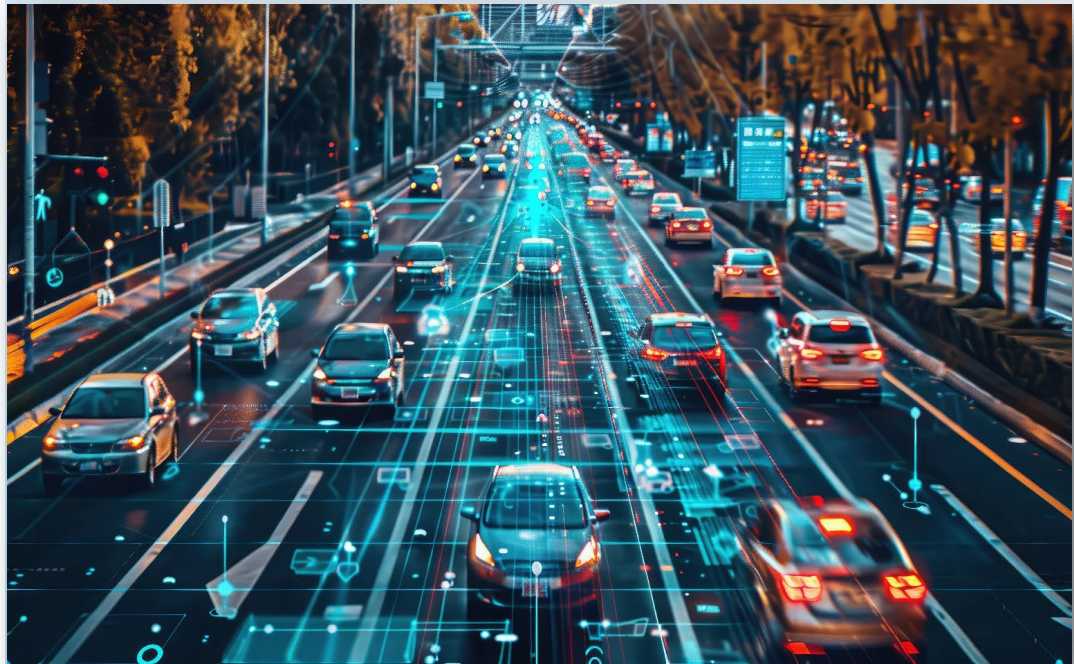
In-Person CV-PFS Meeting



Model Connected Vehicle Procurement Documentation

May 7, 2025

Model Connected Vehicle Procurement Documentation

May 2025

Welcome and Review of Meeting Agenda

Agenda

- Welcome and Introductions
- Project Management Updates
- Stakeholder Interviews
- Procurement Draft
- Next Steps
- Open Discussion
- Wrap Up

