Summary of the Public Meeting for FHWA’s Connected Vehicle-to-Infrastructure (V2I) Deployment Guidance and the V2I Deployment Coalition

Overview
The Federal Highway Administration (FHWA) conducted a public outreach meeting on September 12, 2014 in conjunction with the ITS World Congress in Detroit, MI. Approximately 100 people convened at the Cobo Center in Detroit, and 150 people participated via webinar. Presentations were given by FHWA staff on the draft V2I Deployment Guidance and members of AASHTO, ITE and ITS America discussed their initial thoughts on a proposed V2I deployment coalition.

Participants were asked to provide comments on both topics in breakout sessions. Below is a brief overview of the presentations on the guidance and the deployment coalition, along with the comments from stakeholders organized by topic. In many cases, United States Department of Transportation (USDOT) staff did not respond to the comments as this was an opportunity to gather input for further consideration. The guidance is expected to be finalized by USDOT in mid-summer 2015. The national associations will continue to work with interested stakeholders to organize a V2I deployment coalition over the next several months, including an anticipated meeting during the Transportation Research Board (TRB) Annual Meeting in January.

These proceedings also include a brief summary of the presentations on the American Association of State Highway Transportation Officials (AASHTO) National Connected Vehicle Field Infrastructure Footprint Analysis (“Footprint Analysis”), and communication technologies for connected vehicle applications. Finally, stakeholders are encouraged to provide additional comments or feedback on the materials from this public workshop through the USDOT Intelligent Transportation Systems (ITS) Joint Program Office website at http://www.its.dot.gov/meetings/v2i_feedback.htm. All source materials from the public workshop are available on that site for review and comment.

FHWA Proposed V2I Deployment Guidance
Overview of the Presentation
Bob Arnold and Jonathan Walker, both of the FHWA Office of Operations, gave the presentation on the draft Connected Vehicle-to-Infrastructure Deployment Guidance. This guidance is being developed to assist early adopters who are ready to deploy connected vehicle applications in their area. USDOT is seeking feedback from state and local Departments of Transportation, transit operators, other operating agencies, and infrastructure owners who are starting to plan for the deployment and use of connected vehicle technologies in their area.
The process for developing the V2I Guidance started in 2013 with a first public meeting held in Washington, DC in January 2014 followed by this meeting in Detroit. Development of companion products and tools is a large part of the effort by FHWA. Currently there are nine tools under development and each was highlighted during the presentation. The tools include the following:

- System Engineering Process for Vehicle to Infrastructure
- V2I Benefit Cost Analysis Tool
- V2I Planning Guide
- Guide to V2I Cyber-Security
- Guide to Licensing DSRC Roadside Units
- Guide to V2I Communication Technology Selection
- V2I Message Lexicon
- Guide to Initial Deployments
- Warrants for Deployment

This meeting is being held to engage stakeholders in this effort and to seek comments on the initial draft guidance. Comments are being received after this meeting through the ITS Joint Program Office website at [http://www.its.dot.gov/meetings/v2i_feedback.htm](http://www.its.dot.gov/meetings/v2i_feedback.htm). FHWA is seeking comments on new topics that should be addressed in the guidance, places where current language needs improvement or more definition, places where more flexibility is needed, and identification of areas that are confusing. The final V2I guidance is expected to be released in mid-summer 2015. Many V2I products and tools are currently under development and expected to be complete and ready for release at the end of the year in 2015. The guidance will also be iterative, and as soon as the first draft is issued, work on the next version will start.

**Breakout discussion by topic**

The topics discussed were varied and are summarized below. In most cases, USDOT staff captured the comment and did not offer a response. All comments will be considered in the development of the 2015 guidance.

**Timing of the Draft Guidance and the Connected Vehicle (CV) Pilot RFP:** Why was the guidance worked on before the CV Pilot Request for Proposals? The tools are being developed in parallel. The guidance is envisioned as being iterative, and the CV Pilots and the guidance development process inform each other. Also, the guidance is needed for those conducting early deployments. There are people ready to deploy CV technology and they need guidance and information on how to do so. Finally, there was a need to identify what products and tools to develop. Those have been identified through this guidance development process, and there is a long lead time to getting contracts in place to develop those tools.

**Cost Benefit of V2I:** How do you justify V2I where you need to show it is less costly versus other options to solve the same transportation problem?

**Maintenance:** What is maintenance of a V2I system? Please define.
**Reliability:** Agencies differ in their approaches to reliability, so please provide flexibility in the guidance on this issue.

**Planning for Communication Upgrades:** The information presented on backhaul costs assume that agencies are not upgrading their infrastructure. There is a constant turnover with technology and agencies will be upgrading their ITS infrastructure. CV could be enabled by those updates if states were given guidance on future bandwidth needs and any other future requirements.

