

The Intelligent Transportation Systems
Program Advisory Committee
2014 Report to Congress

1. Overview

- a. Pursuant to Section 53003 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), this report describes how the U.S. Department of Transportation (Department) has implemented recommendations made by the Intelligent Transportation Systems (ITS) Program Advisory Committee (ITS PAC) in 2013.
- b. The Secretary was directed, initially in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and again in MAP-21, to establish the Committee with no more than 20 members to provide advice to the Secretary on ITS aspects of the Department's strategic plan and on ITS research funding. The Secretary is directed also to submit a report to Congress not later than February 1 of each year that includes the following:
 - (1) all recommendations made by the Committee during the preceding calendar year;
 - (2) an explanation of the manner in which the Secretary has implemented those recommendations; and
 - (3) for recommendations not implemented, the reasons for rejecting the recommendations.
- c. In response to the legislative directive, the Secretary established the ITS PAC in 2006. Since its inception, the ITS PAC has met 17 times and has submitted 6 advice memoranda to the Secretary.

2. ITS PAC Activity in 2013

The ITS PAC held three meetings that focused on subcommittee deliberations and progress briefings on their assigned ITS research program evaluation topics. As needed, the subcommittees engaged outside experts and ITS Joint Program Office (JPO) staff in the process of developing their recommendations. Following wide-ranging discussions and debate, the ITS PAC reached consensus on 20 recommendations to help improve the ITS research program in the critical areas of security framework, technology strategy, global harmonization of standards, and outreach communications and promotion plan. The ITS PAC submitted its recommendations in a December 20, 2013, advice memorandum to the Department. The Department carefully considered the ITS PAC's advice and responded, describing the Department's implementation of the Committee's recommendations. The ITS PAC's recommendations and the Department's response are included in paragraph 3 below.

3. ITS PAC Recommendations and Department Response

a. Security Framework

Background: Communications security is a rapidly evolving challenge. Every day new viruses and new forms of attack are invented. It is critical that the security framework of

Connected Vehicles allows for flexibility and evolution, and constant vigilance be exercised.

The Security Framework Subcommittee of the ITS PAC has become aware of independent research regarding potential vulnerability in the Dedicated Short Range Communication (DSRC) communications construct. While the committee's scope and expertise does not allow us to assess the validity of the research or the severity of the vulnerabilities, we believe that it is important for the ITS JPO to similarly be made aware of this research.

Specifically, the ITS PAC Security Subcommittee has received independent research on the proposed Institute of Electrical and Electronics Engineers (IEEE) 1609.2 Security Services for Applications and Management Messages. This research found several potential opportunities to improve the system's performance and security. First, the current protocol lacks support for a mechanism to allow root authorities to change keys, as well as for the Security Credentials Management System (SCMS) Manager to change signature algorithms. Developing a solution to this finding should be high priority due to its impact on the scale of the SCMS. In addition, the research finds that this protocol may be subject to misbinding attacks, which should be considered a practical attack and the protocol revised to enhance resiliency much like other similar protocols such as Transport Layer Security, Internet Protocol Security. In addition, the research finds a potential susceptibility to worm-hole attacks, which also should be studied.

Recommendation 1. The ITS JPO should establish a mechanism to allow entities not directly involved in Federal or automaker developments in the security aspects of DSRC to be able to provide input to the JPO process. This input could be in the form of a briefing request from the ITS JPO or Office of the Assistant Secretary for Research and Technology (OST-R), a solicitation for comments, a public forum for discussion, contractor analysis, public-private partnership, or other means the ITS JPO deems appropriate.

