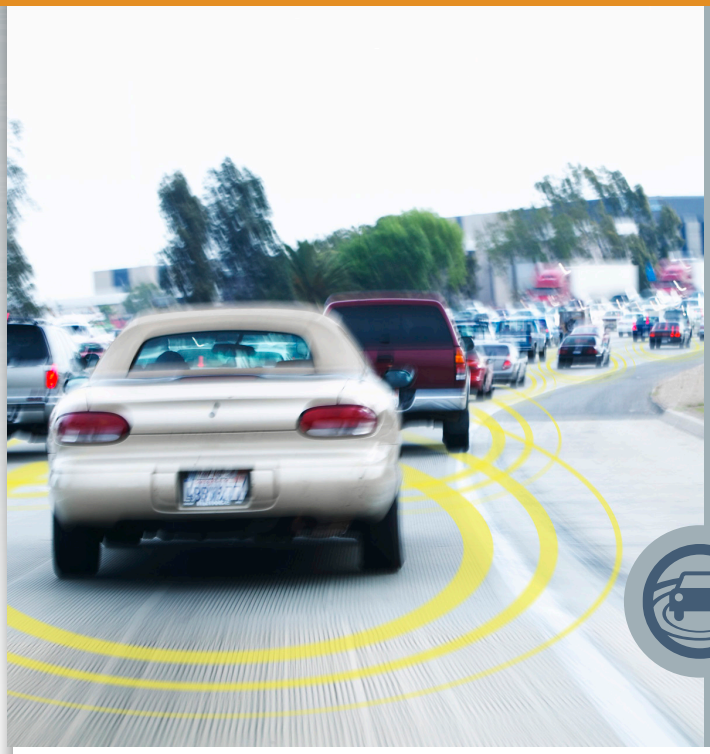
Intelligent Transportation Systems Joint Program Office (ITS JPO)

ITS Newsletter | April 2014



Connected Vehicle Pilots Are Coming to a Region Near You

The U.S. Department of Transportation (USDOT) has released a Request for Information (RFI) to help refine plans for multiple pilot deployments of connected vehicle technology in real-world settings—bringing the promise of connected vehicles to some of our roads very soon.

Read More

QUESTIONS?

At the Office of the Assistant Secretary for Research and Technology, we are committed to providing information and engaging new and existing stakeholders throughout the research process. If you have questions about our programs, please contact Mike Pina at mike.pina@dot.gov

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Connected Vehicle Pilots Are Coming to a Region Near You

Connected vehicles are in the fast lane toward deployment and implementation. With the success of the USDOT's Connected Vehicle Safety Pilot and the recent National Highway Traffic Safety Administration (NHTSA) decision to pursue vehicle-to-vehicle (V2V) technology in light vehicles, a transportation system of connected vehicles communicating with each other will soon be a part of our nation's collective reality. Building on that momentum, the USDOT has released a Request for Information (RFI) to help refine plans for multiple pilot deployments of connected vehicle technology in real-world settings—bringing the promise of connected vehicles to some of our roads even sooner.

Connected vehicles use wireless technology to talk to each other, mobile devices, and roadside infrastructure such as traffic signals. This exchange of information has the potential to make our transportation system significantly safer, smarter, and greener. The new Connected Vehicle Pilot Deployment Program seeks to spur innovation among early adopters of connected vehicle application concepts. The program encourages stakeholders to partner in deploying connected vehicle applications that will improve mobility, system productivity, livability/accessibility, fuel use, and traveler/system safety.

Applications in development include those that adjust traffic signals based on traffic demand and congestion, give priority to emergency and transit vehicles at signalized intersections, coordinate rideshares between travelers and nearby drivers, alert drivers to deteriorated road conditions ahead from ice or heavy rain, provide potential crash warnings, and many more. The potential uses for connected vehicle data are boundless.

With this pilot deployment program, we are taking our research and what we learned during the Connected Vehicle Safety Pilot to the next level. Our experience, lessons learned, and findings will provide the foundation from which these regional pilots can build, innovate, and collectively advance our nation's transportation system.

The program envisions several regional pilot deployments throughout the country with an initial wave starting in calendar year 2015.

The USDOT will host a workshop on the Connected Vehicle Pilot Deployment Program on April 30, 2014, in Washington, DC.