**How do Auto Manufacturers and States know how to work together on the links between Vehicle-to-Vehicle (V2V) and V2I?** If I’m deploying V2I or I2V, do I know what data I should be transmitting? Do I know what I should be doing with the data I receive? How do I know who I can/should talk to before deployment to know who will be receiving my messages or what others will be sending that I could receive?

**Cyber-security:** There are practical insights and experiences from the deployments that can shed light on what is happening with security? Please get results of any information out to states on security as it becomes available.

**SCMS:** The Security and Credentialing Management System (SCMS) is not included in the guidance in the section on security. This is a huge unknown to deployers and more information is needed. Also, are security certificates required for particular interfaces?

**Data Tool Needed:** How do I get data and deal with data in my infrastructure system. This needs a tool developed.

**Outreach on CV is Needed:** Many participants discussed the need for outreach. The list of products/tools does not include anything on outreach. USDOT needs to better explain why to spend tax dollars on CV, and how to do it.

Another participant said outreach is needed to local transportation agencies. A generic package of information could be made available to all states, which can then be tailored to use with local counties.

**Channel Management:** How will channel management occur? Is there information on the use of 72 versus 74? Can you dedicate channels for each CV application? A FHWA representative mentioned that the South East Michigan Test bed is being used to test channel management and that the results of those tests will be incorporated into the guidance.

**Public Private Partnerships (P3):** Will the guidance address P3? A FHWA representative responded that the guidance does cover P3, but it is very general language. Is it too restrictive or too general? Please review it and respond.

**Negotiations for Dedicated Short-Range Communications (DSRC) and/or 4GLTE (4th Generation Long Term Evolution cellular data technology):** Does each locality have to negotiate contracts with communication providers? Can there be a national negotiation to offer services to states and localities?
If every agency has to go through individual negotiations it will be very costly to the country to implement CV.

**Need a tool to decide on what application to use for what purpose.**

**Verification:** There is nothing in the guidance on verification. It could be listed in a tool such as the systems engineering document, but make sure not to lose it.

**Incentives needed for after-market devices and faster market penetration:** How can USDOT incentivize a rigorous market to develop after-market devices, and then incentivize people to use those devices?

**Legal Requirements and Accountability:** Where in the guidance will legal requirements and accountability be addressed?

**Inspections or Re-certifications:** Will we see inspections or recertifications? Is there a need for ongoing guidance for OBEs and RSE? There is a need for a robust plan with information spelled out on lifecycle and how often each deploying agencies intends to update their technology.

**Legacy systems:** How will legacy systems be addressed?

**Will the guidance be bi-lingual?:** This is a short document that can easily be translated if needed.

**Be clear how CV will enhance civil liberties not destroy civil liberties.**

**When will tools be available?** FHWA expects a suite of V2I tools and products to be available at the end of 2015.

### Proposed V2I Deployment Coalition

**Overview of the Presentation**

Gummada Murthy from AASHTO, Doug Noble from the Institute of Transportation Engineers (ITE), and Jennifer Carter of ITS America spoke of the current work each of their organizations are doing to support connected vehicles and V2I deployment. Scott Belcher of ITS America also spoke about the importance of bringing together stakeholders and the need to serve the early adopters through guidance, products and standards. The proposed V2I deployment coalition would add to the work already underway, providing a forum for connected vehicle deployment at a national level. The presentation included information on a proposed structure for the organization, and key tasks for the coalition to undertake.

**Breakout discussion by topic**

The breakout session was guided by the following questions put forth by the facilitators:

- What are thoughts about the structure of the coalition?
- How should associated organizations’ and agencies’ leadership be involved?
- What challenges are likely to arise and need to be addressed?
• Any other concerns / comments?

The topics discussed were varied and are summarized below. In many cases, USDOT, AASHTO and ITE staff captured the comment and did not offer a response. All comments will be considered as development of the Coalition proceeds. Breakout session participant input is summarized by topic below.

**Defining Structure Based on Tasks/Activities:** It is difficult and inappropriate to try to fine-tune the membership and internal structure of the Coalition without knowing the specific objectives and activities that are intended to be accomplished. Once the specific activities are identified the membership and structure should be defined to directly support those activities and objectives.

