical Resources Working Group,*
- *Any members who are aware of resources relevant to procuring on-board units should forward them to Dean for inclusion on the Connected Fleet Challenge website.*
- *This working group to begin to dedicate time on future webinars to sharing deployment experiences related to V2I applications, with an emphasis on applications operated by infrastructure owner operators:*
    a. *Blaine to present the advantages of MMITSS and V2I data exchanges in transit signal priority on the next webinar;*
    b. *Ben McKeever,* Hossam Abdel All, and Allan Clelland to present on future webinars;
    c. *Any members actively deploying V2I applications and wishing to present on them during upcoming webinars are asked to email Dean to discuss a future presentation;*
    d. *Dean will try to align common topics into one webinar, to the extent possible.*

Welcome

Greg Larson (Caltrans and Chair of the Strategic Initiatives Working Group) welcomed everyone to the webinar.

Approximately 44 members and guests joined the webinar. A list of those in attendance is provided at the end of these notes. This list may not be comprehensive, as attendees may have joined late and were not identified on the webinar. Please contact Dean Deeter at deeter@acconsultants.org to be added to the list.

Outreach Plans for Connected Fleet Challenge

Joe Averkamp provided an update on the Connected Fleet Challenge Outreach. The goal is to create and launch a Connected Fleet Challenge web presence within the existing SPaT Challenge Website. In addition to the website, Joe would like to organize outreach to the existing SPaT Challenge sites to inform them of the Connected Fleet Challenge and gather any information on their plans to deploy fleet devices.

The Connected Fleet Challenge web pages will also host the resources identified by members of this working group.

Blaine Leonard added that he has intended to outreach to the agencies that have identified they are pursuing the SPaT Challenge and offered to coordinate with Joe on this.

Once the Connected Fleet Challenge website presence is established, Joe suggested 1-2 webinars to introduce the Fleet Challenge, highlight the tools, and request input from agencies pursuing the challenge.

Blaine suggested that the SPaT Webinar series might be appropriate for these webinars. They conducted a webinar on January 22, 2019 and don't currently have the next webinar planned, but he offered to help coordinate with Joe and Dean on these.

Patrick Son and Joe clarified that the plan will be to create a new map for the Connected Fleet Challenge (in addition to the SPaT Challenge map) to use when tracking the agencies that are pursing the challenge.

Dean noted that he will initiate discussions with Faisal Saleem to engage the CAT Coalition Technical Resources WG in reviewing and finalizing the resources before posting.

Action Items:

- Dean to arrange a webinar with Blaine and Joe to discuss outreach to SPaT Challenge sites and to plan for upcoming webinars. Any others interested in joining the discussion, email Dean.
- Dean to arrange a call with Greg, Joe, and those who have submitted resources to discuss the steps required to finalize resources to post on the website.
- Dean to contact Faisal Saleem to request involvement from the Technical Resources WG in the finalization of Fleet Challenge Resources.

Resource Area #1: Existing OBU Procurement Documents

There was discussion about the OBU procurement resources provided by Tom Timcho. This working group will continue to identify resources related to the procurement of on-board units.

Action Item:

- Greg asked that any members who are aware of resources relevant to procuring on-board units should forward them to Dean for inclusion on the Connected Fleet Challenge website.

Resource Area #2: OBU Mounting Lessons Learned

During discussion on OBU mounting, Tom Timcho shared experiences of the Ohio project and mentioned that there are increasing numbers of after-market products that are more permanent than previous versions, including some that are combined DSRC, CV2-X, and cellular communication devices.

James Chang introduced the group to a report, Connected Vehicle Pilot Deployment Program: Driving Towards Deployment Lessons Learned from the Design/Build/Test/Phase, that was published in December 2018. It incorporates lessons learned during in-vehicle installation and testing from the site perspective. A link for this document will be added to the resource list. All agreed this will be a valuable resource to include in the Fleet Challenge website.

Action Item:

- Dean to include the Connected Vehicle Pilot Deployment Program: Driving Towards Deployment Lessons Learned from the Design/Build/Test/Phase as one of the resources discussed with the Technical Resources Working Group.