Department's Response to Recommendation 1. The Department concurs. The ITS JPO has established two mechanisms for other interested parties to participate in the development of the security aspects of connected vehicles that use DSRC and other communication media. First, we are developing a project in Southeast Michigan (Southeast Michigan 2014 project - - http://www.its.dot.gov/testbed/testbed_SEmichigan.htm) where we will be exploring communication security issues. All are welcome to make use of that facility and comment on the practices we are exploring. That project will provide the communication infrastructure for the upcoming ITS World Congress 2014 event demonstrations. Also, we have started the Affiliated Test Beds http://www.its.dot.gov/testbed/testbed_affiliated.htm to allow outside parties to perform collaborative research with us. We have two communication security companies outside of the auto industry that are participating in that activity.

Background: The United States does not have a specific federal regulation establishing universal implementation of privacy policies. Congress has, at times, considered comprehensive laws regulating the collection of information online, such as the

Consumer Internet Privacy Enhancement Act and the Online Privacy Protection Act of 2001, but none have been enacted. The United States prefers what it calls a 'sectoral' approach to data protection legislation, which relies on a combination of legislation, regulation, and self-regulation, rather than governmental regulation alone. Privacy, at both the federal level and state levels, is regulated by specific industry and type of use in 23 areas, with non-mandatory guidelines that recommend industry self-regulation.

Recommendation 2. The ITS JPO should work with industry and policymakers to develop a Privacy Guideline for Vehicle Data and Content, utilizing best practices from other sectors where appropriate. However, there may be a number of fundamental issues that must be addressed first such as data ownership, metadata policies, and self-regulation, among others.

We recommend outreach and collaboration with automotive, telecommunication and computation industries, consumer and motorist organizations, and other potential stakeholders and experts to provide input and/or review of the guideline.

Department's Response to Recommendation 2. The Department concurs. Consumer privacy protection in a Connected Vehicle environment is of primary concern to the Department. The ITS JPO has worked with its modal partners to ensure that appropriate privacy protections have been designed into ITS JPO funded vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) concept designs and architectures. We also have ensured that privacy impact assessments have been performed for all systems procured in connection with research efforts, as required by law. The ITS JPO is committed to working with its modal partners and the Department's Privacy Office to assess the privacy impacts of any systems developed for implementation through its research. The ITS JPO also intends to continue facilitating the ongoing dialogue between the Department and a wide variety of connected vehicle stakeholders around privacy, and working with its modal partners and the Department's Privacy Office to explore additional Department actions that could help protect consumer privacy, including issuance of potential Guidelines.

b. Technology Strategy

Background: The communication of trusted data between vehicles of all types on the nation's roadways is a basic tenet of a successful Connected Vehicle safety system deployment. Data from misbehaving vehicles, or roadside equipment that causes or initiates the possibility of inappropriate driver responses could damage the trustworthiness and effectiveness of the system to avoid crashes. For example, with inaccurate Global Positioning System (GPS) positional reporting from one or more vehicles in a region, false warnings indicating phantom slowing or stopped vehicles in a lane could result. On the other hand, an inaccurate report of the lateral position of a stopped vehicle may prevent the appropriate warning in a following vehicle. Many instances of such behavior would lose trust from the participating drivers and the effectiveness of the system would be significantly reduced.

There are at least two significant operational modes for misbehavior: one would be operational deficiencies in the installed equipment (non-malicious) and another would be

the purposeful injection of messaging that indicates inaccurate description of the true physical scenario (malicious).

Recommendation 3. The ITS JPO should conduct a study to determine the likelihood of false detections given the minimum positioning performance requirements set in place for a possible regulation or New Car Assessment Program (NCAP) certification, and quantify statistical anomaly vs. misbehavior which should be flagged.

Department's Response to Recommendation 3. The Department concurs. Data gathered from the Safety Pilot Model Deployment and follow-on activities will be analyzed to help update minimum performance requirements for devices participating in crash avoidance applications. Understanding the location of a vehicle is one of the most important performance requirements. Analysis of some of the early samples of the data has shown that the devices used are likely to be adequate in this respect. It has also pointed out some unexpected cases where outside factors may be adversely impacting the operation of the devices that was not anticipated.

