Research for V2I Communication and Safety Applications

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V2I for Safety Program Concept

- Vehicle to Infrastructure (V2I) communications for Safety is the wireless exchange of critical safety and operational data between vehicles and highway infrastructure.
- The purpose of this data exchange is to not only mitigate motor vehicle crashes by using wireless safety applications, but also enable a wide range of other applications that also enhance mobility and provide benefits to the environment.
- V2I applies to all vehicle types and roadway facilities.
V2I Roadmap Tracks

- Track 1  – Applications Analysis
- Track 2 – Prototype Development
- Track 3 – Enabling Technologies
- Track 4 – FOTs & Simulation
- Track 5 – Infrastructure Planning
# V2I Safety Applications Roadmap - 6 April 2011

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<th>Track 1</th>
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<tr>
<td>Applications Analysis</td>
<td>Prototype Development</td>
<td>Infrastructure, Communications &amp; Interoperability</td>
<td>FOTs &amp; Simulation</td>
<td>Infrastructure Planning</td>
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<td>Crash Factors Analysis</td>
<td>Smart Roadside ConOps &amp; Apps Prototype</td>
<td>RG&amp;I Trade Study</td>
<td>V2I Roadmap Review</td>
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<td>Migration</td>
<td>Transit ConOps</td>
<td>SPaT Prototype</td>
<td>Initial Infrastructure Assessment</td>
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<td>Transit Analysis</td>
<td>Safety ConOps</td>
<td>SPaT Unit Test</td>
<td>Infrastructure Deployment Assess.</td>
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<td>Smart Roadside</td>
<td>Prototype Applications</td>
<td>SPaT I/F Review</td>
<td>Define Public Agency Rqmts</td>
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<td>Stakeholder Input &amp; Selection of Apps</td>
<td>Requirements Update</td>
<td>SPaT I/F Definition</td>
<td>Public Agency Guidelines &amp; Specifications</td>
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<td>Preliminary List of Applications</td>
<td>Requirements Review/Prototype Applications Selection</td>
<td>Integrated V2I Prototype</td>
<td>Toolbox Review</td>
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<td>Final SPaT Interface Definition</td>
<td>V2I Reference Implementation</td>
<td>Infrastructure Deployment Recommendations and Procurement Guidance</td>
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- **Stakeholder Input Opportunities**: Indicated by diamonds.
- **Major Milestones**: Indicated by square diamonds.

## Calendar Overview

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- **Phase 1 SLTA**: Crash Factors Analysis, Migration, Transit Analysis, Smart Roadside.
- **Phase 2 SLTA**: CICAS-SLTA Go/No Go Decision, Stakeholder Input & Selection of Apps.
- **Final SPaT Interface Definition**: Integrated V2I Prototype, V2I Reference Implementation, Controller Logic Enhancements.
- **Applications Selection for FOTs**: FOT & Simulation Planning & Build, Multi-modal FOT/Regional Tests for Benefits Assessments.

### Milestone Notes

- ConOps Review
- Requirements Review/Prototype Applications Selection
- SPaT Prototype
- Integrated V2I Prototype
- Controller Logic Enhancements
- Final SPaT Interface Definition
- Applications Selection for FOTs
- Multi-modal FOT/Regional Tests for Benefits Assessments

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*This roadmap details the development timeline and milestones for the V2I Safety Applications project as of 6 April 2011.*
Track 1 – Applications Analysis

- Selection of Applications
  - Stakeholder Input meeting held with AASHTO in Irvine CA – Fall 2010
- Crash Factors Analysis
  - Draft final report has been received and is being evaluated
- Infrastructure Migration Study
  - Final report anticipated this spring
Safety Applications

- Running red light
- Running stop sign
- Gap assist at signals
- Gap assist at stop control
- Speed warnings
  - Curves
  - School Zones and Work Zones
  - Poor weather conditions
  - Variable speed limit locations
Safety Applications (2)

- Work zone alerts
- Pedestrian Detection by Infrastructure
- Priority Assignment for EV Preemption
- At-grade rail crossing (light & heavy)
- Bridge clearance warning
- Secondary accident warning
- Lane departure warning
Track 2 – Prototype Development

- Development of Safety Applications Concept of Operations (Con Ops)
  - Work will be ongoing through 2011
  - Stakeholder input workshop anticipated for winter 2011
  - Select list of Safety Applications for full development of Con Ops
- Completion of Con Ops will provide required information needed to make a selection of safety applications for further R&D testing/prototyping (2013)
- Stakeholder input for prototyped applications (summer 2012)
Track 3 – Infrastructure Enabling Technologies (1)

- Signal Phase and Timing (SPaT) interface definition
  - Contract awarded to Battelle - January 2011
  - SME workshop - Spring 2011
  - Con Ops completed - Summer 2011
    - Opportunity for broader industry input at this time
  - First prototypes ready for unit testing in Jan 2012 (to be tested with 2 controllers and up to 4 different RSE)
  - Initial SPaT Interface Definition available for use in Safety Pilot - 1Q 2012
Track 3 – Infrastructure Enabling Technologies (2)

- Communications and Positioning
  - Trade studies are underway; stakeholder input has been and will continue to be solicited.
  - Requirements defined for select applications in Fall 2011
  - Unit Testing at TFHRC planned for Fall 2011

- Mapping
  - Trade study completed November 2010
  - Mapping requirements and prototype work currently underway
  - Mapping of TFHRC planned for Fall 2011
Track 3 – Infrastructure Enabling Technologies (3)

- Integrated Prototype – Spring 2012
  - Linking the communications, positioning and mapping technologies and assessing interactions
  - Installed at TFHRC
- Reference V2I Implementation – 2013
  - SPaT interface definition and integrated prototype work together to support safety and mobility applications
  - Installed at TFHRC, expanded to MI and other testbeds
- Backhaul Security
  - being addressed under SE contract
  - FHWA considers network security a high priority and will work with practitioners to ensure that all concerns are addressed
Track 4 – FOTs & Simulation

- Providing input to Safety Pilot-Obtain lessons learned
- Analyze applications for Field Operational Tests (FOT) selection – 2013
  - Planning for FOTs will occur in late 2012 with stakeholder input for selection in 2013
- FOTs will be used to gather valuable safety data and assess the benefits for deployment
  - FOTs may be integrated into regional demonstration projects including multi-modal safety applications and dynamic mobility applications
Track 5 – Infrastructure Planning

- Define public agency requirements 2012 thru 2015
  - Stakeholder requirements review – Summer 2013
  - Opportunity for stakeholder input on toolbox during development – early 2015
  - Toolbox will serve as guidelines and recommendations for equipment procurement, system installation specs, and summary of benefits
For More Information

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