

# V2I Deployment Coalition

## Technical Memorandum 1: V2I Deployment Issues

June 2015

### 1. Synthesis of the Technical Memorandum

The purpose of this technical memorandum is to provide background information on the Vehicle to Infrastructure Deployment Coalition (V2IDC); to document the process followed since the coalition was created; to define the issues that the coalition intends to address; and, to summarize the next steps for addressing these issues.

The V2I DC began as a concept to create a single point of reference for stakeholders to meet and discuss V2I deployment related issues. To accomplish this concept, USDOT asked AASHTO, ITE and ITS America to collaborate on organizing and managing the coalition. The V2I DC Project Team (consisting of members from AASHTO, ITE, and ITS America) then created a vision, mission, and set of objectives that would guide the coalition. This original concept was presented to USDOT for input and guidance.

The **vision** of the V2I DC is defined as:

*An integrated national infrastructure that provides the country a connected, safe and secure transportation system taking full advantage of the progress being made in the Connected and Autonomous Vehicle arenas.*

The **mission** of the V2I DC is:

*To work collaboratively with industry, state and local governments, academia and USDOT to achieve the goal of deploying and operating a functioning V2I infrastructure.*

The **objectives** of the V2I DC are to:

- *Provide leadership on Connected Vehicle (CV) Program deployment efforts*
- *Establish CV deployment strategies*
- *Lead and provide support on continued technical research for CV*
- *Support CV standards development*
- *Provide input to and refinement of CV guidance*

*Additional details about the role of the V2I DC and the Project Team are included in [Section 2](#).*

AASHTO, ITE and ITS America presented the V2I DC concept to their respective memberships to build the coalition during the months of March-May 2015.

**Identifying core members for the coalition.** Although the V2I DC intends to host open meetings for all parties interested in V2I deployment, the coalition requires a group of core members to establish consistency among stakeholder feedback and ensure commitment to the initial coalition effort. The target membership level for the coalition was approximately 50 members in total, consisting of a combination of public representatives from the state, county, and municipal levels, as well as private sector industry representatives. AASHTO, ITE and ITS America each identified approximately 15 members that would comprise the core V2I DC. *Additional details of the V2I DC membership are included in [Section 3](#).*

**Introducing the coalition concept.** Each association held webinars in April to introduce the V2I DC to their members. The webinars acknowledged existing CV working groups and how they will function in relation to the V2I DC. The V2I DC purpose, organization and expected outcomes were also presented during the webinars. Webinar attendees were asked to assist with identifying the top V2I related deployment issues, which will become the focus of the V2I DC.

**Kicking off the coalition as one cohesive group of core members.** Once the V2I DC core membership was determined, the Project Team held webinars in May to bring the core members together as one cohesive group under the V2I DC; to kick-off the coalition; and, to prepare for the first in-person workshop scheduled for June 4-5. Several key activities were accomplished during this effort:

- 1) **V2I DC kick-off webinar was held.** AASHTO, ITE and ITS America led a webinar on May 7 to kick-off and introduce the coalition, and prepare for the June 4-5 workshop. *Additional details of the May webinar are included in [Section 3](#) and the preliminary agenda for the June 4-5 workshop is included in [Section 6](#).*
- 2) **Five Technical Working Groups (TWGs) were established.** Chairs, co-chairs and core members were identified for each TWG. A webinar was conducted on May 20 with the chairs to develop a structure for how each TWG will be managed and to discuss how TWGs intend to use the limited in-person meetings and webinars with their membership to accomplish the work plan of each TWG. *Descriptions of each TWG are included in [Section 4](#).* The TWGs include:

TWG 1: Deployment Initiatives

TWG 2: Deployment Research

TWG 3: Infrastructure Operator, OEM and Supplier Partnerships

TWG 4: Deployment Guidance

TWG 5: Deployment Standards

- 3) **V2I issues were identified and consolidated.** When AASHTO, ITE and ITS America conducted their individual association webinars, members were invited to submit the most critical issues facing V2I deployment. *The consolidated issues are listed below and described in detail in [Section 5](#).* The issues are numbered for reference only and are not ordered by priority.

Issue 1: V2X Applications

Issue 2: Alternate Communications to DSRC

Issue 3: Data Business Models

Issue 4: Patents-Intellectual Property

Issue 5: Security

Issue 6: V2I Outreach

Issue 7: Business Model for V2I Deployment

Issue 8: V2I Standards

Issue 9: Understanding V2I Liability Assignment

Issue 10: V2I Synergies with Other Emerging Technologies

Issue 11: V2I Consumer Messaging

Issue 12: V2I Multimodal Applications

**Planning next steps.** During the June 4-5 workshop breakout sessions, each TWG will be asked to review the top issues and select those most appropriate to be addressed by their group. With direction from the chair, each TWG will then create a work plan describing specific actions and deliverables that will be completed over the course of the V2I DC.<sup>1</sup>

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<sup>1</sup> Based on AASHTO, ITE and ITS America webinar and email announcements about the V2I DC workshop on June 4-5, over 100 participants are expected to attend from the public sector, private industry and academia.