Model Connected Vehicle Procurement Documentation

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Program Management Updates

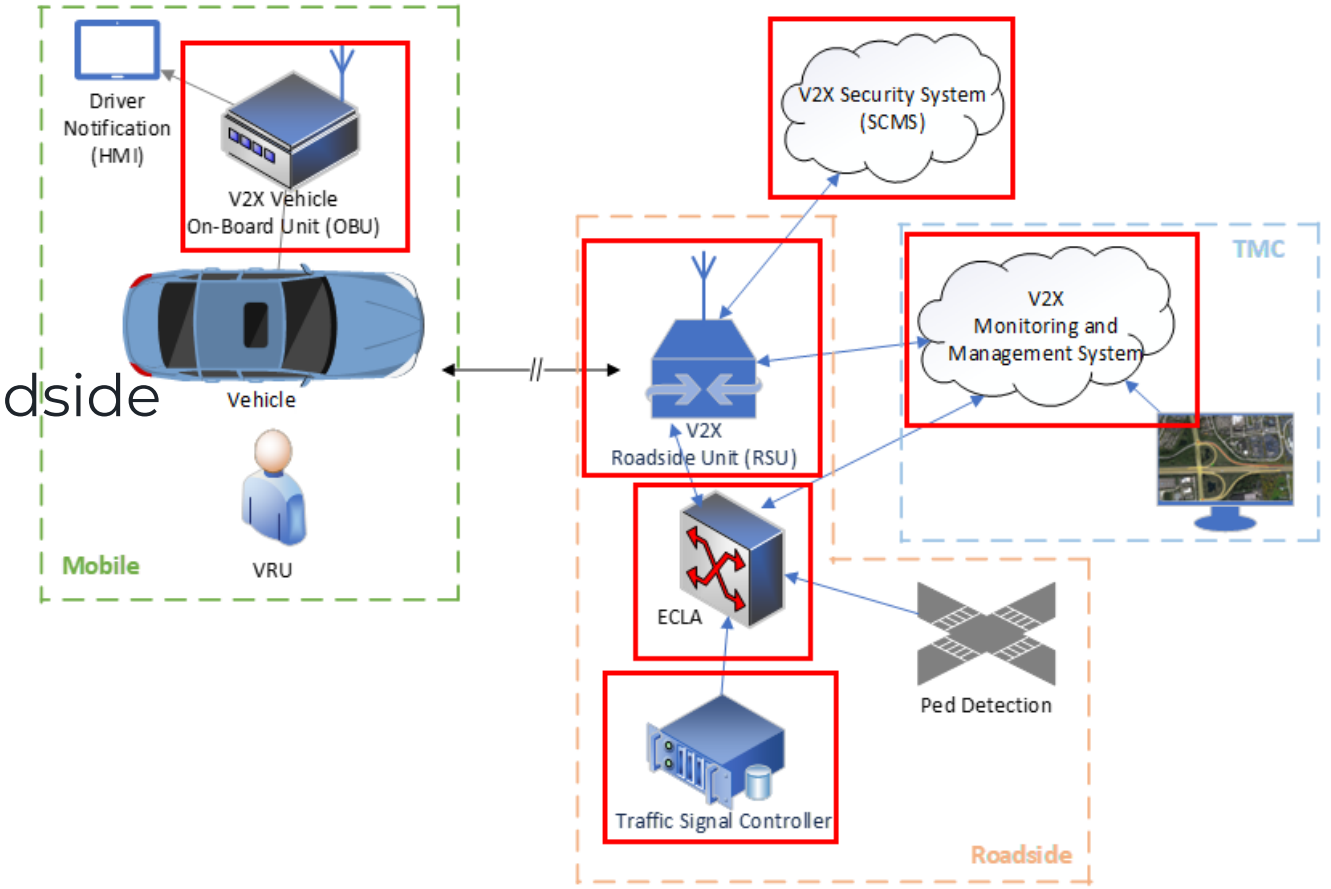
Scope

- **Develop V2X Procurement Guide**
- Participate in V2X Standards Activities
- Conduct Stakeholder Interviews
  - *IOO, RSU, OBU, SCMS, Controller Suppliers, and Academia*
- Circulate Draft Procurement Document for Stakeholder Review

System Boundaries

- RSU
- External Control Local Application (ECLA) (Roadside Processor)
- TSC
  - *V2X interface only*
- SCMS
- V2X Monitoring System
- OBU