Photos Courtesy of USDOT and Thinkstock

Help Develop the FHWA 2015 Guidance for Connected Vehicles

Connected vehicles are coming. As previously noted, NHTSA has decided to move forward with V2V communication technology for light vehicles—confirming the potential life-saving benefits of a system of vehicles talking with each other on our nation's roads. Anticipating this decision, the FHWA has already begun to develop guidance for transportation infrastructure owners and operators on the deployment of such connected vehicle systems.

The USDOT seeks your input to this guidance, specifically on the guidelines, tools, resources, and policies that will support the successful implementation and operations of connected vehicle technologies at the state and local level. Tell us your concerns and perspectives, as well as your ideas on anticipated institutional challenges. Your feedback will be used as input for FHWA's development of connected vehicle guidance, which is slated for release in 2015.

Thinking of Implementing ITS in Work Zones?

FHWA's Work Zone Management Program will soon release the Work Zone ITS Implementation Guide, which targets the unique challenges and constraints of implementing technology in a work zone environment. The guide illustrates the use of a systems engineering process to determine the feasibility and design of ITS for different types of work zone applications and project characteristics. Guidance is structured along the key phases of implementation—from project conceptualization, through operations, to evaluation of the effectiveness of the system in achieving stakeholder goals.

The implementation guide is intended for a wide variety of users involved in the planning, design, and implementation of ITS in work zones, such as public agencies; design and construction firms; and developers, manufacturers, distributors, packagers, and providers of devices, systems, and programs.

The final document will be available on the FHWA Work Zone Management Program website in early 2014.

Photos Courtesy of USDOT and Thinkstock

INFLO Prototype Development of Speed Harmonization with Q-Warning Application

The use of nomadic devices to address traffic congestion

We are already using our smart phones and tablets to help avoid traffic congestion and find alternate routes. Soon, we could be using these devices to address traffic directly—not only avoiding congestion, but also reducing it and increasing mobility.

Through the Dynamic Mobility Program, the USDOT has been researching new technologies that could optimize traffic flow on our nation's highways, freeways, and arterials. A system of connected vehicles and infrastructure has the ability to provide such benefits by enabling vehicles and roadside equipment to communicate, sharing valuable data that offers tremendous possibilities. The Mobility program is exploring new transformative applications that could use this data to improve the efficiency of our nation's transportation system as well as our individual mobility.

Under this program, the USDOT has identified several bundles of high-priority mobility applications that focus on reducing delays and congestion and thus significantly improving mobility, including the Intelligent Network Flow Optimization (INFLO). The INFLO bundle aims to maximize roadway throughput, reduce crashes, and reduce fuel consumption through the use of the data from wirelessly connected vehicles, infrastructure, and travelers' nomadic devices such as smart phones or tablets. INFLO includes three applications:

- Queue Warning
- Dynamic Speed Harmonization
- Cooperative Adaptive Cruise Control (CACC).

The INFLO effort is putting its ideas into action—progressing past research toward prototype demonstration of the speed harmonization and queue warning applications, as well as demonstration of the use of nomadic devices to transform transportation in innovative ways. The speed harmonization application uses the data from connected vehicles and infrastructure to predict impending congestion and generate target speeds to mitigate it. The application then communicates the target speed recommendations to drivers via a nomadic device, helping them to get to their destinations sooner and safer. The queue warning application uses connected vehicle data to detect existing or impending queues and communicate advisory messages to drivers, thereby reducing potential rear-end or secondary collisions. The nomadic devices (smart phone or tablet) integrate with in-vehicle sensors, enabling the collection of data and communication of advisories.

Currently, the USDOT is focusing on just two of the INFLO bundle's applications for this prototype demonstration because the CACC application still needs more research. However, the Department envisions all three applications to work both together and individually. The collective benefit of increased mobility and reduced congestion will be achieved if implemented as a bundle.

The data and findings from the small-scale demonstration will help the USDOT make more informed decisions regarding the technical feasibility and potential impacts of deploying the applications more widely.

Photos Courtesy of USDOT and Thinkstock

Road Weather Management: Reducing the Impact of Weather on Our Roads and Our Lives

Heavy Rain on Detroit Metro Freeway
Source: http://detroit.cbslocal.com/2013/04/11/heavy-rain-causes-crashes-gawker-delays-on-metro-detroit-freeways/

Adverse weather conditions, such as snowstorms, heavy rain, and fog, can have a severe impact on the safety and mobility of our nation's transportation system, as well as the operation and maintenance of our roads. Weather conditions influence driver behavior, vehicle performance, visibility, and pavement friction, all of which are factors in increased crash risk and decreased mobility.