Recommendation 4. In the case where a detection of misbehaving devices occurs, the ITS JPO should identify the technical issue and policy actions to be taken to keep the user trust at a level that supports the benefit/cost ratios calculated for deployment.

Department's Response to Recommendation 4. The Department concurs. Efficient revocation and/or quarantining of malfunctioning and misbehaving devices will be an important area of research in the near future.

Background: This topic concerns commercial vehicle regulations and is not directly within the ITS JPO's responsibility, but the Committee chose to comment on this broader Department issue under its extended charter provisions.

In 2014, the National Highway Traffic Safety Administration (NHTSA) and the Federal Motor Carrier Safety Administration (FMCSA) will consider the same vehicle safety message communication rulemaking for interstate commercial vehicles. There are definite advantages to deploying in the commercial vehicle environment. After initial implementation, within a few years many commercial vehicles, including retrofitted existing vehicles, could provide data on performance, robustness, security and viability to support evaluation of passenger vehicle efficacy. Commercial vehicle interior space for device placement, and antenna shape and placement are not as constrained as they are for passenger vehicles. And with vehicle-to-any device (V2X) implemented in commercial vehicles, the incremental cost to include vehicle diagnostics, driver behavior monitoring, trailer integrity, road condition, weather and traffic awareness is now a simpler business decision, and we should see a broad adoption of those capabilities. Suitable *quid pro quo* arrangements with commercial vehicle operators are then possible for U.S. DOT, state and local agencies to harvest the mobility information. Meanwhile, public awareness, technology refinement, value proposition and ability to address security issues are now accelerated in a controlled environment of long haul truckers.

Recommendation 5. FMCSA and NHTSA should pursue Interstate Commercial Vehicle Rulemaking for both V2V Safety Messages and V2X capabilities.

Department's Response to Recommendation 5. The Department concurs. NHTSA will issue a regulatory decision in 2014 for new heavy-duty vehicles similar to the recently announced decision to pursue rulemaking for V2V light vehicles. Any other rulemaking by the Department regarding trucks will need to wait for these decisions to be announced.

Background: Positioning system performance, accuracy and reliability, will be critical to Connected Vehicle operations. While the Committee understands that extensive testing has been done on positioning, the ITS JPO needs to ensure that this technology will not affect successful deployment and operation and be achievable at acceptable cost.

Recommendation 6. The ITS JPO should ensure that adequate testing of positioning system performance is conducted in all expected conditions and that cases where positioning performance will not be adequate are well understood and their likelihood of occurrence calculated and potential impact on vehicle interactions understood. Furthermore, successful positioning performance must be achievable at acceptable component costs and the performance/cost tradeoffs should be analyzed.

Department's Response to Recommendation 6. The Department concurs. Samples of data gathered from the Safety Pilot Model Deployment and follow-on activities are being prepared for performance requirement studies. Different analysis capabilities are being investigated.

c. **Global Harmonization of Standards**

Background: The Global Harmonization of Standards Subcommittee was formed to provide recommendations on effective ways to ensure that ITS standards are harmonized globally in order to promote the efficient and rapid deployment of ITS technologies and to minimize the cost and complexity of maintaining those standards once they are deployed. The Subcommittee agreed that a wide range of stakeholder groups will need to work together to ensure that a necessary and beneficial level of harmonization occurs including governments, vehicle manufacturers, other ITS-related industries, trade associations, and relevant standards organizations. The Subcommittee recognizes that significant progress has been made in harmonization since the last ITS PAC report in 2011. However, continued strong leadership to encourage harmonization is needed to enable the use of common hardware and/or software modules across multiple regions, and in this area technology expertise is critical. The Subcommittee believes that standards need not be identical for there to be tangible benefits and that not all standards need to be globally harmonized, only those where there are common international markets.