- MAP Services
- Acceptance Testing Services
- TIM Services



Schedule

Task Name	Duration	Start	Finish
NTP	0 days	Mon 12/2/24	Mon 12/2/24
Task 1: PM	**253 days**	**Mon 12/2/24**	**Fri 12/19/25**
PM	253 days	Mon 12/2/24	Fri 12/19/25
Kickoff Meeting (Complete)	1 day	Tue 12/3/24	Tue 12/3/24
Task 2: Review and participate in V2X Standards activities	228 days	Mon 12/9/24	Fri 11/14/25
Task 3: Interview IOOs and V2X Community to document needs	**157 days**	**Mon 1/13/25**	**Wed 8/27/25**
Develop Stakeholder List (Completed)	**32 days**	**Mon 1/13/25**	**Tue 2/25/25**
Develop Draft Stakeholder List (Complete)	15 days	Mon 1/13/25	Fri 1/31/25
Submit Draft for Panel Review (Complete)	1 day	Mon 2/3/25	Mon 2/3/25
Panel Review (Complete)	10 days	Tue 2/4/25	Mon 2/17/25
Update Stakeholder list based on Panel feedback (Complete)	5 days	Tue 2/18/25	Mon 2/24/25
Submit Final (Complete)	1 day	Tue 2/25/25	Tue 2/25/25
Develop Interview questionnaire	**37 days**	**Mon 2/24/25**	**Tue 4/15/25**
Develop Draft Questionnaire (Complete)	20 days	Mon 2/24/25	Fri 3/21/25
Submit Draft Questionnaire (Complete)	1 day	Mon 3/24/25	Mon 3/24/25
Panel Review	10 days	Tue 3/25/25	Mon 4/7/25
Update Questionnaire based on Panel feedback	5 days	Tue 4/8/25	Mon 4/14/25
Submit Final Questionaire	1 day	Tue 4/15/25	Tue 4/15/25
Conduct Interviews	**72 days**	**Mon 5/12/25**	**Wed 8/27/25**
Conduct Interviews	35 days	Mon 5/12/25	Mon 7/7/25
Develop Draft Report	20 days	Tue 7/8/25	Mon 8/4/25
Submit Draft for Panel Review	1 day	Tue 8/5/25	Tue 8/5/25
Panel Review	10 days	Wed 8/6/25	Tue 8/19/25
Update Draft based on comments	5 days	Wed 8/20/25	Tue 8/26/25
Submit Final	1 day	Wed 8/27/25	Wed 8/27/25
Task 4: Create Draft Procurement Documentation	**74 days**	**Mon 4/14/25**	**Fri 8/1/25**
Develop Draft Document	30 days	Mon 4/14/25	Wed 6/25/25
Submit Draft for Panel Review	1 day	Thu 6/26/25	Thu 6/26/25
Panel Review	10 days	Fri 6/27/25	Thu 7/17/25
Update Draft based on comments	10 days	Fri 7/18/25	Thu 7/31/25
Submit Final Draft	1 day	Fri 8/1/25	Fri 8/1/25
Task 5: Outreach for Feedback on Draft Documentation	**97 days**	**Mon 7/14/25**	**Wed 12/3/25**
Conduct Outreach	60 days	Mon 7/14/25	Mon 10/6/25
Develop Draft Report	20 days	Tue 10/7/25	Mon 11/3/25
Submit Draft for Panel Review	1 day	Tue 11/4/25	Tue 11/4/25
Panel Review	10 days	Wed 11/5/25	Tue 11/18/25
Update Draft based on comments	5 days	Wed 11/19/25	Tue 12/2/25
Submit Final	1 day	Wed 12/3/25	Wed 12/3/25
Task 6: Create Final Procurement Documentation	**31 days**	**Tue 9/23/25**	**Tue 11/4/25**
Develop Final Document	30 days	Tue 9/23/25	Mon 11/3/25
Submit Final Document	1 day	Tue 11/4/25	Tue 11/4/25
Task 7: Create Outreach Material for Procurement Documentation	**32 days**	**Thu 10/30/25**	**Fri 12/19/25**
Develop Draft Material	15 days	Thu 10/30/25	Wed 11/19/25
Submit Draft for Panel Review	1 day	Thu 11/20/25	Thu 11/20/25
Panel Review	10 days	Fri 11/21/25	Thu 12/11/25
Update Draft based on comments	5 days	Fri 12/12/25	Thu 12/18/25
Submit Final	1 day	Fri 12/19/25	Fri 12/19/25
Presentations	30 days	Thu 10/30/25	Wed 12/17/25

Model Connected Vehicle Procurement Documentation

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Task 3: Interview IOO and V2X Community

Task 3: Stakeholder Interviews

- Interview Guide
  - *Incorporated comments from March meeting*
  - *Final comments due April 28*
- Stakeholder Outreach
  - *Initial outreach began in early April*
  - *Received positive responses and interest in participating in interviews*
- Interview Scheduling has Begun
  - *IOOs*
  - *TSC manufacturers*
  - *V2X device manufacturers (RSU/OBU vendors)*
  - *SCMS providers*
  - *Academia*