New Initiative Concept: V2I Applications

The SPaT Challenge has encouraged RSU deployments, and Greg recommended this working group increase the focus on V2I applications that can be deployed by Infrastructure Owner Operators, such as Red Light Violation Warning, signal priority, Eco approach and departure, and emergency vehicle preemption. There were many examples noted during the webinar of applications deployed (or in deployment), for example:

- Blaine Leonard mentioned that Utah DOT has two corridors that are operating transit signal priority using the V2I data exchanges and the Multi-Modal Intelligent Traffic Signal System (MMITSS). Blaine noted that they have collected a lot of data, and they have found there is a benefit to the advantages that their system supported by MMITSS / V2I offers over traditional transit signal priority systems. Blaine agreed to share more details at the next webinar.

- Ben McKeever reported that Caltrans has an RLVW location and is looking at DSRC vs cellular. He offered to present at a future webinar after they have had time to compile information.

- Hossam Abdel All from Macomb County shared that they have been working with multiple applications built upon V2I data exchanges, including pedestrian crossing and emergency vehicle preemption. He offered to present on a future webinar.

- Additional volunteers (including Allan Clelland) offered to share about their experiences in future presentations.

Dean asked that any members that would like to present their deployment of applications to email him if they would like to present on future webinars.

Action:

- *Any members actively deploying V2I applications and wishing to present on them during upcoming webinars are asked to email Dean to discuss a future presentation.*

Testing and Verification of V2I Broadcasts

Ben McKeever shared the results of testing V2I broadcasts using an off-the-shelf product (e-Trans) for validating broadcasts. This was PATH's first experience with the validation tool, and they found it valuable and easy to set up. There were a few issues but overall it was a good experience and Ben would recommend it.

Some discussion followed regarding a procedure for distributing the tool to confirm the SPaT Challenge. Aaron is adding several to the equipment loan program. SPaT Challenge sites just need to be informed that it is available.

Close

Greg informed members that all CAT Coalition working groups are transitioning to quarterly webinars. Emails will supplement communications among members between webinars.

Greg announced he is retiring before the next webinar. A replacement to chair this working group has not yet been named but will be in place before the next meeting.

T**he next meeting is scheduled for Thursday, April 25, 2019, at 2pm Eastern.**

TWG 1 January 24, 2019 Webinar Participants

- Greg Larson, Chair
- Hossam Abdel All
- Joe Averkamp
- Susan Catlett
- James Chang
- Alan Clelland
- Ray Derr
- Gary Duncan
- Jim Frazer
- Kyle Garrett
- Aaron Greenwood
- Hideki Hada
- Mohammed Hadi
- Cliff Heise
- Doug Hohulin
- Shah Imran
- Ahmad Jawad
- Tom Kern
- Christian Kulus
- Sean Laffey
- Steve Lockwood
- John Lower
- Ben McKeever
- Adam Merchant
- Dave Miller
- Liana Mortazavi
- Roxane Mukai
- Venkat Nallamothu
- Jon Obenberger
- Jay Parikh
- Pierre Rasoldier
- Jonathan Riehl
- John Roman
- Jeremy Schroeder
- Patrick Son
- Chris Stanley
- Jeff Stewart
- Thomas Timcho
- Brian Watson
- Ken Yang
- Dean Deeter

CAT Coalition
Strategic Initiatives TWG – January 24, 2019
Webinar Agenda

1. Welcome
2. Connected Fleet Challenge Outreach
3. Resource Area #1: Existing OBU Procurement Documents
4. Resource Area #2: OBU Mounting Lessons Learned
5. New Initiative: V2I Applications – Lessons Learned
6. Testing and Verification of V2I Broadcasts

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Agenda Item #2:

Connected Fleet Challenge Outreach

Volunteers include:
Joe Averkamp, Hideki Hada, Hossam AbdelAll, Sean Laffey

Joe will update on progress and current approach to the Outreach / web presence

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Agenda Item #3:

Resource Area #1: Existing OBU Procurement Documents

1. Any Feedback from members on the OBU Procurement Documents Tom Timcho shared in November?
2. Round robin discussion about any members current activities or plans to procure OBU equipment.
3. Any additional OBU procurement resources members can share?