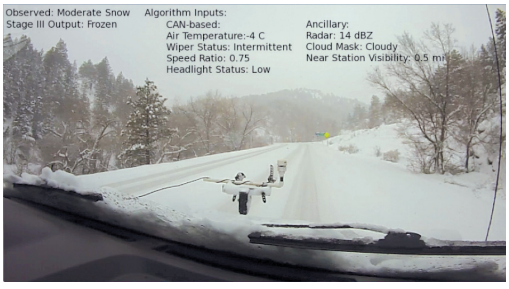
While we cannot change the weather, the USDOT's Road Weather Management Program (RWMP) is trying to better understand its impacts on roadways and develop and promote effective tools and strategies to mitigate them. Fundamental to this effort is sharing and integrating data and information.

The RWMP is working in close cooperation with the USDOT's connected vehicle research program. This program has been researching a system of "talking cars" that use GPS and wireless technology to share information among cars, trucks, transit vehicles, and traffic signals, which could be used to alert drivers of potential crashes and other dangers, such as unsafe road weather conditions. Connected vehicles will provide new sources of road weather information that offer opportunities to dramatically enhance our existing systems and create transformative applications.

The RWMP's goal is to broaden the foundation of road weather data to include mobile sources and to focus the analysis on improving the ability to detect and forecast road weather and pavement conditions by specific roadway links. The program's vision is of a system that provides real-time road weather information to road users and road operating agencies—anytime and anywhere. The following are highlights of some of the RWMP's efforts toward this vision.

Integrated Mobile Observations (IMOs)

The USDOT has partnered with the Minnesota, Nevada, and Michigan departments of transportation (DOTs) to develop, test, and evaluate systems for capturing and communicating weather data from vehicles. The three state DOTs have placed instrumentation on over 430 snowplow fleet vehicles, light-duty trucks, and passenger cars to collect data and evaluate road weather information and applications.



Integrated Mobile Observations
Source: NCAR

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Photos Courtesy of USDOT and Thinkstock

About the Road Weather Management Program

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The Minnesota DOT is using a system similar to automatic vehicle location to collect and transmit data via cellular communications. The Nevada DOT created hardware and software to collect and transmit onboard vehicle data using a statewide radio system, as well as cellular communications. The Michigan DOT created a smartphone application to capture and transmit data via cellular.

These DOTs are evaluating road weather connected vehicle applications developed by the National Center for Atmospheric Research (NCAR), such as the Motorist Advisories and Warnings (MAW) and Enhanced Maintenance Decision Support System (E-MDSS) applications. All three states are implementing, testing, and evaluating the applications and their costs and benefits. The benefit-cost analysis will support the National Highway Traffic Safety Administration rulemaking decision on the future of connected vehicle technology.

The Vehicle Data Translator (VDT)

To handle the increased volume of data from mobile sensors and connected vehicles, NCAR developed a VDT. The VDT checks the data quality, integrates the data with other sources of weather data, and aggregates the data to infer current and forecasted observations, such as pavement conditions along specific road segments.

Road weather connected vehicle applications would then use these observations to advise and inform road users and operators. The data from the three IMO states is being sent to the VDT.

NCAR is making the final enhancements to the VDT based on the requirements developed for the MAW and E-MDSS applications.

The Weather Data Environment (WxDE)

The robust and immense amount of data collected from mobile sensors and connected vehicles demands a platform for storage and sharing. Thus, the RWMP is developing the WxDE to acquire, validate, store, and share weather-related information gathered from mobile and infrastructural sources. This data environment will provide the platform for the various research needs of the ITS JPO's connected vehicle programs. It will build on and integrate the capabilities of the former Clarus System and the VDT. The WxDE will also interoperate with the ITS JPO's new Research Data Exchange (RDE), which is a platform to facilitate user access to data related to connected vehicles and ITS and helps to spur application development and testing and encourage innovation.

Weather-Responsive Traffic Management (WRTM)

As data sources and decision support tools continue to evolve, opportunities to enhance traffic management strategies increase. For weather, such strategies enable operators to better evaluate and adjust responses to managing safe and efficient traffic flow during inclement weather conditions. The USDOT's WRTM initiative is working with state DOTs to develop and implement these strategies related to integrated corridor management (ICM) and active traffic management (ATM).