The following obstacles to global harmonization have been identified:

- Competition among certain standards organizations working to develop similar standards.
- European governments, automobile manufacturers and infrastructure suppliers/operators are driving short initial deployment timing with significant voluntary

resources from the European manufacturers and financial support from the European Union on standards development. The U.S. must fortify their international standardization participation to mitigate the risk that early stage technologies based on non-harmonized standards be adopted locally in Europe, which may make the adoption of harmonized multiregional standards more difficult in the longer term.

- Although multiple forums with interests in harmonized standards exist and some progress has been made towards this end, sufficient cohesive processes and/or appropriate integrative forums to facilitate harmonization of specific standards are currently lacking.
- Lack of agreement among vehicle manufacturers and governments concerning the scope and timing of harmonization needs.
- Lack of understanding of the level of harmonization necessary to be beneficial.

Recommendation 7. ITS JPO and other organizations within the Department should continue to identify harmonization of ITS standards as a critical priority in their public communications about ITS technologies and continue to include it in their strategic plans. While ITS JPO has in the past made such statements as part of its outreach programs, reinforcement from higher levels within the Department, the Department of Commerce, and the White House would be of substantial value. Other regions are invested at these levels of authority; the U.S. government should be as well.

Department's Response to Recommendation 7. The Department concurs that high level reinforcement of the benefits of internationally harmonized standards by key U.S. policy leaders is valuable and desirable. The Department has continued to publicly reinforce our commitment to internationally harmonized high-quality standards and has cooperated with the Department of Commerce via the National Institute of Standards and Technology (NIST) to disseminate our messages. The Department will continue to seek appropriate cooperation from the White House, NIST, and other Federal organizations in publicly reaffirming both the value of, and our commitment to international standards harmonization. Standards harmonization will continue to remain a key focus area in the next Departmental ITS Strategic Plan which is currently being developed.

Recommendation 8. ITS JPO should continue to adequately fund organizations and programs acting to harmonize ITS standards. Sufficient funding should be made available to effectively deploy U.S. experts from the U.S. Government, automobile manufacturers, and relevant organizations to the appropriate forums working on ITS standards. In the case of federally funded organizations, the ITS JPO should fully exercise contractual/grant authority to encourage harmonization.

Department's Response to Recommendation 8. The Department concurs with this recommendation and is acting accordingly within resource and policy constraints. The Department intends to continue to provide limited travel funding support for voluntary industry experts participating in standards harmonization efforts along with executing needed work via more traditional means, including Standards Development Organizations (SDOs), technical support contracts and cooperative agreements with industry, to expeditiously meet Connected Vehicle standardization needs. Recently initiated contracts with SDOs explicitly call out harmonization activities and make funding available to execute them. To further support harmonization, we have sought

cooperation from ITS JPO funded research programs to support and fund researcher participation in appropriate standards working groups and we have developed appropriate contracting language to facilitate such participation. While we recognize that personal – and in-person – participation in consensus-based standards development efforts remains critical to assuring that U.S. interests are fully represented in effective standards development efforts, resource and travel policy restrictions will likely continue to impact such participation by Federal staff for the foreseeable future.

Recommendation 9. The ITS JPO should assure that the U.S. – European Union (EU) Standards Harmonization Working Group (WG) and any future U.S.–regional collaborations working on harmonized standards are properly supported by both U.S. government and industry personnel who are actively engaged in standards work. Further, these groups should meet face-to-face on a frequent basis and for periods of sufficient duration to allow thorough discussion and resolution of pertinent issues. Additionally, the U.S. should work to consolidate the various regional groups with interests in standards harmonization into a single global working group.