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Agenda Item #4:

Resource Area #2: Existing OBU Mounting Lessons Learned

1. Any Feedback from members on the OBU mounting materials that Matt Smith shared and circulated?
2. Round robin discussion about any other resources members are aware of.
3. Any additional OBU mounting resources or lessons learned that members can share?

Connected Vehicle Pilot Deployment Program: Driving Towards Deployment: Lessons Learned From the Design/Build/Test Phase
https://rosap.ntl.bts.gov/view/dot/37681

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Next Steps with the Connected Fleet Challenge Resources

Next Steps:

1. Work with NOCoE to create a portion of the Fleet Challenge web pages (inside the SPaT Challenge website) to house resources (or links to resources) in one location:
   - Suggestion is that members wishing to post resources email them to Joe and Dean, who will work with NOCoE to incorporate the resources into the website
2. Share the availability of these resources with the wider CAT Coalition / encourage use of the resources
   - Work with the CAT Coalition Technical Resources Team for their input and suggestions for additional resources

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Agenda Item #5:

New Initiative Concept: V2I Applications

- The SPaT Challenge has helped with the 'chicken and egg' problem and encouraged RSU deployments
- Proposal is for this working group to focus the next 3-4 webinars on V2I Applications (e.g. sharing of lessons learned & deployment experiences)
- Proposed emphasis is on IOO deployed applications, e.g.:
  - Transit signal priority utilizing V2I communications
  - Eco Arrival/Departure (transit vehicles or fleet vehicles)
  - Emergency Vehicle preemption
  - Red Light Violation Warning (RLVW)
- Encourage examples of various communications approaches (DSRC, C-V2X, Cellular)

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Agenda Item #5:
New Initiative Concept: V2I Applications

Candidate Applications to include:

- Utah Transit Signal Priority
- Caltrans C-V2X Caltrans Transit Eco A/D
- Arizona MMITSS

Questions for Today:

- What should be the focus of these presentations?
- Can anyone offer to present during our next webinar?

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Agenda Item #6:
Testing & Verification of V2I Broadcasts

Introduction:

- Any V2I deployment (regardless of communications medium) requires testing and verification that the data is accurate and being broadcast according to the standard
- PATH will share the results of testing of V2I broadcasts using an off-the-shelf product for validating broadcasts
- After the presentation:
  - We'll discuss other testing that members have conducted.
  - Would others like to present on their testing experiences and/or resources used for testing?

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Use of CAMP/eTrans SPaT/MAP Validation Tool in the California Connected Vehicle Test Bed

UC Berkeley California PATH

January 24, 2019

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Background

- PATH acquired eTrans SPaT/MAP validation tool from CAMP and performed SPaT/MAP validation in the California Test Bed
- This is PATH's first experience with the validation tool
- Prior to testing, eTrans didn't know the contents of messages that are broadcasting in the California Test Bed
- MMITSS uses SPaT/MAP data elements including those are required for the tool plus a few additional data elements
  - MMITSS includes the posted speed limit in MAP

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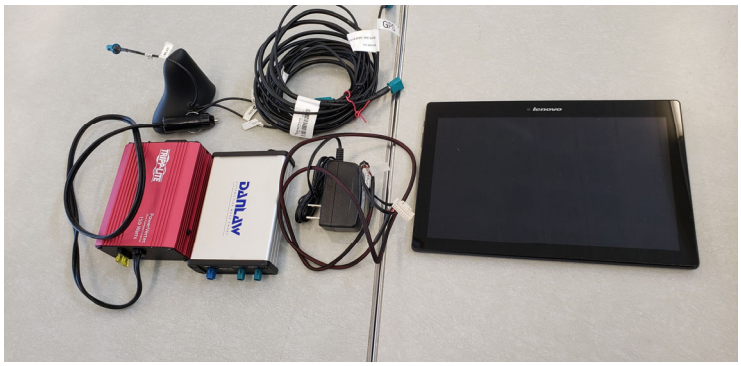
eTrans SPaT/MAP Validation Tool



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SPaT/MAP Validation Procedure