## 2. Background on the V2I DC

AASHTO, ITE and ITS America have established a coalition for Connected Vehicle and infrastructure related deployment. The Vehicle to Infrastructure Deployment Coalition (V2I DC) consists of stakeholders from state and local transportation agencies, and private industry. The purpose of the coalition is to support a broad partnership within the connected vehicle community that intends to contribute a shared understanding of the issues to be considered and resolved for advancing the V2I infrastructure in preparation for implementation. The V2I DC intends to:

- Engage and solicit input from a wide range of transportation stakeholders and provide them with information about V2I deployment applications;
- Allow this group of stakeholders to express and prioritize questions and potential issues related to V2I deployment; and
- Provide a structure where stakeholders can work together to discuss questions and issues, and recommend action to be taken to resolve these issues.

The V2I DC Project Team, membership identified in Table 1, intends to work with coalition members to ensure that stakeholder input represents all aspects of the transportation industry that are potentially impacted by V2I deployment.

Table 1 V2I DC Project Team

Project Team Representative	Association
Gummada Murthy, Project Team Manager	AASHTO
Siva Narla	ITE
Jennifer Carter	ITS America
Patrick Zelinski	AASHTO
Carlos Alban	ITS America
Dean Deeter	Athey Creek Consultants
Ginny Crowson	Athey Creek Consultants

The V2I DC will also be guided by an Executive Committee consisting of transportation agency and private industry leaders. The Executive Committee will provide direction for the coalition and liaison with USDOT on coalition matters. The Executive Committee will be formed prior to the second in-person meeting of the coalition.

## 3. Structure and Early Activities of the V2I DC

The V2I DC Project Team initiated the coalition effort with USDOT on February 25. Project Team representatives from AASHTO, ITE and ITS America reviewed with USDOT the tasks, schedule and deliverables that will guide the V2I DC work through June 2016.

AASHTO, ITE and ITS America each held webinars in April to introduce the V2I DC to their members. Following the introductory webinars, the Project Team representatives worked with their associations to identify a group of core members for the coalition. Tables 2-4 identify core members of the V2I DC identified by the association that appointed them. Although each association recommended coalition members, **the V2I DC will function as one cohesive group, rather than segmenting members by the association that appointed them.**

Table 2 AASHTO Appointed Members of the V2I DC

AASHTO	
Arizona DOT – Reza Karimvand	Texas DOT – Jianming Ma/Alex Power
Caltrans – Greg Larson	Utah DOT – Blaine Leonard
Florida DOT – Elizabeth Birriel	Virginia DOT – Melissa Lance
Idaho DOT – Robert Koeberlein	Washington State DOT – Bill Legg
Iowa DOT – Scott Marler	Wisconsin DOT – TBD
Michigan DOT – Matthew Smith	AASHTO Subcommittee on Traffic Engineering – TBD
Minnesota DOT – Ray Starr	AASHTO Subcommittee Maintenance – TBD
New Jersey DOT – Bill Kingsland	AASHTO Subcommittee on Highway Transport – TBD
New York DOT – Richard McDonough	V2IDC Chair – TBD
Pennsylvania DOT – Mark Kopko	Optional Member – TBD

Table 3 ITE Appointed Members of the V2I DC

ITE	
CCTA – Randy Iwasaki	Purdue University – Darcy Bullock
City Anaheim – John Thai	Qualcomm – Jim Misener
Econolite – Gary Duncan	RCOC – Gary Piotrowicz
Iteris – Cliff Heise	SANDAG – Peter Thompson
Kimley Horn – Doug Gettman	Savari – Ravi Puwala
Maricopa County – Faisal Saleem	Siemens – David Miller
Montgomery County – Emil Wolanin	Transcore – Robert Rausch
Palm Beach County – George Webb	California Polytech - Rob Bertini

Table 4 ITS America Appointed Members of the V2I DC

ITS America	
Cal PATH – Tom West	NXP – Leland Key
Cisco – Barry Einsig	NYCDOT – Steve Galgano
CMU – Zachary Rubinstein	MTC – Virginia Lingham
Denso – Roger Berg	TTI – Ed Seymour
Ford – Mike Schulman	VTTI – Ray Resendes
HERE – Monali Shah	Xerox – Joe Averkamp
Kapsch – Chuck Mraz	GM – Scott Giesler
Meritor Wabco – Alan Korn	Toyota – Ed Bradley
Michigan MTC – John Maddox	

