Connected & Automated Vehicles – Infrastructure Owners Perspective

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Chair, AASHTO STSMO CAV TWG
ITS Program Manager – Utah DOT

AASHTO SCOTE CV/AV Panel Session
June 7, 2016
Savannah, GA
Connected Vehicles

- Safety
  - Mitigate 83% of non-impaired crashes
- Mobility
  - Data / Traveler Information

- Collaboration is important to leverage the investment we are all about to make

- Significant paradigm shift
Connected Vehicle Communications

Source: Noblis, “TMC in a CV Environment”, 2013
AASHTO SCOH CAV TWG

Standing Committee on Highways (SCOH)

Subcommittee on Transportation Systems Management and Operations (STSMO)

Connected & Autonomous Vehicles Technical Working Group (CAV TWG)

Providing a forum for state DOTs to share their connected and automated vehicle advancements, challenges, and experiences with the goal of helping all states prepare for deployment.
## Current CAV TWG Member States

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<thead>
<tr>
<th>Washington</th>
<th>Minnesota</th>
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<td>California</td>
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CAV TWG -- Recent Activities

• Presentations from the three Pilot Deployment Sites
• Monitored patent infringement issues
• Reviewed deployment decision tools
• Discussion about AV Policy / Legislation
• Survey of Infrastructure Owners (Joint effort with V2I DC TWG 1)
CV Pooled Fund Study

- Led by Virginia DOT (Melissa Lance)
- Fourteen members:
  - State, local, Transport Canada
- Projects:
  - Multi-modal Intelligent Traffic Signal Systems (MMITSS)
  - Mobile Road Weather Application
  - Automated Intersection Pavement Marking Detection
  - Standardizing a Basic Infrastructure Message (BIM)
CV Pooled Fund Study
V2I Deployment Coalition (DC)

The Concept:
- A single point of reference for stakeholders to meet and discuss V2I deployment related issues

The Approach:
- USDOT asked AASHTO, ITE and ITS America to collaborate

The Goal:
- To help accelerate consistent and effective deployments of Connected Vehicle technologies
V2I Deployment Coalition Structure

- TWG 1: Deployment Initiatives
- TWG 2: Deployment Research
- TWG 3: Infrastructure, Operator, OEM, and Supplier Partnerships
- TWG 4: Deployment Guidance
- TWG 5: Deployment Standards

Connected Vehicle Executive Leadership Team

V2IDC Executive Committee

USDOT - ITS JPO - FHWA - FTA - NHTSA
# Deployment Issues Addressed

<table>
<thead>
<tr>
<th>Issue</th>
<th>TWG 1 Initiatives</th>
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5 TWG Work Plans

- Surveys
- Webinars
- Technical Diagrams
- Documents / Papers
- Guidance Feedback
V2I DC Goals

Initial Goals of the V2I DC:
To help accelerate V2I deployments related to:
1. Intersections (signalized & non-signalized)
2. End of queue warnings
3. Work zone management
4. Curve warning systems
CAV Institutional Framework

Entity

CAV Executive Leadership Team (CAV ELT)

Vehicle to Infrastructure Deployment Coalition Executive Committee (V2I DC EC)

V2I DC Technical Working Groups (TWGs)

Role

Recommend Policies & Deployment Approaches
(Chair: Kirk Steudle, MDOT)

Guidance to V2I DC on Technical & Institutional Issues

Collaborate on technical work (Input level actions)

Technical findings & Questions

Policy level Feedback

Input

Feedback & Guidance
CAV Executive Leadership Team (ELT)

Meeting since 2005, Original Focus:

- Provide strategic guidance,
- Recommend policies and national deployment approaches,
- Provide critical program reviews,
- Assess the risks associated with deployment,
- Commit the resources of their organizations,
- Educate their organizations and supporting institutions
CV Applications Included in Plans or Proposals

Survey of State and Local Infrastructure Owners
(# of Responders = 22)

72 Connected Vehicle Applications by Group
Priority Applications – Results of TWG 1 Survey

Top 11 of 72 Connected Vehicle Applications

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Connected Vehicle Applications