1. Install the tool on the testing vehicle
2. Activate the tool by following the user instructions
3. Verify the OBU is communicating with RSU over DSRC
4. Drive the vehicle along testbed corridor (El Camino Real)
5. Park the vehicle near the stop-bar of each equipped intersection
6. Check SPaT/MAP visualization screen
7. Repeat the procedure in opposite direction (we did five one-way trips)

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Summary of SPaT/MAP Validation Results

- The user instruction is informative and easy to follow
- Install and activate the validation tool took about 10 minutes
- The out-of-box OBU communicates with the RSUs right away
  - The OBU is receiving SPaT/MAP/RTCM from the RSUs
  - The RSU is receiving BSM from the OBU
  - All messages are correctly formed in SAE J2735-2016 format
- MAP visualization was only able to display a portion of the entire MAP
  - Due to different approaches to include speed limit in MAP
- RLVW application is also available in tool but not tested

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Approaches to Specify Speed Limit in MAP

MSG_MapData (MAP)		SAE J2735-201603	RLVW Application	MMITSS Implementation	
msgIssueRevision	MsgCount (DE)	Required	Required	Required	
layerType	LayerType (DE)	Optional	Required	Required	
intersections	IntersectionGeometryList (DF)	Optional	Required	Required	
IntersectionGeometry (DF)					
id	IntersectionReferenceID (DF)	Required	Required	Required	
revision	MsgCount (DE)	Required	Required	Required	
refPoint	Position3D (DF)	Required	Required	Required	
laneWidth	LaneWidth (DE)	Optional	Required	Required	MMITSS uses
speedLimits	SpeedLimitList (DF)	Optional	Optional	Required	Approach Level
laneSet	LaneList (DF)	Required	Required	Required	
GenericLane (DF)					
nodeList	NodeListXY (DF)	Required	Required	Required	
delta	NodeOffsetPointXY (DF)	Required	Required	Required	
attributes	NodeAttributeSetXY (DF)	Optional	Optional	Optional	
dWidth		Optional	Optional	Optional	
dElevation		Optional	Optional	Optional	
data	LaneDataAttributeList (DF)	Optional	Optional	Optional	
LaneDataAttribute		Optional	Optional	Optional	Etrans expects
speedLimits	SpeedLimitList (DF)	Optional	Optional	Optional	Lane level

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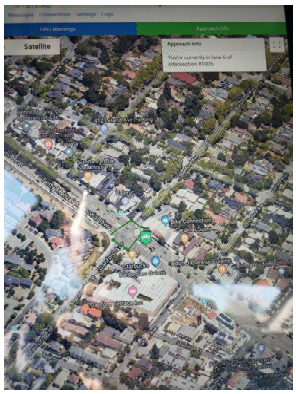
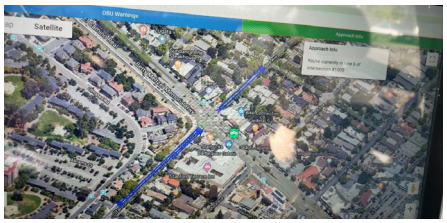
SPaT/MAP Visualization Example: Stanford Ave





Two trips at Stanford Ave. The picture on the left only shows crosswalks (displayed the correct laneID and intersectionID on Approach Info) while the picture on the right only shows traffic lanes on Stanford Ave.

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Approaches to Specify Speed Limit in MAP

MSG_MapData (MAP)		SAE J2735-201603	RLVW Application	MMITSS Implementation	
msgIssueRevision	MsgCount (DE)	Required	Required	Required	
layerType	LayerType (DE)	Optional	Required	Required	
intersections	IntersectionGeometryList (DF)	Optional	Required	Required	
IntersectionGeometry (DF)					
id	IntersectionReferenceID (DF)	Required	Required	Required	
revision	MsgCount (DE)	Required	Required	Required	
refPoint	Position3D (DF)	Required	Required	Required	
laneWidth	LaneWidth (DE)	Optional	Required	Required	
speedLimits	SpeedLimitList (DF)	Optional	Optional	Required	Approach Level
laneSet	LaneList (DF)	Required	Required	Required	
GenericLane (DF)					
nodeList	NodeListXY (DF)	Required	Required	Required	
delta	NodeOffsetPointXY (DF)	Required	Required	Required	
attributes	NodeAttributeSetXY (DF)	Optional	Optional	Optional	
dWidth		Optional	Optional	Optional	
dElevation		Optional	Optional	Optional	
data	LaneDataAttributeList (DF)	Optional	Optional	Optional	MMITSS uses /
LaneDataAttribute		Optional	Optional	Optional	Etrans expects
speedLimits	SpeedLimitList (DF)	Optional	Optional	Optional	Lane level