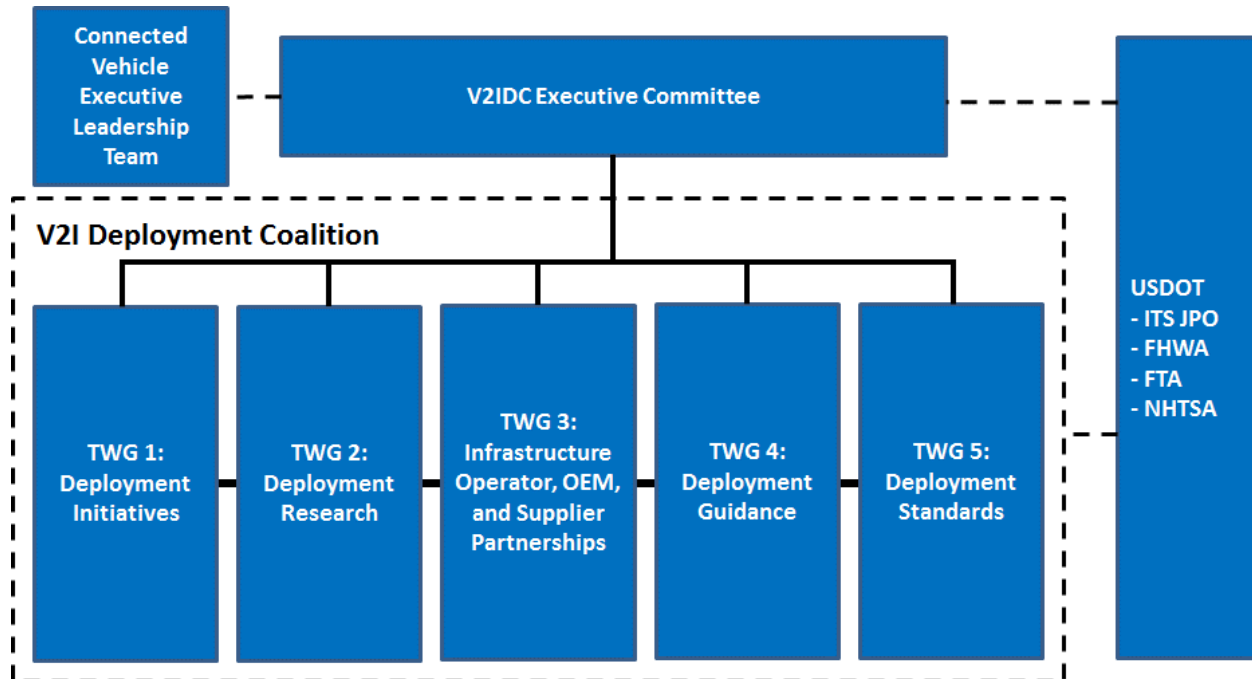
Once membership was established, the V2I DC kick-off meeting was held May 7. A list of the webinar attendees is included as Appendix 1. During the kick-off webinar, the following topics were addressed:

1. Introductions were given by representatives from AASHTO, ITE and ITS America
2. Objectives and organizational structure of the V2I DC were presented
3. Coalition membership was presented in the form of members nominated from each association
4. TWGs were introduced and the chairs for each group were identified

5. A preliminary agenda for the June 4-5 workshop was presented
6. Sample agendas for each TWG break-out session were shared to help TWG chairs begin to create their agendas

The structure of the V2I DC, as it was presented during the kick-off webinar, is shown in Figure 1.

Figure 1 V2I DC Organizational Structure



#### 4. Descriptions of Technical Working Groups and Initial Membership

Five initial TWGs have been established to address specific aspects of V2I deployment. TWGs may be added or modified as the coalition members further define their needs. The role of the TWGs will be to:

- Discuss issues prioritized by the V2I DC and assigned to the specific TWG;
- Discuss additional issues identified by TWG members;
- Recommend and/or perform actions to reach resolution of as many issues discussed in the TWGs as possible; and
- Exchange information.

The TWGs will work towards defining actions that are needed to resolve the issues associated with V2I deployment. The TWGs are not expected to solve all issues identified, but rather to work towards defining the specific actions that need to be performed (e.g. additional demonstrations, additional pilot deployments, additional research, etc.) in regard to the issues.

Core members of the coalition were asked to identify which of the five TWGs they would like to participate in. Following are descriptions of each TWG, the core members assigned to each, the chairs and co-chairs selected to lead each group, and the Project Team liaisons. **Descriptions of the TWGs are preliminary and each TWG is tasked with reviewing and recommending any needed changes to the Project Team.**

***TWG 1: Deployment Initiatives***

This TWG will share information and discuss current and previous V2I implementation initiatives. Initiatives discussed by the group will include any small or large V2I initiative that the TWG members wish to discuss (e.g. activities of the Connected Vehicle Pooled Fund, the Connected Vehicle Safety Pilot Program, the Michigan Connected Vehicle test bed, and other locations where initiatives are underway or were recently completed). The group is intended to be a sharing body where all the implementation efforts are given a forum to explain and share their experiences. A peer to peer exchange will be established here for those selected as Pilot Deployment Sites to share experiences with each other and all others interested. The TWG will discuss needs for future initiatives to address stated issues, especially any ‘gaps’ or issues not addressed by current or previous deployment initiatives. This TWG will also discuss any appropriate V2I issues identified by the coalition. TWG 1 is tasked with coming up with a multi-phase work plan with the first phase concluding in June 2016. The first phase shall include specific actions and deliverables, and a broader description of plans for future phases.

