Moving Towards Implementation of Wireless Connectivity in Surface Transportation

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Research and Innovative Technology Administration

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Vision

To research and facilitate a national, multimodal surface transportation system that features a connected transportation environment around vehicles of all types, the infrastructure, and portable devices to serve the public good by leveraging technology to maximize safety, mobility, and environmental performance.

Plan developed with full participation by all surface transportation modal administrations as well as with significant interaction with multi-modal stakeholders.
ITS Research = Multimodal and Connected

Drivers/ Operators

Infrastructure

Vehicles and Fleets

Wireless Devices
A World With Connected Vehicles and Travelers

"Here I Am" / Where's My Bus/Carpool?

latitude, longitude, time, heading angle, speed, lateral acceleration, longitudinal acceleration, yaw rate, throttle position, brake status, steering angle, headlight status, wiper status, external temperature, turn signal status, vehicle length, vehicle width, vehicle mass, bumper height
Opportunity for Transformational Safety: V2V and V2I

- **Greater awareness**
  - Vehicles can “see” nearby vehicles and know roadway conditions that are not visible

- **Reduce crashes through:**
  - Driver advisories
  - Driver warnings
  - Vehicle control

V2V+V2I may have the potential to address 80% of the vehicle target crashes involving unimpaired drivers*

*National Highway Traffic Safety Administration, October 2010, DOT HS 811 381
## ITS Research Program Components

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<th>Safety</th>
<th>Mobility</th>
<th>Environment</th>
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<td>V2V</td>
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<td>Safety Pilot</td>
<td>Real Time Data Capture &amp; Management</td>
<td>Road Weather Applications</td>
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<td>Dynamic Mobility Applications</td>
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### Technology
- Harmonization of International Standards & Architecture
- Human Factors
- Systems Engineering
- Certification
- Test Environments

### Policy
- Deployment Scenarios
- Financing & Investment Models
- Operations & Governance
- Institutional Issues
Step One – Accelerate V to V Safety

- Develop a Core Set of Applications
- Conduct Benefits Assessment
- Develop Driver Vehicle Interface Guidelines
- Define Globally Harmonized Standards
- Assess Security Issues
- Accelerate V to V DSRC Devices
  - Basic Safety Message Broadcast Devices (Here I am)
  - Aftermarket Safety Devices
- Prepare for 2013 NHTSA Agency Decision
Step Two - Demonstrate Safety

Safety Pilot

- Major road test and real world implementation taking place 2011 – 2013 involving:
  - Multiple vehicle types
  - Fully integrated systems and aftermarket devices
- Also to test
  - Prototype security mechanisms
  - Certification processes
Safety Pilot continued

• Goals
  • Support V2V and V2I applications development and testing
  • Obtain benefits data to support NHTSA 2013 agency decision on V2V communications
  • Create public awareness & determine user acceptance

• Outcomes
  • Benefits and user acceptance data
  • Archived road network data for supporting mobility, environmental, and other industry research
  • Multiple supplier sources for devices and infrastructure (qualified product lists for “here I am”, roadside equipment and aftermarket safety)
  • Better understanding of the operational policy issues associated with the deployment of V2V and V2I
Step Three – Define the System and Establish a Testing Environment

User Needs → Concept of Operation → System Requirements → System Architecture


Research Initiatives → Product Concepts → Public/Private Sector Initiatives → Academic Initiatives

Michigan Test Bed

“In the street – running Jan 2011”

CA Testbed
FL Testbed
NY Testbed

FHWA Turner Fairbank Testbed

Model Deployments
Full Deployment
Step Four - Build V to I Safety, Mobility, and AERIS Data Environments and Applications

- V to I for Safety – Accelerate Signal Phase and Timing (SPAT) Based Applications, Smart Roadside, and Transit
- Prototype the Data Environment of the Future – All Vehicles as Probes and Open Data
- Prototype, Field Test and Analyze Mobility Applications
  - Use Open Source Software Approach to accelerate deployment
- Define and Test AERIS Applications
High Priority Mobility Applications
Step Five – Build a Reference Implementation

- Reflect the System Architecture
- Utilize Harmonized International Standards
- Implement a Certification Process
- Implement a Governance Process
- Implement a Security Process
Step Six - Conduct Regional Pilots

- Multiple Implementation Areas
- Opportunity to Pilot a variety of applications per area’s need (Sites choose from a suite of field tested applications)
- Seeds Implementation
- Uses Lessons Learned from Safety Pilot
- Builds on a Stakeholder Defined Architecture
- Accelerates DSRC for Safety
- Leverages Available Wireless Communications for Mobility and Environment Applications
- Leverages Private Sector Investments Occurring Now
## Major Milestones

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<tr>
<th>PROGRAM AREA</th>
<th>FOUNDATIONAL ANALYSIS</th>
<th>RESEARCH, DEVELOPMENT &amp; TESTING</th>
<th>PILOT IMPLEMENTATIONS</th>
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<td>SAFETY</td>
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<td>Safety V2V</td>
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<td>Data Capture</td>
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<td>Mobility and Environment Workshop</td>
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<td>High-Priority Mobility Apps Announced</td>
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<td>Testbed Launch</td>
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<td>Revised Architecture Released</td>
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<td>Prototype Security Process</td>
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### Safety Pilot

- V2V NHTSA Agency Decision
- Safety Benefits Assessment Completed
- Regional Pilots

### Safety V2I

- V2V Apps Defined
- Qualified Product Lists (QPLs)
- Initial V to V Apps
- Aftermarket V to I Apps
- Safety Pilot
- Safety Benefits Assessment Completed
- Mobility Benefits

### Data Capture

- High-Priority Mobility Apps Announced
- Apps Develop
- Data Environments
- Mobility Benefits
- Regional Pilots

### Testbed

- Revised Architecture Released
- Upgraded Testbed Launch
- Prototype Governance Structure

### AERIS

- High-Priority AERIS Applications Selected
- AERIS Benefit

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U.S. Department of Transportation
ITS Professional Capacity Building

Reached 2,500 transportation professionals in 2010

- Workforce Development a Priority for DOT
- PCB Strategic Plan Development
  - http://itspcbplan.ideascale.com/
- ITS Standards Training
  - 18 Modules under development
- Continuing Education
  - T3s: Talking Transportation & Technology
  - Peer-to-Peer (P2P) Technical Assistance Program
  - Classroom based Training
  - Web based Training
- Workshops and Presentations
- Embedding technology transfer in research process
For More Information

www.ITS.DOT.GOV

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