Model Connected Vehicle Procurement Documentation

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Task 4: Draft Document

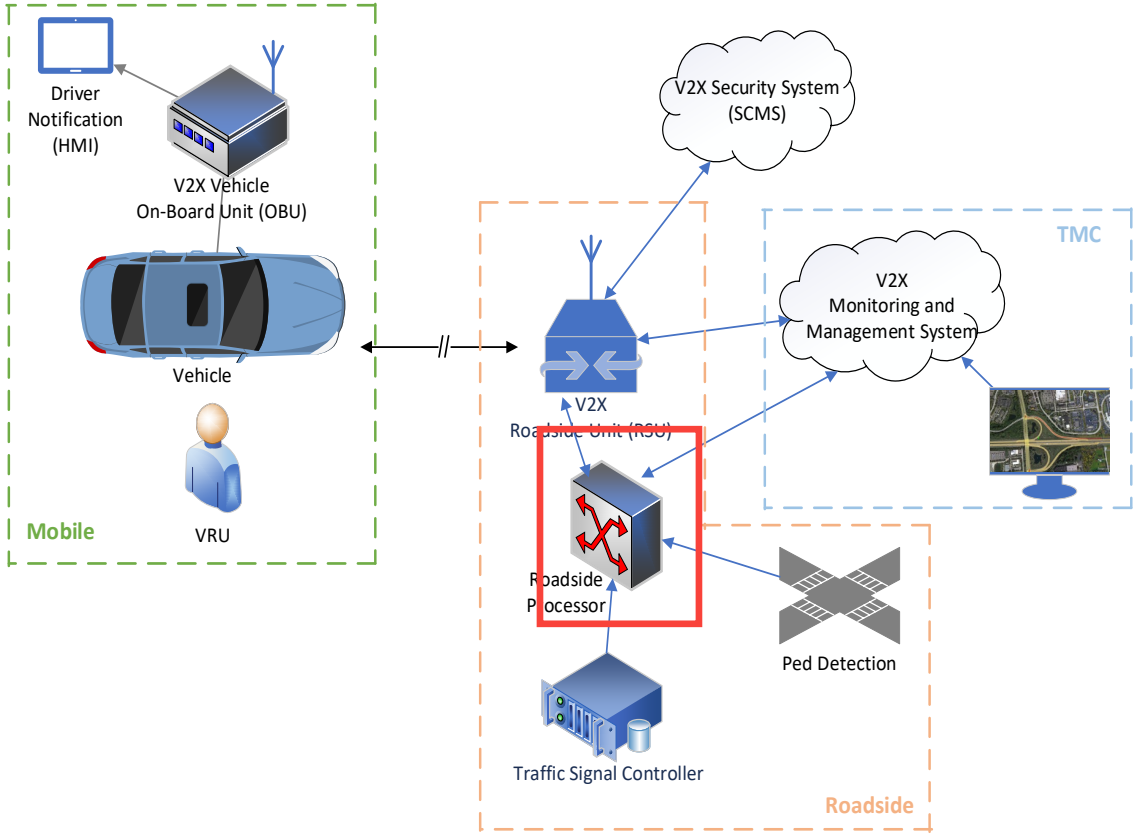
Task 4: Draft Document - Assumptions

- Document is intended for agencies new to V2X
- Document will primarily focus on what devices should be able to support “today”
- Document will include brief descriptions of system architecture, messages, standards, component, and supporting systems

Task 4: Draft Document

Roadside Architectures for generating SPaT messages

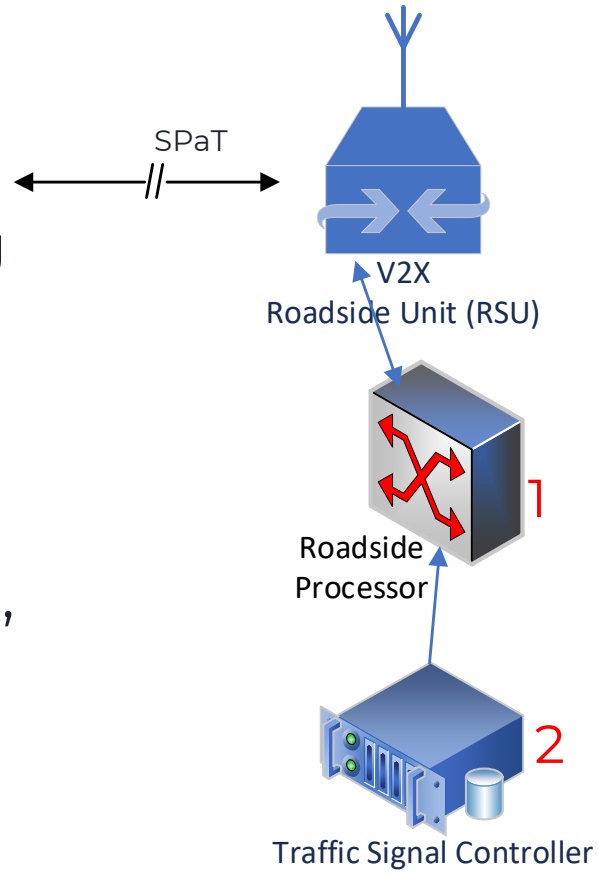
- 2 Physical architectures
  - *With roadside processor*
  - *Without roadside processor*