*Table 5 Members of TWG 1: Deployment Initiatives*

<b>Name</b>	<b>Organization</b>	<b>Business Email</b>
<b>Bill Legg (Chair)</b>	Washington State DOT	<a href="mailto:LeggB@wsdot.wa.gov">LeggB@wsdot.wa.gov</a>
<b>Joe Averkamp (Co-Chair)</b>	XEROX	<a href="mailto:joseph.averkamp@xerox.com">joseph.averkamp@xerox.com</a>
<b>Dave Miller</b>	Siemens	<a href="mailto:miller.dave@siemens.com">miller.dave@siemens.com</a>
<b>Gary Duncan</b>	Econolite	<a href="mailto:gduncan@econolite.com">gduncan@econolite.com</a>
<b>Randell Iwasaki</b>	CCTA	<a href="mailto:riwasaki@ccta.net">riwasaki@ccta.net</a>
<b>Ray Resendes</b>	VTTI	<a href="mailto:RResendes@vtti.vt.edu">RResendes@vtti.vt.edu</a>
<b>Mark Kopko</b>	Pennsylvania DOT	<a href="mailto:markopko@pa.gov">markopko@pa.gov</a>
<b>Steve Galgano</b>	New York City DOT	<a href="mailto:sgalgano@dot.nyc.gov">sgalgano@dot.nyc.gov</a>
<b>Barry Einsig</b>	Cisco	<a href="mailto:BEinsig@cisco.com">BEinsig@cisco.com</a>
<b>Leland Key</b>	NXP	<a href="mailto:leland.key@nxp.com">leland.key@nxp.com</a>
<b>Blaine Leonard</b>	Utah DOT	<a href="mailto:bleonard@utah.gov">bleonard@utah.gov</a>
<b>Reza Karimvand</b>	Arizona DOT	<a href="mailto:rkarimvand@azdot.gov">rkarimvand@azdot.gov</a>
<b>John Maddox</b>	Michigan MTC	<a href="mailto:maddoxjm@umich.edu">maddoxjm@umich.edu</a>
<b>Dean Deeter (Liaison)</b>	Athey Creek Consultants	<a href="mailto:deeter@acconsultants.org">deeter@acconsultants.org</a>

***TWG 2: Deployment Research***

The purpose of the Deployment Research TWG is to provide insight into what further research, analysis, and planning studies are needed to be undertaken to guide the states and others as they proceed toward implementation. V2I issues identified by the coalition that relate to topics best addressed through research may be addressed by this TWG. The Deployment Research TWG is intended to collaborate to identify and describe actions to be accomplished (either by the TWG or to be proposed for future work efforts). TWG 2 is tasked with coming up with a multi-phase work plan with the first phase concluding in June 2016. The first phase shall include specific actions and deliverables, and a broader description of plans for future phases.

Table 6 Members of TWG 2: Deployment Research

Name	Organization	Business Email
Greg Larson (Chair)	Caltrans	<a href="mailto:greg.larson@dot.ca.gov">greg.larson@dot.ca.gov</a>
Rob Bertini (Co-Chair)	California Polytech	<a href="mailto:rbertini@calpoly.edu">rbertini@calpoly.edu</a>
Alan Korn	Meritor Wabco	<a href="mailto:alan.korn@meritorwabco.com">alan.korn@meritorwabco.com</a>
Jianming Ma	Texas DOT	<a href="mailto:Jianming.Ma@txdot.gov">Jianming.Ma@txdot.gov</a>
Douglas Gettman	Kimley Horn	<a href="mailto:doug.gettman@kimley-horn.com">doug.gettman@kimley-horn.com</a>
Thomas West	Cal PATH	<a href="mailto:tomwest@path.berkeley.edu">tomwest@path.berkeley.edu</a>
Roger Berg	DENSO	<a href="mailto:Roger_berg@denso-diam.com">Roger_berg@denso-diam.com</a>
Randell Iwasaki	CCTA	<a href="mailto:riwasaki@ccta.net">riwasaki@ccta.net</a>
Zachary B. Rubinstein	CMU	<a href="mailto:zbr@cs.cmu.edu">zbr@cs.cmu.edu</a>
Scott Marler	Iowa DOT	<a href="mailto:scott.marler@dot.iowa.gov">scott.marler@dot.iowa.gov</a>
Pat Zelinski (Liaison)	AASHTO	<a href="mailto:pzelinski@aaashto.org">pzelinski@aaashto.org</a>

**TWG 3: Infrastructure Operator, OEM, and Supplier Partnerships**

The purpose of this TWG is to identify cross-cutting issues related to infrastructure operators, OEMs and suppliers, and discuss possible approaches towards resolving them. Examples of known issues include: access to vehicle based data, privacy, cybersecurity, and liability for the infrastructure operators, OEMs, and suppliers. This TWG will discuss and expand upon these and other issues and develop a scope and a work plan. Membership will be comprised of a combination of public and private sector members, representing all aspects of the industry. TWG members will work together to develop descriptions of the actions that are needed to resolve the issues addressed by the group. TWG 3 is tasked with coming up with a multi-phase work plan with the first phase concluding in June 2016. The first phase shall include specific actions and deliverables, and a broader description of plans for future phases.

Table 7 Members of TWG 3: Infrastructure Operator, OEM and Supplier Partnerships

Name	Organization	Business Email
Matt Smith (Chair)	Michigan DOT	<a href="mailto:smithm81@michigan.gov">smithm81@michigan.gov</a>
Roger Berg (Co-Chair)	DENSO	<a href="mailto:Roger_berg@denso-diam.com">Roger_berg@denso-diam.com</a>
Richard McDonough	New York DOT	<a href="mailto:Richard.McDonough@dot.ny.gov">Richard.McDonough@dot.ny.gov</a>
Mike Shulman	Ford	<a href="mailto:mshulman@ford.com">mshulman@ford.com</a>
Ed Bradley	Toyota	<a href="mailto:Ed_Bradley@toyota.com">Ed_Bradley@toyota.com</a>
Peter Thompson	SANDAG	<a href="mailto:Peter.Thompson@sandag.org">Peter.Thompson@sandag.org</a>
John Thai	City of Anaheim	<a href="mailto:jthai@anaheim.net">jthai@anaheim.net</a>
Ray Starr DOT	Minnesota DOT	<a href="mailto:ray.starr@state.mn.us">ray.starr@state.mn.us</a>
Melissa Lance	Virginia DOT	<a href="mailto:melissa.lance@vdot.virginia.gov">melissa.lance@vdot.virginia.gov</a>
Scott Geisler	General Motors	<a href="mailto:scott.p.geisler@gm.com">scott.p.geisler@gm.com</a>
Monali Shah	HERE	<a href="mailto:monali.shah@here.com">monali.shah@here.com</a>
Ravi Puvvala	Savari	<a href="mailto:ravi@savarinetworks.com">ravi@savarinetworks.com</a>
Jennifer Carter (Liaison)	ITS America	<a href="mailto:jcarter@itsa.org">jcarter@itsa.org</a>

