V2V-SP Light Vehicle Driver Acceptance Clinics and Model Deployment Support

ITS World Congress

Oct 20, 2011
Presentation Outline

- V2V Safety Pilot Light Vehicle Driver Acceptance Clinics and System Performance Testing
- V2V Safety Pilot Light Vehicle Build and Model Deployment Support
- Questions during presentation are encouraged
V2V Light Vehicle Driver Acceptance Clinics (DAC) Project

• Period of Performance: Sep 2010 to March 2013
• Assess if and how drivers from a diverse cross-section of US residents accept and respond to V2V safety technology
• Assess V2V safety system performance and reliability (especially 5.9 GHz DSRC & GPS) across a wide variety of environments and diverse geographic locations
• Promote V2V-based safety technology and its potential safety benefits
Team

CAMP - Vehicle Safety Communications 3

Mercedes-Benz  GM  TOYOTA

HONDA  Ford  NISSAN

HYUNDAI-KIA MOTORS  VOLKSWAGEN

Intelligent Transportation Systems

NHTSA  www.nhtsa.gov

DENSO  North America

U.S. Department of Transportation  Federal Highway Administration

RITA  Research and Innovative Technology Administration  Volpe National Transportation Systems Center

AUTOMOTIVE EVENTS
# V2V Safety Applications per OEM

<table>
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<tr>
<th>OEM/Applications</th>
<th>Ford</th>
<th>GM</th>
<th>Honda</th>
<th>Mercedes</th>
<th>Toyota</th>
<th>Hyundai-Kia</th>
<th>Nissan</th>
<th>VW-Audi</th>
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<tr>
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<td>X</td>
<td>X</td>
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<tr>
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<tr>
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EEBL: Emergency Electronic Brake Lights  
FCW: Forward Collision Warning  
BSW/LCW: Blind Spot Warning/Lane Change Warning  
DNPW: Do Not Pass Warning  
IMA: Intersection Movement Assist  
LTA: Left Turn Assist
V2V Safety Applications Scenarios 1/3

Figure 1: RV in Same Lane with Blocking Vehicle (WARN)
V2V Safety Applications Scenarios 2/3
V2V Safety Applications Scenarios 3/3
Driver Acceptance Clinics Locations and Dates

• Brooklyn, MI (Michigan International Speedway), August 8-12
• Brainerd, MN (Brainerd International Raceway), September 27-29
• Orlando, FL (Walt Disney World Speedway), October 21-25
• Blacksburg, VA (VTTI Smart Road), November 7-10
• Fort Worth, TX (Texas Motor Speedway), December 5-9
• Alameda, CA (former Alameda Naval Air Station), January 16-21
18th ITS World Congress
Connected Vehicle Technology Demonstration

CAMP - VSC3 Consortium
Driver Vehicle Interface Examples
Safety Feature Exposure

- 112 participants over a 4 day period
- Typically, 4 sessions per day at 8 participants each
- Participants are:
  - Equally split by gender
  - Equally split into three age categories (20-30, 40-50, 60-70)
- Participants experience each V2V safety feature
- After each exposure the experimenter asks a series of questions
  - Captures their immediate impressions
  - Safety Application Effectiveness
  - Relevance of Driver Vehicle Interface (DVI)
- Focus Groups
DAC #1 Station Layout

Station 1 – GM & Ford
Station 2 – Honda & M-B
Station 3 – VW & Nissan
Station 4 – Hyundai & Toyota
DAC #1 Station Examples
System Performance Testing - Overview

Purpose

• To assess system performance and reliability in diverse geographic regions of the country under real-world conditions in both rural and urban locations
• Performance testing is a critical activity to support the 2013 V2V NCAP or regulatory decision

Approach

• Performance testing will be performed after each of the DACs and executed at close proximity to the DAC sites
• Will utilize eight (8) similarly-equipped OEM engineering template vehicles
• This activity is coordinated with the DAC Schedule
System Performance Testing

- **Open-road testing**
  - Urban, rural and freeway driving with eight (8) vehicles

- **Targeted testing**
  - Performed as needed in specifically identified challenging locations

- **Closed-road testing**
  - Evaluate and refine warning timing for certain system features (e.g., IMA, DNPW)

- **Performance Metrics**
  - GPS solution availability and quality
  - Absolute GPS positioning error
  - Relative GPS positioning error
  - Communications Performance
  - Application Level Performance
Open Road Testing: Final Vehicle Configuration

**Vehicles**
TV – Template Vehicle

**GPS Receivers**
- O = Novatel OEMV
- A1 = uBlox LEA-6T
- A2 = Trimble Condor C1919A
- HA1 = Hemisphere Crescent
- HA2 = Geneq SXBlue

**Available combinations**
receivers for relative error measurements

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<th></th>
<th>O</th>
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<th>A2</th>
<th>HA1</th>
<th>HA2</th>
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Open Road Testing: Environment Selection Criteria

Freeway Open Sky

Major Throughway

Local Roads – Tree Cover

Mountains

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<td>Major Urban Thruway</td>
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<td>Major Rural Thruway</td>
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Note: Roadway environment distribution used in VSC-A relative positioning availability/accuracy study. Represents road usage of average driver [Our Nation’s Highways, FHWA 2008].
Vehicle-to-Vehicle Safety System Light Vehicle Builds and Model Deployment Support (V2V-MD)

(Initial) Period of Performance: 8/1/2011 – 1/31/2012

- Task 1: Technical Project Management
- Task 2: Model Deployment Vehicle Preparation
- Task 5: Device Interoperability and Minimum Performance Testing
- Task 9: Coordination with Other USDOT Programs
MODEL DEPLOYMENT SUPPORT ACTIVITIES

• Equip a total of sixty-four (64) Light Vehicles with V2V Safety Systems
• Each vehicle has Data Acquisition System (DAS) for data collection during Model Deployment
• Support OBE Certification Testing, Perform Safety Application Verification on the Light Vehicles
• Support device interoperability and minimum performance testing
• Coordinate Delivery of Vehicles to USDOT Test Conductor for use in Model Deployment
• Support data collection during Model Deployment duration – August 2012 – August 2013 (two 6-month periods)
Discussion and Q&A