Message size is about 5-10% larger when specifying speed limit at the lane level

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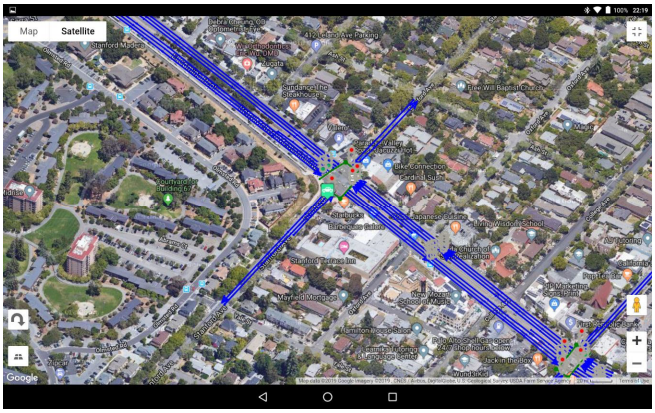
SPaT/MAP Visualization Example: Stanford Ave



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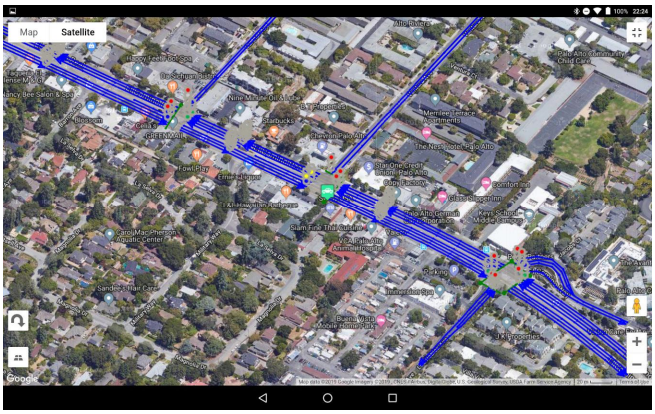
SPaT/MAP Visualization Example: Ventura Ave



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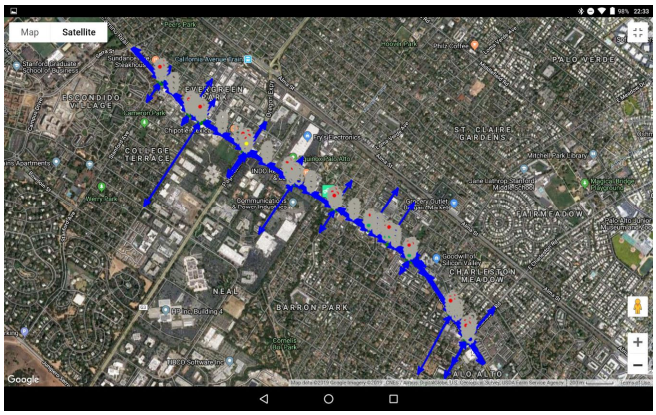
SPaT/MAP Visualization Example: Entire Test Bed



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Discussion

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Agenda Item #6:
Testing & Verification of V2I Broadcasts

Follow-on Discussion:

- Would members like to hear more about testing activities of other areas?
- Would others like to present on their testing experiences and/or resources used for testing on the next webinar?
- Are there any test plans or testing documentation members can share?

Next Strategic Initiatives TWG Webinar

- All CAT Coalition working groups are transitioning to quarterly webinars.
  - We will supplement with emails in between webinars.
- Next webinar for this group:
  - April 25th, 2019 2:00 PM Eastern
- Dean will update the recurring invite