**TWG 4: Deployment Guidance**

This TWG is focused on assessing the stakeholder impact of the USDOT Deployment Guidance, and providing input. This TWG will provide review and input to the USDOT Deployment Guidance as a stakeholder group, and will identify gaps and provide recommendations for additional products needed for the V2I deployment community. TWG 4 is tasked with coming up with a multi-phase work plan with the first phase concluding in June 2016. The first phase shall include specific actions and deliverables, and a broader description of plans for future phases.

*Table 8 Members of TWG 4: Deployment Guidance*

<b>Name</b>	<b>Organization</b>	<b>Business Email</b>
<b>Elizabeth Birriel (Chair)</b>	Florida DOT	<a href="mailto:Elizabeth.Birriel@dot.state.fl.us">Elizabeth.Birriel@dot.state.fl.us</a>
<b>Faisal Saleem (Co-Chair)</b>	Maricopa Co., AZ	<a href="mailto:faisalsaleem@mail.maricopa.gov">faisalsaleem@mail.maricopa.gov</a>
<b>George Webb</b>	Palm Beach Co	<a href="mailto:gwebb@pbcgov.org">gwebb@pbcgov.org</a>
<b>Gary Piotrowicz</b>	RCOC	<a href="mailto:gpiotrowicz@rcoc.org">gpiotrowicz@rcoc.org</a>
<b>Emil Wolanin</b>	Montgomery Co., MD	<a href="mailto:Emil.Wolanin@montgomerycountymd.gov">Emil.Wolanin@montgomerycountymd.gov</a>
<b>Robert Rausch</b>	Transcore	<a href="mailto:robert.rausch@transcore.com">robert.rausch@transcore.com</a>
<b>Bob Koeberlein</b>	Idaho DOT	<a href="mailto:robert.koeberlein@itd.idaho.gov">robert.koeberlein@itd.idaho.gov</a>
<b>Clifford D. Heise</b>	Iteris	<a href="mailto:cdh@iteris.com">cdh@iteris.com</a>
<b>Virginia Lingham</b>	MTC (Bay Area)	<a href="mailto:vlingham@mtc.ca.gov">vlingham@mtc.ca.gov</a>
<b>Scott Marler</b>	Iowa DOT	<a href="mailto:scott.marler@dot.iowa.gov">scott.marler@dot.iowa.gov</a>
<b>Ginny Crowson (Liaison)</b>	Athey Creek Consultants	<a href="mailto:crowson@acconsultants.org">crowson@acconsultants.org</a>

**TWG 5: Deployment Standards**

There are several organizations currently developing standards for CV including the International Standards Organization Technical Committee 204 (ISO TC 204), SAE J2735 and IEEE. This TWG will identify and discuss applicable standards, the state of practice in standards development and deployment, and the expectations for future standards. This TWG will discuss issues related to the need for standards and the timeline for when the standards are needed, enabling the group to identify gaps among needs, the state of practice and plans for future standards. TWG 5 is tasked with coming up with a multi-phase work plan with the first phase concluding in June 2016. The first phase shall include specific actions and deliverables, and a broader description of plans for future phases.

*Table 9 Members of TWG 5: Deployment Standards*

<b>Name</b>	<b>Organization</b>	<b>Business Email</b>
<b>Ed Seymour (Chair)</b>	TTI	<a href="mailto:ESeymour@tamu.edu">ESeymour@tamu.edu</a>
<b>Gary Duncan (Co-Chair)</b>	Econolite	<a href="mailto:gduncan@econolite.com">gduncan@econolite.com</a>
<b>Chuck Mraz</b>	Kapsch	<a href="mailto:Chuck.mraz@kapsch.net">Chuck.mraz@kapsch.net</a>
<b>John Thai</b>	City of Anaheim	<a href="mailto:jthai@anaheim.net">jthai@anaheim.net</a>
<b>Jim Misener</b>	Qualcomm	<a href="mailto:jmisener@qti.qualcomm.com">jmisener@qti.qualcomm.com</a>
<b>Robert Rausch</b>	Transcore	<a href="mailto:robert.rausch@transcore.com">robert.rausch@transcore.com</a>
<b>Andy Mao</b>	Texas DOT	<a href="mailto:andrew.mao@txdot.gov">andrew.mao@txdot.gov</a>



<b>Ray Starr</b>	Minnesota DOT	<a href="mailto:ray.starr@state.mn.us">ray.starr@state.mn.us</a>
<b>Richard McDonough</b>	New York DOT	<a href="mailto:Richard.McDonough@dot.ny.gov">Richard.McDonough@dot.ny.gov</a>
<b>Clifford D. Heise</b>	Iteris	<a href="mailto:cdh@iteris.com">cdh@iteris.com</a>
<b>Siva Narla (Liaison)</b>	ITE	<a href="mailto:snarla@ite.org">snarla@ite.org</a>

The TWG chairs and co-chairs participated in a webinar to exchange ideas with other chairs and with members of the Project Team on May 20. During this webinar, the group discussed leadership roles and responsibilities, expectations of the coalition collectively and the TWGs individually, agendas for the TWG breakout sessions during the workshop, and other logistics for the June 4-5 Workshop. A copy of the agenda for the May 20 webinar is included in Figure 2.