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Priority Applications – V2I DC Priority Areas

Top 11 of 72 Connected Vehicle Applications

- Road Weather Motorist Alert and Warning
- Incident Scene Work Zone Alerts for...
- Queue Warning
- Speed Harmonization
- Vehicle Data for Traffic Operations
- Emergency Vehicle Preemption
- Intelligent Traffic Signal System
- Signal Phase and Timing
- Curve Speed Warning
- Warnings about Hazards in a Work...
- Warnings about Upcoming Work Zone
Priority Applications – CV Pooled Fund Projects

Top 11 of 72 Connected Vehicle Applications

Priority Applications – CAMP Demo Applications

Top 11 of 72 Connected Vehicle Applications

- V2I DC End of Queue
- V2I DC Work Zone
- V2I DC Curve Speed
- V2I DC Intersections
- V2I DC Work Zone

CV PFS Road Weather
CV PFS Intelligent Signals
CAMP Reduced Speed / Work Zone
CAMP Red-Light

Road Weather
Queue Warning
Speed Harmonization
Vehicle Data for Traffic Operations
V2I Safety
V2I DC End of Queue
V2I DC Work Zone
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V2I DC Intersections
V2I DC Work Zone
V2I Deployment Challenge

- Discussed within V2I DC TWG 1:
  - How do we encourage / initiate broad V2I deployment?
  - How do we demonstrate commitment to OEM and private industry?
  - What is a reasonable, early expectation?
  - Signalized Intersections
V2I Deployment Challenge

A challenge to achieve:

• Deployment of roadside DSRC hardware broadcasting Signal Phase and Timing (SPaT) on:
  ▪ a coordinated corridor of at least 20 intersections
  ▪ in each state
  ▪ by 2020

• Commitment to operate for at least 10 years
V2I Deployment Challenge

Goal of the Challenge:

• Give DOTs an entry into V2I deployment and operations (valuable experience with procurement, installation, operations)
• Help promote future (more advanced) V2I deployments
• Show a commitment to OEMs and developers
Connected Vehicle Deployment Challenge
20 SPaT Intersections in 50 States by 2020

The Challenge:
Equip at least one corridor (roughly 20 signalized intersections) in each of the 50 states with Dedicated Short Range Communications (DSRC) infrastructure to broadcast SPaT information by January 2020, and maintain operations for at least 10 years.

What is SPaT:
A Signal Phase and Timing (SPaT) message defines the current intersection signal light phases. The current state of all lanes at the intersection are provided, as well as any active pre-emption or priority.

Why This Challenge/Goal is Needed:
- To provide State and Local DOTs with an entry into DSRC based V2I Deployment (allow them to gain valuable procurement, licensing, installation, and operation experience)
- To promote future (more advanced) V2I deployments
- To show a commitment to automobile manufacturers and applications developers

“Fortunately, there is one fairly basic connected vehicle element which is relatively simple to deploy and fundamental to a number of applications, the “signal phase and timing” (SPaT) message. SPaT defines the actions of a traffic signal. It is obtained from a traffic signal controller via a standard query protocol and is broadcast by most DSRC roadside devices as a standardized data message.”
- Blaine Leonard, Utah DOT ITS Program Manager

Deployment Tools Will Be Available
The following tools will be developed:
- Guidelines for selecting corridors
- Procurement guidance
- DSRC licensing information
- Installation guidance
- Estimated costs
- Identification of existing funding sources that agencies may consider

Success in meeting the Challenge will be Measured
The V2I Deployment Coalition will work with the National Operations Center of Excellence (NOCe) to maintain a website to track progress using a national map to depict locations where:
- There is a commitment to deploy; and
- DSRC SPaT broadcast is operational.

How to get involved?
The Connected Vehicle SPaT Deployment Challenge is being led by the V2I Deployment Coalition TWG 1 and the AASHTO CAV WG. Information is available at:
http://www.transportationops.org, Infrastructure Owners & Operators wishing to join the challenge, or others wishing to participate in the effort, may contact: Dean Deeter (AASHTO support liaison to both groups) at deeter@acconsultants.org

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What? Why? Tools Measure Success
Questions?