Department’s Response to Recommendation 9. The Department concurs with this recommendation and is acting accordingly within resource and policy constraints. Both the frequency and duration of U.S. – EU Standards Harmonization WG meetings are subject to agreement by both the U.S. and EU. These meetings are co-led by U.S. Federal staff, and to the extent that domestic or international travel is required, meeting frequency and duration is governed by Departmental and organizational travel policies as well as staff availability. Going forward, we will seek to maintain a frequency of at least semi-annual public meetings adjacent to other events with substantial stakeholder participation, with equitable location distribution between the U.S. and EU and remote participation opportunities. It should be noted that the ability to execute a Harmonization Action Plan (HAP) or other cooperative work items remains dependent upon our international partners’ willingness and ability to act along with the Department and industry partners.

Recommendation 10. The ITS JPO should cooperate with industry and others to develop a list of key Connected Vehicle interfaces and standards required to support broad Connected Vehicles deployment and identify and aggressively pursue beneficial harmonization and multiregional joint standards development opportunities. The progress of these standards can then be tracked through the various standards organizations and pressure applied to ensure that they are being developed in a harmonized fashion and the development of redundant standards discouraged.

Department’s Response to Recommendation 10. The Department concurs with this recommendation and is acting accordingly. A Connected Vehicle Reference Implementation Architecture (CVRIA) is under development with broad domestic and international stakeholder input from industry, academia, and government. The CVRIA will be used to identify candidate interfaces for standardization and to support development of a prioritized connected vehicle standardization plan, again with broad stakeholder input. These candidate interfaces will be aligned to the extent practical with those in other global connected vehicle architectures to the extent that these are known and documented in order to facilitate standards harmonization. As part of the analysis,

interfaces will be evaluated, standards gaps will be identified, and opportunities to adopt or adapt existing standards as well as needs for new standards development identified. When in the public interest, the Department will seek to harmonize needed standards. For example, in cases where both the U.S. and another region such as the EU have identified identical or similar interfaces in their architectures for which no suitable standards currently exists, we will seek to cooperatively adapt or develop a single harmonized standard to cover such an interface. In addition to opening this process to the aforementioned broad stakeholder input, we are also seeking to perform the required gap analysis cooperatively with the EU under our existing cooperation agreement and to open this effort to other regions/nations interested in cooperating.

Recommendation 11. The ITS JPO should ensure that the intellectual property and patent rights embedded in existing and emerging standards are clearly understood and develop a plan to mitigate the impact of these issues on Connected Vehicle implementation.

Department's Response to Recommendation 11. The Department agrees that intellectual property and patent rights embedded in existing and emerging standards should be clearly understandable. As directed by legislation, we cooperate with Standards Development Organizations (SDOs) to facilitate development and publication of standards. SDO's intellectual property policies apply to these standards; the Department does not have any specific authority to enforce or dictate what these policies are. The extent to which essential intellectual property might be incorporated in any specific standard is determined by the collective expert judgment of the participants in each standards working group in accordance with the SDO's consensus/voting procedures.

Recommendation 12. The ITS JPO should continue to consider the relationship between Connected Vehicle standards and emerging standards for new technologies, including machine-to-machine communication, necessary to support automated/autonomous vehicle deployment to ensure that Connected Vehicle standards evolve to meet the needs of these developing technologies as well.

Department's Response to Recommendation 12. The Department concurs with this recommendation and is acting accordingly. For example, OST-R has become an Associate Member of the oneM2M global standards development consortium on behalf of the Department, and we continue to monitor and appropriately participate in oneM2M activities to help ensure that U.S. ITS standardization interests are well represented. The analysis of candidate interfaces for standardization following the CVRIA effort will broadly seek out appropriate standards from global sources as candidates for adoption/adaption to meet Connected Vehicle interface needs. Via technical support services contracts and standards working group participation, we seek to remain aware of technological and standardization developments in other industries/fields which might be of benefit to ITS. Further, ITS standards working groups themselves often include experts with broad expertise and do facilitate substantial knowledge transfer to benefit ITS standardization. We recognize the importance of globally harmonized standards, test procedures, and certification processes to facilitate the efficient introduction of

automated/autonomous vehicle technologies and we are currently formulating our program plan to address these and other automated/autonomous vehicle research needs.