Figure 2 V2I DC Chair Webinar

V2IDC TWG Chair Webinar	
May 20, 2015 2:00pm EDT (note: tentative date/time)	
Agenda	
2:00 PM	Introductions and Review of Agenda (AASHTO/ITE/ITS America)
2:15 PM	Discuss the Role of the TWG Chairs (AASHTO/ITE/ITS America) <ul style="list-style-type: none"> <li>a. Collaborate and work with co-chairs to lead the TWG</li> <li>b. Lead in-person meetings and webinars to exchange information and discuss the issues, helping TWG members identify and focus on the 'Key Points'.</li> <li>c. Lead the TWG in the development of 'Action Items' that can be documented in future Tech Memos</li> </ul>
2:30 PM	Each TWG Chair Presents Their Draft Agenda for June Workshop <ul style="list-style-type: none"> <li>a. TWG 1: Initiatives (Bill Legg, WSDOT)</li> <li>b. TWG 2: Research (Greg Larson, Caltrans)</li> <li>c. TWG 3: OEM (Matt Smith, MDOT)</li> <li>d. TWG 4: Guidance (Elizabeth Birriel, FDOT)</li> <li>e. TWG 5: Standards (Ed Seymour, TTI)</li> </ul>
3:15 PM	Discussion Time <ul style="list-style-type: none"> <li>a. TWG chairs have an opportunity to ask questions and/or discuss their draft agendas with other chairs on the call</li> <li>b. Introduce liaison assignments for each TWG <ul style="list-style-type: none"> <li>• TWG 1: Initiatives Liaison (Dean Deeter, Athey Creek)</li> <li>• TWG 2: Research Liaison (Pat Zelinski, AASHTO)</li> <li>• TWG 3: OEM Liaison (Jennifer Carter, ITS America)</li> <li>• TWG 4: Guidance Liaison (Ginny Crowson, Athey Creek)</li> <li>• TWG 5: Standards Liaison (Siva Narla, ITE)</li> </ul> </li> </ul>
3:30 PM	Adjourn

## 5. Top V2I Deployment Issues

As AASHTO, ITE and ITS America announced the V2I DC to their members, they also solicited input on the top issues associated with V2I deployment. This section presents the issues as they have been identified, to-date, by the associations. At this time, the issues are not assigned to specific TWGs. During the June 4-5 Workshop break-out sessions, each TWG will be tasked with reviewing the set of issues and identifying the issues that their specific TWG feels they can address during the course of the V2I DC. Each TWG will report back at the close of Day 1 of the workshop identifying the issues they propose to address. In the event there are gaps or issues not selected by any TWG, the Project Team may make suggestions during Day 2 for TWGs to take on additional issues, if needed. It is understood that multiple TWGs may address a common issue, and this is acceptable. The TWGs may collaborate together to address complementary aspects of the issue. TWG discussions regarding these issues will focus on clarifying and elaborating details, and identifying actions for addressing them. The issues are numbered for reference and tracking purposes, and do not represent a priority order.

### Issue 1: V2X Applications

There is currently a list of safety and mobility applications that have been developed through a collaborative effort between the auto industry, and public agencies facilitated by USDOT. These efforts have led to concepts of operations and requirements for selected applications, based on the systems engineering process. In addition, the auto industry is in the process of developing applications for their customers. There has also been some limited pilot testing done at the state and local level of selected applications (e.g. signal priority, wrong way driving).

Recognizing the current state of practice as described in the previous paragraph, the V2I DC intends to develop a clear understanding of how the applications developed within the auto industry and the applications developed in the public sector will work together and if they need to work together. One of the needs is to determine whether there should be a public application portal where applications are accepted, developed, tested, updated, made secure and made available to operators.

### Issue 2: Alternate Communications to DSRC

Most discussion around V2X has assumed the use of DSRC as the communications means, given the NHTSA rulemaking activities. However, other communication methods, such as cellular, may present a viable alternative to DSRC for some V2I applications. There is a need to document the benefits and limitations of the various technologies with a look at implementation challenges, operational challenges, infrastructure requirements, and cost implications. NCHRP 03-101 initiated a start on answering some of these questions, however, the initiative has stalled.

It is important to clearly understand the role of competing technologies, such as cellular, as compared to DSRC, and in particular to explore how DSRC may work in conjunction with other technologies for select V2I applications. Consideration should be given to protocols, interfaces on messaging, and engagement of system and equipment providers, and work should include discussions with the Department of Commerce on the broadband cellular network and FirstNet.

**Issue 3: Data Business Models**

Discussions surrounding V2I data have advanced in recent years, but there still remains unanswered questions regarding: data needs of transportation agencies; availability of data (particularly the Basic Safety Message Part 1 (BSM 1) and BSM 2); accessibility of V2I data; security of V2I data; ownership and business models for data access, management and storage.

Recognizing the current state of practice, and the questions that remain, the V2I DC intends to develop a succinct business model that addresses the data needs, availability, security, and ownership of data.