SPaT: With Roadside Processor

1. **TSC sends TSCBM to Roadside Processor (RSP)**, RSP generates and sends J2735 SPaT messages to RSU, RSU signs and broadcasts J2735 SPaT

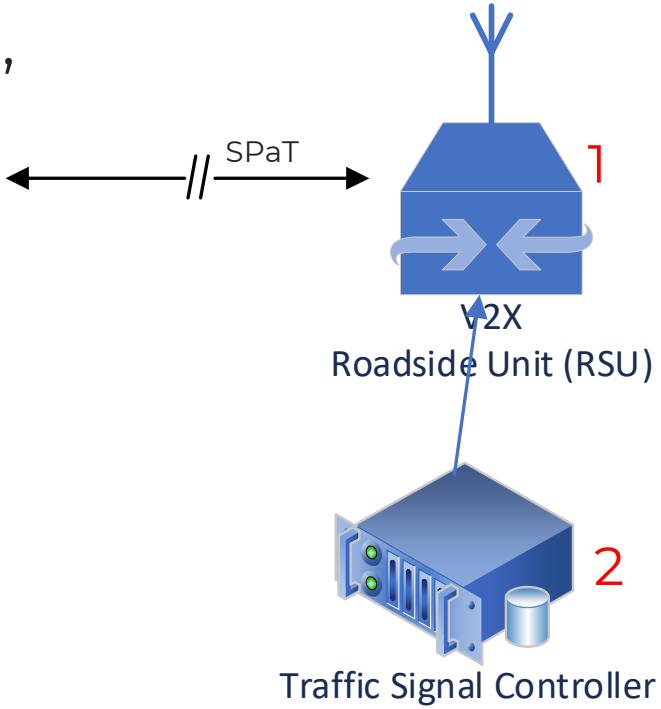
2. **TSC sends J2735 SPaT message to RSP**, RSP passes the J2735 SPaT message to RSU, RSU signs and broadcasts J2735 SPaT



SPaT: Without Roadside Processor

1. **TSC sends Traffic Signal Controller Broadcast Message (TSCBM) to RSU**, RSU generates, signs, and broadcasts J2735 SPaT

2. **TSC sends J2735 SPaT message to RSU**, RSU signs and broadcast J2735 SPaT



Task 4: Draft Document

Why does this matter?

Given the Procurement Document will focus on components, we need to assign the SPaT generation to a component (RSU, RSP, TSC)

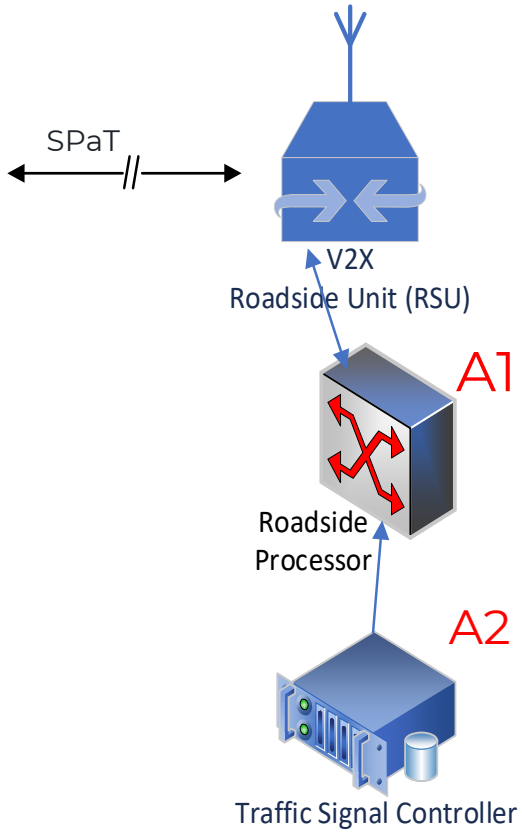
Include a “should” (optional) generate J2735 messages for all 3

