Building the Foundations for a Connected Vehicle Environment

2014 SXSW Interactive Conference
How Talking Cars Will Transform The Way We Travel

March 9, 2014
Items Critical to a Successful Environment

- Ensuring User Privacy
- Establishing Trusted Communications and Protecting Data Confidentiality
- Enabling Development Enterprise
- Reducing Distracted Driving
Short Range Communications Technology

- 5.9 GHz DSRC
- Wi-Fi radio adapted for vehicle environment
- Inexpensive to produce in quantity
- Original FCC spectrum allocation in 1999
- FCC revised allocation in 2004 and 2006
Crash Avoidance Communications Technology: How it Works

- Data is transmitted 10 times/sec (300m range – line of sight)
- Privacy is protected (vehicle are anonymous, location is NOT tracked)
Connected Vehicle Communications Technology: Other Options

- 4G and older 3G cellular networks provide high-bandwidth data communications over widely deployed commercial networks
- Increasingly available in vehicles
- Not suitable for safety applications that require low latency
- Other wireless technologies such as Wi-Fi, satellite, and HD and satellite radio may have roles to play
Mobile BSM device or cellular

Road Sensors

Cars are coasting as they approach intersection because they know when the light will turn green (Eco-Approach).

Traffic Signal Controller with SPaT Interface

Bus Equipped with TSP Application

Outgoing Vehicle Notified to Hold

Mobile BSM device or cellular

Transfer Requested Mobile BSM device or cellular
How Does All This Get Architected?

- A system of specifications and requirements that allow the various components of V2I hardware, software and firmware to work together.
- An agency will be able to select the capabilities and applications desired at a given installation.
Guiding Principles for Connected Vehicle Environments

- **Secure exchange** of trusted data between users and applications without pre-existing relationship or entering into a permanent relationship.
- **Assurance of privacy** between users and from third parties.
- **More efficient data collection** from various sources and distribution to many users.
Are There Environments Where Devices and Applications Can Be Tested?

- Test Bed Partners
  - U.S. Department of Transportation
  - California Department of Transportation
  - Florida Department of Transportation
  - Maricopa County Department of Transportation
  - Michigan Department of Transportation
  - New York State Department of Transportation
  - Vehicle Infrastructure Integration Consortium
A Path to Multiple Operational Systems

- The vision is to have multiple interoperable locations as part of one connected system moving toward nation-wide deployment.
  - Common architecture
  - Common standards
  - Independent operations
  - Shared resources
- Connected Vehicle Test Bed encourages this through:
  - Exchanging information
  - Sharing of deployment lessons learned
  - Developing a common technical platform
  - Expanding test bed operations for users
How Can One Participate in the Test Bed?

- Go to this link: http://www.its.dot.gov/testbed/testbed_affiliated.htm
- Complete a 2-page template, and a Memorandum of Agreement will be drawn up for you

- Auto manufacturers, suppliers, technology developers, and even those that interested in engineering as a hobby are all encouraged to use the Test Bed to advance connected vehicle technology.

Examples of Key Collaborators include:
- Denso
- Delphi
- University of North Texas
- Siemens
- Southwest Research Institute
- Tampa Hillsborough Expressway Authority
- University of Arizona
- University of Michigan
Southeast Michigan Test Bed - 2014

- The Southeast Michigan 2014 Test Bed will:
  - Give users the capability to test safety, mobility, and environment applications, services, and components.
  - Define the “high level” system architecture using evolving Connected Vehicle architecture as a reference and foundation.
  - Introduce concepts in terms of functions and information flows.
  - Illustrate concepts through selected operational scenarios.

- In the Southeast Michigan 2014 Project, we want to:
  - **Assure trust** in data exchanged.
  - **Protect the confidentiality** of certain data exchanged.
  - **Protect the anonymity and privacy of individuals** while operating in a multi-application, multi-industry, multi-medium environment.
Architecture and Standards Keep Evolving, How Do We Keep Up?

- Having a Memorandum of Agreement for the Test Bed gives access to PlugFests.
- PlugFests are events during which devices are tested for interoperability with emerging standards.
  - Participants bring their own devices (BYOD) for interoperability testing
  - Multiple day, two track events offer a training track for new participants and an operations track for those conducting tests
  - Neutral, cooperative space for testing new devices, products, and applications
USDOT Connected Vehicle PlugFests

- Upcoming Events in 2014:
  - Midwestern PlugFest: March 12-13, 2014, Novi, MI
  - Western PlugFest: June 2014, Palo Alto, CA
  - Bimonthly World Congress Mini-Fests tentatively scheduled for:
    - May 2014 – Novi, MI
    - July 2014 – Detroit, MI
    - Mid-August 2014 – Detroit, MI
  - Hackathon: Early November 2014/January 2015, Novi, MI

CV Pilot Deployment Program Overview

- Clear opportunities for synergy among technologies, messages, and concepts

- CV Pilot Program in pre-deployment development phase since July 2013
  - First wave of deployments expected in 2015
  - Program runs through 2020

- Pilots will be *pilot deployments*, that is, real-world environment deployments
  - If successful, deployed technologies are expected to remain as permanent operational elements

- There will be *multiple* pilot deployment sites across the nation
  - Each site may have different needs, focus and applications
  - Performance-driven deployment concepts will *address integrated objectives* related to mobility, safety, and environmental impacts
  - Sites will deploy *multiple applications* drawing on current research
Example Applications to Explore in CV Pilots

- Eco-Traffic Signal Timing
- Dynamic Parking Guidance
- Enhanced Maintenance Decision Support
- Transit Connection Protection
- Drayage Optimization

- Reduced Emissions
- Reduced Fuel Consumption
- Reduced public agency spending
- Increased Transit Use
- Reduced Emissions from Idling at Ports
Key Dates

- Request for Information (RFI) Issued: March 2014
- Conduct Initial CV Pilot Program Stakeholder Workshop: April 2014
- Regional Pre-Deployment Workshop Series: Summer-Fall 2014
- Solicitation for Wave 1 Pilot Deployment Concepts: Early 2015
- Wave 1 Pilot Deployments Begin: September 2015
- Wave 2 Pilot Deployments Begin: September 2016
- Pilot Deployments Complete: September 2020
Sample Request for Information (RFI) Questions

- Should the USDOT develop a portfolio of a few, larger deployments or many, smaller deployments?

- The USDOT desires to make real-time data available from deployment sites using principles of open data sharing – is this acceptable and/or desirable?

- Similarly, the USDOT seeks to share source code and other technologies developed specifically under the CV Pilot program – is this acceptable and/or desirable?

- What are the best measures and methods in determining the impact and value of connected vehicle deployments?

- Should public sector organizations or private sector entities lead pilot deployment efforts?
For More Information

www.ITS.DOT.GOV

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