**Issue 4: Patents-Intellectual Property**

The topic of Intellectual Property has been raised with regards to V2I applications and systems. The V2I DC suggested approach to this topic and related issues is to develop a frame of reference and/or best practice regarding Intellectual Property to assist public agencies in the topic of patents and Intellectual Property.

**Issue 5: Security**

Security for Connected Vehicle continues to be a concern even though substantial work has been done by USDOT and others attempting to define an effective system. In 2014 NHTSA released request for information (RFI) requesting ideas from the private sector on how they would approach and operate a national security system. There is other environments where security is being addressed (e.g. NHTSA, Homeland Security, etc.).

As a coalition, the V2I DC recognizes the value of having a robust security framework that extends beyond specific individual solutions, and recognizes the need to develop a framework within the transportation industry. The V2I DC looks forward to leading or collaborating with other activities in this area, with the intent of leveraging and applying frameworks developed by other domains, such as the Industry Council for Emergency Response Technologies (ICERT) within the Department of Homeland Security (DHS), if possible.

**Issue 6: V2I Outreach**

Since the state and local transportation agencies will be directly involved with operating a connected vehicle system there is a sense that they should be more prominently and directly involved with the OEMs and USDOT in developing the system. It is essential for the USDOT to have broad stakeholder input into the Guidance and the program.

Additional outreach and education is needed regarding Connected Vehicle in general and V2I issues in particular for transportation agencies. Topics should include planning and investing for V2I deployments; control, operations and maintenance of V2I applications; adding DSRC devices to roadside ITS devices; and other physicality related issues that surround a transition to supporting large scale RSE that will be required for V2I applications.

**Issue 7: Business Model for V2I Deployment**

The potential benefits of V2I applications have been researched and identified through a number of deployment initiatives. Benefits include increased safety, improved mobility, and cost savings to transportation agencies. As transportation agencies begin to plan for long-term sustained deployment of V2I applications, it is inevitable that the need will arise for a business model to emerge and facilitate decision-making. Analyses of the benefits and costs and prioritization of specific applications are just some of the discussions that would fold into an eventual business model. As one example, V2I applications may enable agencies to eliminate existing infrastructure and systems that are costly to maintain. These cost savings will result in financial benefits to help offset V2I costs.

Each transportation agency will face the challenge of prioritizing V2I application deployments and weighing the benefits to the costs. If no additional funding sources are available, V2I application deployments may compete with other infrastructure deployments and operations. Discussing this issue and identifying an overall approach for how agencies can approach the business model decision will assist these processes and help agencies understand how to prioritize V2I applications and accelerate V2I deployment in accordance with the business plan.

**Issue 8: V2I Standards**

As transportation agencies begin the process of deploying V2I equipment and supporting systems, they may begin to deploy V2I infrastructure during their normal life cycle replacement period. This poses a challenge with understanding how an agency can confidently procure and deploy infrastructure that will be compatible with future V2I applications. Similarly, from the vendor perspective, vendors will inevitably want to begin to design, develop and manufacture devices and systems that they are confident will be compatible with future V2I applications.

Standards are perhaps the most logical solution to ensure interoperability, vendor independence, and scalability of V2I systems and applications. This scope of V2I standards could include both migration of current ITS and vehicle standards to the V2I environment, as well as developing new standards as needed to enable consistent development, procurement, and deployment of the infrastructure and devices that will eventually comprise the nation's V2I network.

**Issue 9: Understanding V2I Liability Assignment**

While V2I research and pilot deployments have been ongoing for a number of years, there are limited examples of full scale live deployments involving large numbers of participants from the traveling public. For this and other reasons, the V2I industry lacks a deep history of legal proceedings that can serve as precedence to understand how liability is typically assigned. As a result, transportation agencies, drivers, manufacturers and third party data providers would benefit from guidance on how to interpret, understand, and quantify liability and risk exposure related to V2I applications.

This issue will likely involve legal research to formulate guidance for how transportation agencies can begin to prepare to interpret and manage liability assignment.

**Issue 10: V2I Synergies with Other Emerging Technologies**

Outside of the V2I industry, there are examples of other emerging technologies that could soon become a part of everyday life. These may include Smart Cities, the Internet of Things (IoT), and other similar emerging technologies. If approached in a collaborated forum, a scenario could easily be imagined where V2I equipment, communications, and infrastructure can co-exist and integrate with other technologies.

At this stage, the extent to which it is possible to collaborate with other sectors, and the timing and technology ramifications of this collaboration should be researched and understood to enable the industry to make long term decisions.

**Issue 11: V2I Consumer Messaging**

As V2I applications spread throughout the United States, public education and marketing will become increasingly important. There are potentially a number of issues associated with common marketing messages between public and private marketing campaigns. For example, consumers may not understand the role the public sector plays in the product or service they have purchased. The approach that transportation agencies and vendors take towards marketing could play a large role in managing expectations while generating enthusiasm for new products and services.

This issue should explore common messaging to end consumers that may be used by both public and private sector organizations involved in V2I deployment.

**Issue 12: V2I Multimodal Applications**

Many of the V2I applications identified to-date have focused on safety and mobility for passenger and commercial fleet vehicles. These applications will generate broader and deeper data regarding current conditions of the transportation system and that, in turn, offers the potential to make traveler information more robust. Such data could create greater information for travelers to choose multimodal options in real-time as an alternative or as a daily transportation choice. There are also opportunities to develop V2I applications that will make multimodal options more appealing and feasible to travelers. For example, knowing the current and forecasted availability of space at park and ride facilities could encourage travelers to explore mass transit alternatives for daily transportation.