**Key Issues to Be Addressed by the Coalition:** One of the first tasks of the Coalition and one not shown on the list of “Key Tasks” on the handout should be to develop consensus among implementing agencies and Original Equipment Manufacturers (OEMs) on what V2I applications should be the initial focus for deployment. This is especially important since, unlike V2V, no V2I mandate is expected that would provide impetus and focus. This should be a separate task of the Coalition. (USDOT noted that identifying initial applications for deployment is part of the research that is occurring to support completion of the FHWA V2I Deployment Guidance; specifically part of the follow-on work to the AASHTO Footprint Analysis). Other issues that should be addressed by the Coalition are:

- Making data collected usable
- Dealing with legacy systems
- How state and local agencies will work with developers to shape the technology and how it is implemented
- Legal issues, including security and privacy
- The business case and federal-aid funding

**Importance of a Good “Elevator Speech”:** It is very important to have a good, short explanation of the purpose and need for the Coalition—an “elevator speech” that can quickly communicate the justification and benefits of the Coalition to senior decision makers and other stakeholders. Is the core purpose of this Coalition to facilitate collaboration among parties or to actually facilitate state and local deployment of V2I?

**Relationship to FHWA V2I Guidance-related Research:** Exactly how will the work of the Coalition relate to the work being done to complete the Guidance? The “Key tasks” for the Coalition listed on the handout look very similar to Guidance work. Will the Coalition just review work products from those efforts or will the Coalition carry out some of that technical work, and if so, which specific activities?

**Balancing Breadth of Representation and Extent of Structure Against the Need to Be Nimble:** Although it is important to have broad representation, the larger the Coalition becomes, the slower it will move. Senior leadership will be less likely to participate if the Coalition is not able to move quickly...
and accomplish things. We (the V2I deployment community) is already slow, already behind—some agencies and industries are moving faster than we can keep pace with. Based on experience with other organizations, in order to get anything done quickly a contractor support team is needed to coordinate meetings and other communications and conduct technical work. It is important that a contractor support team is independent; that they do not have a vested interest in the results. It is more efficient to use a single contractor team than multiple contractors working on parallel tasks.

**Coalition Membership:** Consider the following when refining the composition and roles of the Coalition membership:

- OEMs cannot deal with a large number of individual state and local implementing agencies—they need to deal with associations of these agencies.
- Move ITE up to the Executive Committee to help represent the perspective of state and local agencies at a high level.
- The aftermarket industry is not currently represented on the draft organizational structure chart and should be included.
- Add regional planning agency associations, e.g., Association of Metropolitan Planning Associations (AMPO) and National Association of Regional Councils (NARC).
- Make sure that freight is represented, e.g., American Transportation Research Institute (ATRI)
- The Coalition should involve and promote collaboration among both technical personnel as well as decision-makers/managers—who make investment decisions. Beyond ITE, organizations that could involve technical personnel include the Institute of Electrical and Electronics Engineers (IEEE) and the National Electrical Manufacturers Association (NEMA).
- The Council of University Transportation Centers (CUTC) is not currently represented on the organizational structure.
- Include technology firms, such as network technology companies like Cisco, Juniper, and Polycom.
- Include stakeholders representing the “demand side” of the transportation equation; the draft organizational structure seems to include almost entirely representatives of the supply side.
- Does the Cooperative Transportation Systems Pooled Fund Study need to be directly involved given AASHTO’s extensive involvement in that organization?
- How will OEMs be involved? (ITS America suggested that OEMs would likely be involved through organizations, such as the Vehicle Infrastructure Integration Consortium (VIIC) and the Crash Avoidance Metrics Partnership (CAMP).
Other Topics Covered

AASHTO Footprint Analysis
Jim Wright of AASHTO spoke about the ongoing work by his organization to develop a footprint analysis and vision of CV deployment over the next 25 years. AASHTO has been under contract with USDOT to look at how connected vehicle infrastructure might be deployed over time nationally. The AASHTO Footprint Analysis report is now publicly available at http://ntl.bts.gov/lib/52000/52600/52602/FHWA-JPO-14-125_v2.pdf, and identifies target levels of deployment by 2040 and initial estimates of costs for deployment. AASHTO believes the next steps are to get CV applications into the marketplace, create decision tools for decision makers, and identify the value proposition for connected vehicles.

CV Communications Technology
Suzanne Sloan of the USDOT Volpe Center spoke about the wide range of communications technology that can be used in the CV environment. She noted that DSRC 5.9 GHz must be used for crash-avoidance applications, cellular, Wi-Fi and satellite can be used in other situations. The V2I systems engineering guide that is under development will provide information on how to best select technologies or leverage them. Additional supporting research is underway to further inform decision making on communications. The Dynamic Mobility Application (DMA) prototype sites, CV Pilots, and the Communication Data Delivery System (CDDS) were highlighted with results being disseminated by USDOT as they become available. One comment from the audience concerned the use of CV technologies for law enforcement. USDOT plans do not include the use of CV technology for law enforcement.