Include a “shall” (mandatory) generate J2735 messages in all 3

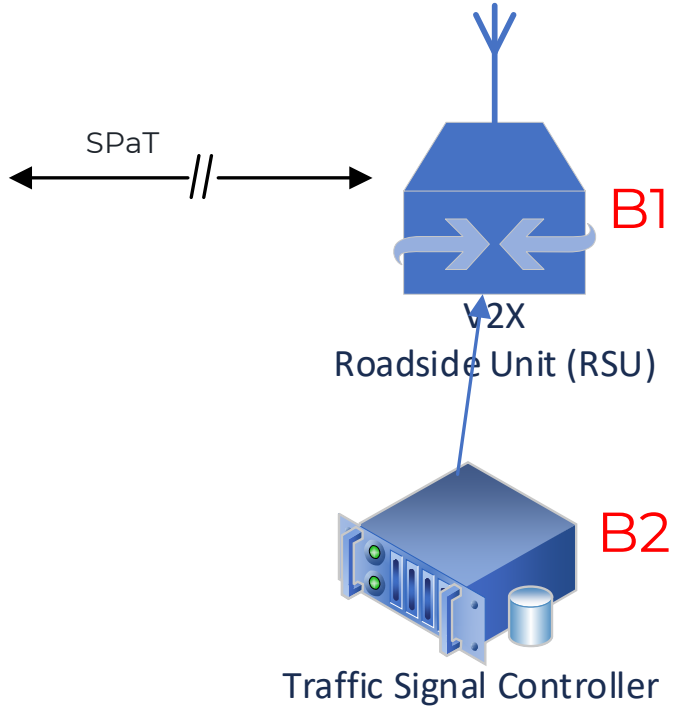
Task 4: Draft Document

Describe multiple roadside architectures?

- A) With a Roadside Processor
  - *1) RSP generates SPaT*
  - *2) TSC generates SPaT*



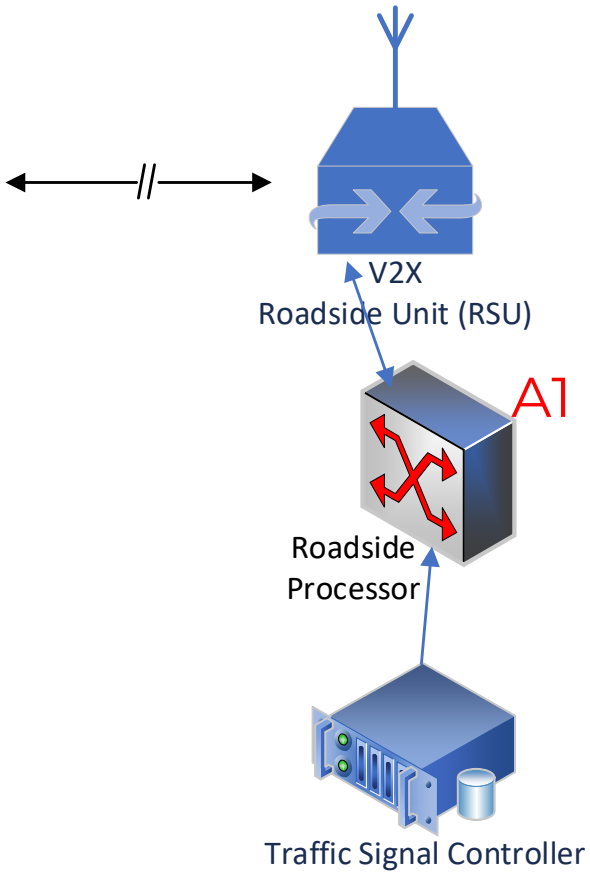
- B) Without a Roadside Processor
  - *1) RSU generates SPaT*
  - *2) TSC generates SPaT*



Task 4: Draft Document

Describe only A1; RSP generates SPaT?

- Require a Roadside Processor
- Require the RSP to generate and sends SPaT to RSU



Draft Document

See Draft

Model Connected Vehicle Procurement Documentation

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Next Steps

Next Steps

— Schedule interviews with stakeholders

— Continue developing draft procurement document

Next Panel Meeting

— Scheduled for Thursday, May 22 at 3pm ET

Model Connected Vehicle Procurement Documentation

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Thank you!

Questions?