This issue will explore how V2I applications could be assessed for their potential to support multimodal travel and it will identify what types of V2I applications could be specifically developed to support various modes.

## 6. Next Steps

The June 4-5 Workshop will officially launch the broader work of and stakeholder engagement associated with the V2I DC. The TWGs will establish themselves and their business processes to meet through June 2016, and they will begin to discuss and elaborate on the V2I issues identified in this technical memorandum.

Following the June 4-5 Workshop, a second technical memorandum will be prepared to document proceedings from for the workshop, showcasing the TWG discussions and business processes going forward. The memorandum will also identify when and how the V2I DC will collectively meet, as well as when and how the TWGs will individually meet, after the June 4-5 Workshop and before the next workshop targeted to occur during TRB in January 2016. The draft agenda for the June workshop is as follows.



U.S. Department of Transportation  
Federal Highway Administration



## V2I Deployment Coalition Workshop

Preliminary Agenda

Omni William Penn Hotel – Pittsburgh, PA

Day 1 – June 4, 2015

- 8:00 **Welcome and Introductions**
- King Gee, AASHTO (Moderator)
  - John Halikowski, Arizona DOT
  - David St. Amant, Econolite
  - TBD
  - Jeff Lindley, FHWA
- 9:30 **V2I Deployment Coalition Background and Brief Update on Connected Vehicle Activities**
- Brian Cronin and Jonathan Walker, FHWA
- V2I Deployment Coalition Introduction**
- Gummada Murthy, AASHTO
  - Jennifer Carter, ITS America
  - Siva Narla, ITE
- 9:45 **V2IDC Technical Working Groups Breakout Sessions Logistics**
- Gummada Murthy, AASHTO
- 10:00 **Break**
- 10:15 **V2IDC Technical Working Group Breakout Sessions**
- TWG 1: Deployment Initiatives – Chair, Bill Legg, Washington State DOT; Co-chair, Joe Averkamp, Xerox
  - TWG 2: Deployment Research – Chair, Greg Larson, Caltrans; Co-chair, TBD
  - TWG 3: Infrastructure Operator, OEM & Supplier Partnerships – Chair, Matt Smith, Michigan DOT; Co-Chair, Roger Berg, Denso
  - TWG 4: Deployment Guidance – Chair, Elizabeth Birriel, Florida DOT; Co-chair, TBD
  - TWG 5: Deployment Standards – Chair, Ed Seymour, TTI; Co-chair, Gary Duncan, Econolite
- 12:00 **Lunch**
- 1:30 **Resume V2IDC Technical Working Group Breakout Sessions**
- 3:00 **Break**



- 3:30 **V2IDC Technical Working Group**
- Updates on what was discussed
  - Plans for next day

5:00 **Day 2 Activities Overview**

5:30 **Adjourn**

Day 2 – June 5, 2015

- 8:00 **V2IDC Technical Working Group Breakout Sessions Reconvene**  
The TWGs, with staff support, will finalize next steps and work plans
- TWG 1: Deployment Initiatives – Chair, Bill Legg, Washington State DOT; Co-chair, Joe Averkamp, Xerox
  - TWG 2: Deployment Research – Chair, Greg Larson, Caltrans; Co-chair, TBD
  - TWG 3: Infrastructure Operator, OEM & Supplier Partnerships – Chair, Matt Smith, Michigan DOT; Co-Chair, Roger Berg, Denso
  - TWG 4: Deployment Guidance – Chair, Elizabeth Birriel, Florida DOT; Co-chair, TBD
  - TWG 5: Deployment Standards – Chair, Ed Seymour, TTI; Co-chair, Gary Duncan, Econolite

9:30 **Break**

- 10:00 **V2IDC Closing Session**  
The V2IDC TWG Chairs will present their important issues for the program to consider, work plans and discuss next steps.

12:00 **Adjourn**



**Appendix 1 – List of Attendees at the May 7, 2015 V2I DC Kickoff Webinar****Webinar Attendees (48)**

Alan Korn	Joe Averkamp
Barry Einsig	John Kenney
Bill Legg	John Thai
Blaine Leonard	John Tivaldo
Bob Arnold	Jonathan
Bob Koeberlein ITD	Linda Lee MTC
Brian Cronin	Mark Kopko PennDOT
Carl Andersen	Matt Smith
Chuck Mraz Kapsch TrafficCom NA	Monali Shah HERE/Nokia
Cliff Heise	Peter Thompson SANDAG
Dave Miller [Siemens]	Carlos Alban
Dean Deeter	Ravi Puvvala Savari
Douglas Gettman	Ray Resendes
Ed Seymour	Ray Starr
Emil Wolanin	Reza Karimvand ADOT
Faisal Saleem (MCDOT)	Rick McDonough NYSDOT
Gary Duncan, Econolite	Roger Berg DENSO R&D
Gary Piotrowicz	Scott Geisler GM
George T Webb	Siva Narla
Greg Larson, Caltrans	Stan Caldwell
Gummada Murthy	Texas DOT
Jennifer Carter ITS America	Thomas West PATH/UC Berkeley
Jianming Ma	Tom Schaffnit
Jim Misener Qualcomm	Virginia Lingham MTC