Establishing Connectivity in Transportation: Connected Vehicle research in the U.S.

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Tracking Our Success

- Investment in ITS has nearly tripled
Consumer Forces on Communications and ITS

ITS Research = Multimodal and Connected

Drivers/Operators

Vehicles and Fleets

Connectivity

Wireless Devices

Infrastructure
What is the Connected Vehicle Program

- Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) wireless communications for:
  - Crash prevention
  - Improved mobility
  - Environmental sustainability

• Connected vehicle capability addresses over 80% of unimpaired crash scenarios

• Encompasses autos, buses, and trucks
  - Partnership among RITA, NHTSA, FHWA, FMCSA, and FTA
What is the Connected Vehicle Program

- Uses wireless communications
  - Dedicated short-range communications (DSRC) technology using FCC-dedicated spectrum that is essential for safety applications

- Other communications types for non-safety applications

- Research is maturing such that NHTSA has committed to an agency decision regarding whether the safety technology is sufficiently developed to support rulemaking
Fully Connected Vehicle

- 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
Why It Matters

Up to **80%** of non-impaired crash types may be impacted by connected vehicle technology

Source: NHTSA

Based on initial estimates & studies. Actual benefits are not determined at this time.
## ITS Research Program Components

### Applications
- **Safety**
  - V2V
  - V2I
  - Safety Pilot
- **Mobility**
  - Real Time Data Capture & Management
  - Dynamic Mobility Applications
- **Environment**
  - AERIS
  - Road Weather Applications

### Technology
- Harmonization of International Standards & Architecture
- Human Factors
- Systems Engineering
- Certification
- Test Environments

### Policy
- Deployment Scenarios
- Financing & Investment Models
- Operations & Governance
- Institutional Issues

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U.S. Department of Transportation
Key Program Objectives

- 2013 Decision on Vehicle Communications for Safety (light vehicles)

- 2014 Decision on Vehicle Communications for Safety (heavy vehicles)

- Future Guidance on Infrastructure Implementation
NHTSA Agency Decision

- Possible decision options include:
  - **Rulemaking** on minimum performance requirements for vehicle communications for safety on new vehicles
  - Inclusion in NHTSA’s **New Car Assessment Program** to give car makers credit for voluntary inclusion of safety capability in new vehicles
  - **More research** required
NHTSA Agency Decision (continued)

- Data will determine NHTSA’s action for the 2013 decision point:
  - Simulation and modeling efforts based upon previous field operational tests
  - Data collection from V2V test track testing
  - Empirical data obtained from Safety Pilot
    - Driver clinics (user acceptance)
    - Model deployment activities (safety effectiveness)
- A key factor for the NHTSA decision will be the need for, and timing of, necessary infrastructure for communication security (still undefined)
User Acceptance -- Driver Clinics

- 6 locations across the U.S.
- 100 drivers per location
- Experience crash warnings
  - Forward Crash Warning
  - Emergency Brake Light
  - Blind Spot Warning
  - Lane Change Warning
  - Intersection Assist
  - Do Not Pass Warning
Model Deployment

• Major road test and real-world implementation taking place from 2011 thru 2013, involving:
  □ Approximately 3,000 vehicles
  □ Multiple vehicle types
  □ Fully integrated systems and aftermarket devices
  □ Roadside infrastructure
  □ System-wide interoperability testing
• Also to test
  □ Prototype security mechanisms
  □ Device certification processes
Safety Pilot Objectives

- Generate empirical data for supporting 2013 and 2014 decisions
- Show capability of V2V and V2I applications in a real-world operating environment using multiple vehicle types
- Determine driver acceptance of vehicle-based safety warning systems
Safety Pilot Objectives (Continued)

- Assess options for accelerating the safety benefits through aftermarket and retrofit safety devices
- Extend the performance testing of the DSRC technology
- Collect lots of data and make it available for industry-wide use
- Let others leverage the live operating environment
Connected Vehicle Safety Program
Partners and Contractors

Vehicle Manufacturers
- BMW
- GM
- VOLVO
- HONDA
- DAIMLER
- Daimler Trucks North America
- TOYOTA
- NISSAN
- CHRYSLER
- HYUNDAI
- KIA
- FREIGHTLINER

USDOT
- U.S. Department of Transportation
- NHTSA
- Federal Motor Carrier Safety Administration
- Federal Highway Administration
- the VOLPE Center
- FTA

Academia
- UGPTI
- UMTRI
- UNIVERSITY OF IOWA
- GEORGE MASON UNIVERSITY
- MONTANA STATE UNIVERSITY
- PATH
- CVPC

Public Agencies
- MDOT
- Michigan Department of Transportation
- Oakland County
- ADOT
- NYSDOT
- Oak Ridge National Laboratory
- MCDOT

Industry
- noblis
- Booz Allen Hamilton
- Telcordia
- Siemens
- Visteon
- Delcan
- kapsch
- DGEN

Associations/Standards Developers
- ATR
- ITE
- IEEE
- APTA
- SAE International
- ITS America
- MacroSys
- ARADA Systems
- Cognia
- Cohda Wireless
- ITRI
- Industrial Technology Research Institute
- ARINC
- OmniAir
- MITI
- TIA
- Siemens
- NHTSA
- STD
- Visteon
- Delcan
- kapsch
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