Please contact :

Frank Perry

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Mobile: +1 734-552-9638

Model Connected Vehicle Procurement Documentation

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Back Up

Task 4: Draft Document-Outline

- Brief Architecture Description
  - *Brief intro to messages, standards, component, and supporting system*
    - Messages
    - Standards
    - Roadside Equipment (include architecture variations)
      - RSU
      - ECLA (Roadside Processor)
      - TSC
    - Vehicle Equipment
      - OBU
    - Supporting Systems
      - Monitoring and Management System
      - SCMS

Task 4: Draft Document-Outline

- Procurement Requirements
  - *Roadside Equipment*
    - RSU
    - ECLA
    - TSC
  - *Vehicle Equipment*
    - OBU
  - *Supporting Systems*
    - SCMS
    - Monitoring and Management System
  - Services
    - MAP Message Development
    - Acceptance Testing

Model Connected Vehicle Procurement Documentation

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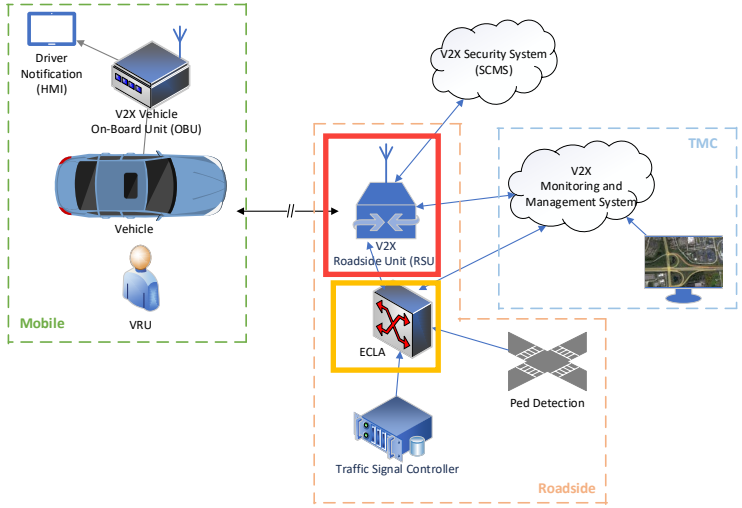
Task 2: Review Existing and Emerging V2X Standards

Task 2: Review Existing and Emerging V2X Standards



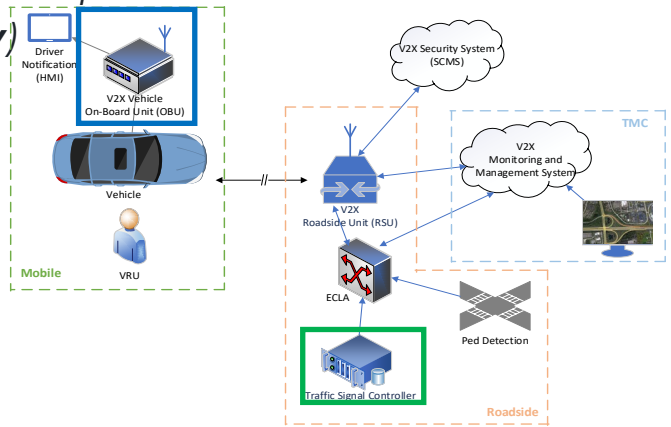
- RSU
  - *ITE-4001-RSU*
  - *IEEE 1609.2.1-Security Credentials*
  - *NTCIP 1218-RSU to back-office systems*
  - *SAE J3161/1 (SLSS)*
  - *OmniAir*
    - RSU needs to be OmniAir certified
    - Or provide a Letter from OmniAir stating device certification is in process
    - Need to account for evolving OmniAir certification requirements
  - *Optional (SPaT generation)*
    - SAE J4501
    - SAE J2945/A-MAP and RTCM
    - SAE J2945/B- SPaT, SSM, and SRM
    - FHWA Signal Phase and Timing and related message binary format (BLOB) details (Traffic Signal Controller Broadcast Messages (TSCBM))
  - *Consideration message validation*
    - RSU sends messages (TIM) to TMC for comparison with what was broadcast to what was sent to the RSU
- ECLA (Roadside Processor)
  - *SAE-J4501*
  - *SAE-J2945/A-MAP and RTCM*
  - *SAE-J2945/B- SPaT, SSM, and SRM*
  - *FHWA Signal Phase and Timing and related message binary format (BLOB) details (Traffic Signal Controller Broadcast Messages (TSCBM))*
  - *Consider Caltrans options*