Utah DOT Traffic Operations Center Main Control Room
Source: http://ntl.bts.gov/lib/38000/38100/38165/HTML/sec4.htm

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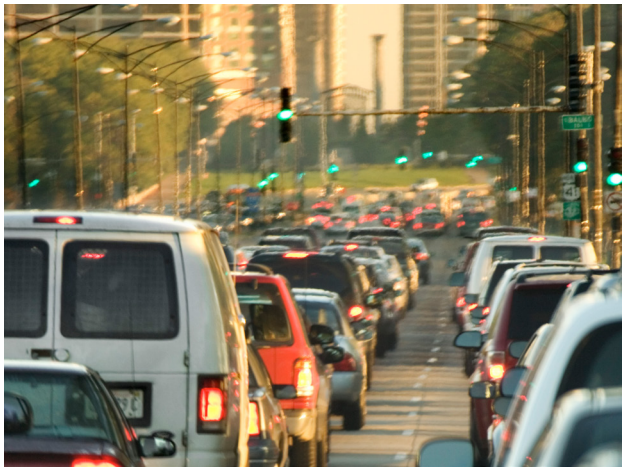
Latest Modeling Results for Environmental Connected Vehicle Applications Show Benefits in Reduced Fuel Use

Continuing the push toward a future connected transportation system, the USDOT has released the latest modeling results from its Applications for the Environment: Real-Time Information Synthesis (AERIS) Program. These results indicate the tremendous multi-faceted benefits of a connected vehicle system—offering the potential to save gas and money and improve air quality, in addition to saving lives and improving mobility.



As part of the USDOT's connected vehicle program, AERIS is researching sets of connected vehicle applications that could provide significant fuel and emissions reduction benefits. One such application involves the use of smart traffic signals to reduce idling and unnecessary stops. The traffic signals broadcast data about their current signal phase and timing, and systems inside the vehicles use the data to determine speed advice for drivers. Drivers could then adjust their vehicles' speed to pass the next traffic signal on green or slow down to a stop in the most eco-friendly manner, thereby saving gas, reducing carbon dioxide emissions, and saving money.

The AERIS program recently tested this application in a full corridor model of the El Camino Real, near Palo Alto, CA. The 6-mile modeling region included 2005 network and demand conditions, 27 signalized intersections, fixed-timing and well-coordinated signals, and mostly three lanes in each direction.

Preliminary modeling results show that the application itself can provide average fuel savings of 5 to 10 percent per vehicle. In the modeling scenario, this equated to annual savings of more than $170 for cars and $280 for SUVs (based on driving 8,000 miles per year on arterials). Fleet owners also stand to benefit, with estimated savings of more than $42,000 per year for a fleet of 150 mixed-type vehicles in the hypothetical modeling corridor.

In addition, combining this technology with partial vehicle automation could help to reduce driver distraction and improve the application's performance and benefits.

More research and prototyping are still to come, but these preliminary results are exciting. Connected vehicles promise to transform our nation's transportation system for the better, making it safer, smarter, and greener. Imagine the possibilities.

Photos Courtesy of USDOT and Thinkstock

The ITS JPO Welcomes a New Member to the Team

Kevin Dopart: Program Manager, Connected Vehicle Safety and Automation

Kevin Dopart has joined the ITS JPO as the program manager for Connected Vehicle Safety and Automation.

Mr. Dopart comes to the ITS JPO with more than 30 years of operations, engineering, and policy experience in vehicle systems, automation, and public safety for government programs. His extensive transportation career experience includes program management, federal policy, and system operations, as well as collaborating with diverse stakeholders to develop and implement innovative ITS technology program strategies.

In his most recent experience, Mr. Dopart served as Transportation Systems Manager at Noblis. In that position, he led connected vehicle concept development, systems engineering, stakeholder engagement and consensus building, technical reviews and assessment, and program management support for projects under the ITS JPO's Dynamic Mobility Applications Program.

As a recognized expert in ITS programs and corresponding research and development topics, Mr. Dopart has previously worked directly with the ITS JPO to provide strategic planning, independent evaluations, and acquisition and technical support to the ITS collision avoidance, highway safety, and public safety programs. He collaborated frequently with senior Federal Highway Administration, National Highway Traffic Safety Administration (NHTSA), Federal Transit Administration, Federal Motor Carrier Safety Administration, and Office of the Secretary of Transportation officials to strategize, plan, and implement these initiatives.