Task 2: Review Existing and Emerging V2X Standards

- OBU
  - *SAE J5001**
    - First draft in development; publication not expected until 2027
  - *Identity and Pseudonym certificates (for emergency vehicles, especially law enforcement vehicles)*
  - *OmniAir*
    - OBU needs to be OmniAir certified
    - Or provide a Letter from OmniAir stating device certification is in process
    - Need to account for evolving OmniAir certification requirements

- TSC
  - *FHWA Signal Phase and Timing and related message binary format (BLOB) details (Traffic Signal Controller Broadcast Messages (TSCBM))*
  - *NTCIP-1202v3-Object Definitions for Actuated Signal Controllers (ASC) Interface (**V2X interface only**)*
  - *Include J2735 SPaT Generation ability as a baseline with J4501 as optional for now*
  - *NTCIP-1211-signal control and prioritization (**V2X interface only**)*
  - *Consider Caltrans options*

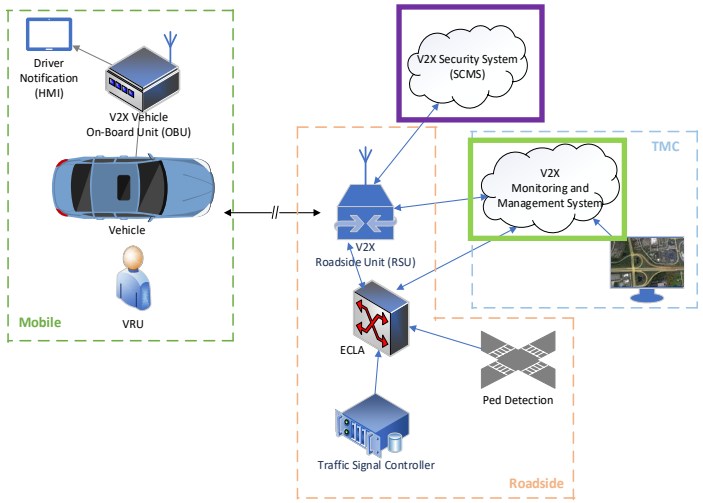
  - *Optional (SPaT generation)*
    - SAE J4501
    - SAE J2945/B- SPaT, SSM, and SRM



Task 2: Review Existing and Emerging V2X Standards

- Security Credentials Management System
  - *PSIDs, applications, messages, etc.*
  - *Security top off*
    - IPv6 for OBUs, IPv4 for RSUs, etc.

- V2X Management System
  - *General State of Health*
  - *CIMMS*
  - *Configuration*
  - *NTCIP 1218*
    - Certificate Health
  - *SCMS Certificate Health*



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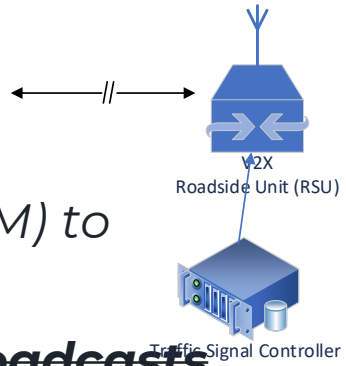
SPaT

Task 4: Draft Document-Outline

- SPaT
  - *Req 1 (Mandatory) RSU shall supported, and broadcast (SPaT) messages received as CTI 4001 Immediate Forward messages*
  - *Req 2 (Optional) RSU shall generate, sign, and broadcast J2735 SPaT messages based on TSCBM data received from the TSC*
  - *If Req 2 is not supported, then an ECLA (roadside processor) is required*
  - *If we assume J2735 SPaT messages are generated by a separate device (ECLA or TSC) (i.e., we do not include Req 2), then the architecture variations are reduced*

SPaT

1. TSC & RSU
    1. *TSC sends Traffic Signal Controller Broadcast Message (TSCBM) to RSU,* ***RSU generates, signs, and broadcasts J2735 SPaT***
    2. ~~*TSC sends 1202v3 data to RSU,* ***RSU generates, signs, and broadcasts J2735 SPaT***~~
    3. *TSC sends J2735 SPaT message to RSU, RSU signs and broadcast J2735 SPaT*



2. TSC, ECLA, & RSU
    1. *TSC sends TSCBM to ECLA,* ***ECLA generates and sends J2735 SPaT messages*** *to RSU, RSU signs and broadcasts J2735 SPaT*
    2. ~~*TSC sends 1202v3 data to ECLA,* ***ECLA generates and sends J2735 SPaT messages*** *to RSU, RSU signs and broadcasts J2735 SPaT*~~