While at Noblis, he led technical and policy analyses of vehicle safety system research, testing, and deployment for automobiles, motor carriers, transit buses, and specialty vehicles such as highway maintenance trucks. He provided strategy, acquisition, stakeholder engagement, and program management assistance to the USDOT's ITS initiatives including Integrated Vehicle-Based Safety Systems, Cooperative Intersection Collision Avoidance Systems, Next Generation 9-1-1, public safety, and rural safety, as well as NHTSA's Advanced Crash Avoidance Technology, Vehicle Safety Communications Applications, and other crash avoidance programs.

Mr. Dopart has also worked for the U.S. Congress Office of Technology Assessment as a transportation project director and for the U.S. Naval Academy as an instructor in the Math and Aeronautical Engineering Departments.

Photos Courtesy of USDOT and Thinkstock

Photo Source: SAIC

USDOT to Host a Series of PlugFests to Prepare for a Southeast Michigan Connected Vehicle Test Bed

What Are USDOT Connected Vehicle PlugFests?

U.S. Department of Transportation

Connected Vehicle PlugFest

In an effort to achieve its strategic vision in connected vehicle research, the USDOT is launching a series of "PlugFests"—events that allow for peer-to-peer information exchanges, sharing of deployment lessons learned, development of a common technical platform, and expansion of test bed options for users critical in transitioning connected vehicle technology to full deployment.

PlugFests are vendor test sessions that assess the level of interoperability and ensure understanding of the base standard requirements for the Southeast Michigan Connected Vehicle Test Bed deployment. The multi-day events will be hosted at test beds across the country and include classroom training and lab environments providing connectivity, instruction, and facilities.

The PlugFests provide opportunities for connected vehicle technology stakeholders, including operators, developers, and suppliers, to validate vehicle-to-infrastructure (V2I) data exchanges, support development and testing, and support the standardization process.

The PlugFests will be rolled out in three phases corresponding to three key themes:

1. **V2I Interoperability –** Focuses on infrastructure interface testing based on the Southeast Michigan Connected Vehicle Test Bed 2014 Architecture – Layer 0
2. **Application Development –** Focuses on the use and interpretation of connected vehicle data
3. **Security –** Focuses on ensuring trust and preventing unauthorized access to connected vehicle data and backhaul.

Southeast Michigan Connected Vehicle Test Bed

In 2014, the USDOT will begin deploying the Southeast Michigan Connected Vehicle Test Bed. It will be the first regional deployment of its kind to ensure multi-site interoperability between test beds in the southeast Michigan area, including the USDOT's Connected Vehicle Test Bed in Novi and the City of Detroit Connected Vehicle Test Bed in downtown Detroit.

The USDOT expects to have the Southeast Michigan Connected Vehicle Test Bed operational by the ITS World Congress in September 2014.

For more information on the Southeast Michigan Connected Vehicle Test Bed 2014 project, visit www.its.dot.gov/testbed.htm.

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Photos Courtesy of USDOT and Thinkstock

USDOT to Host a Series of PlugFests to Prepare for a Southeast Michigan Connected Vehicle Test Bed

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The PlugFests are tentatively scheduled for the following dates and locations:

- **May 2014:** Novi, MI
- **June 2014:** Palo Alto, CA
- **July 2014:** Detroit, MI
- **August 2014:** Detroit, MI
- **Winter 2015 Hackathon:** Novi, MI.

The USDOT will also host these PlugFests via webinar to engage remote participants.

For more information and to register for the PlugFests, visit: www.itsa.org/plugfest or www.its.dot.gov/meetings.htm.

About the Road Weather Management Program

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For ICM, the Utah DOT is installing weather-responsive traffic signals that enable operators to monitor both weather conditions and corridor traffic performance. Operators could implement new coordinated signal timing plans to address the deteriorating roadway and weather conditions and achieve optimum corridor performance.

For active traffic management (ATM), the Oregon DOT is improving efforts to advise drivers of safe operating speeds based on measurements of the road surface temperature as well as the road surface (water, ice, snow). Strategies also include posting real-time travel times, queue warnings, and a weather-responsive curve warning system.

Conclusion

The impacts of weather on the nation's roads are significant, but can be reduced through focused efforts. Through close collaboration and coordination across the transportation and weather communities, the vision and goals of the RWMP can be realized in getting the right information to the right people, so they can make the right decisions. These efforts are making surface transportation in the United States more efficient. More importantly, they are making travel in adverse or compromising situations much more safe.