Recommendation 13. The ITS JPO should continue efforts to pursue global harmonization of 5.9 Gigahertz (GHz) radio spectrum standards to meet the needs of low-latency, secured Connected Vehicle communications. The ITS JPO should closely monitor and participate in spectrum usage testing to ensure that no changes are made unless thorough data-driven review testing demonstrates that no harmful interference would occur to the existing frequency allocation. The U.S. DOT and the Federal Communication Commission (FCC) should collaborate in reaching the right decision on this matter.

Department's Response to Recommendation 13. The Department agrees that global harmonization of the 5.9 GHz radio spectrum would facilitate harmonized standards and common hardware and software to support connected vehicle deployments and will continue to call-out these benefits in appropriate forums. We continue to monitor and participate in standards working group activity associated with evaluation of proposed spectrum sharing and development of candidate approaches, and will continue to participate in regulatory processes via appropriate channels.

d. Outreach Communications and Promotion Plan

Background: Success of Connected Vehicle deployment is inextricably linked to consumer awareness of and buy-in to the benefits of the new technology. Such awareness, acceptance and enthusiasm will be a key factor in the speed of deployment, whether that is replacing older, non-equipped vehicles or buying and installing approved aftermarket devices. This program starts with developing a broad-based communications plan targeting multiple areas including stakeholders and audiences, internal, external, public, private, and multiple levels of government. This plan is needed considering the NHTSA rulemaking decision in 2014 concerning light vehicles and the FCC decision on spectrum sharing. Implementation solutions, particularly regarding possible aftermarket solutions, will need to be clearly described along with implementation benefits.

Recommendation 14. The ITS JPO should engage communication professionals to develop an overarching communications strategy, and aggressively launch an effective public communications campaign.

Department's Response to Recommendation 14. The Department concurs and is acting accordingly within the bounds of its legislative mandate, which is limited to communications and outreach to advance research and technology transfer. Ultimately, consumer awareness of the benefits of connected vehicle capabilities must be a shared responsibility among the many partners involved in advancing these systems.

Recommendation 15. NHTSA should create a comprehensive document on safety benefits, particularly as new technologies are being introduced that improve the safety of vehicles. NHTSA cited such a document on Connected Vehicle benefits when voicing support for Connected Vehicles in May 2012.

Department's Response to Recommendation 15. The Department partially concurs. NHTSA routinely releases safety information regarding new vehicle technology when it has confidence in the results, rather than compiling comprehensive reports regarding multiple technologies. In addition, withholding results to compile a comprehensive list would delay the public release of information. For connected vehicles, as NHTSA has stated, it will evaluate the potential safety benefits of this technology and release that information as soon as it is ready. The Department will continue to be cognizant of current and future technologies and release information on safety benefits when such analyses are appropriate.

e. Implementation

Recommendation 16. The ITS JPO should create a Glossary of Terms as part of the Strategic Plan. The ITS Connected Vehicles program would benefit from greater attention to nomenclature. Activities, programs, and technologies should be identified with unique terms that have clear and stable meanings. Every attempt should be made to use terms consistently and to encourage consistent use in the ITS community.

We identify two general areas where nomenclature is especially important. The first is in technology. Terms like "V2V", "automated vehicles," "autonomous vehicles," and "driverless cars" should be defined and used consistently.

The second area is in deployment. Terms like "adoption," "implementation," and "deployment" should also be clearly defined and consistently used. Clarity of terms may make clearer how new technologies will transition into use.

Since there is widespread use of these various terms by different sectors such as academia, industry, the press, the public and others, it not likely that the ITS JPO can drive a common lexicon, but at least for the purposes of its own generated documents this glossary can serve to clarify the discussion.

Department's Response to Recommendation 16. The Department concurs. This is planned to be featured as an appendix to the Strategic Plan. Definitions will be drawn from sources like the NHTSA Decision (once available), the Government Accountability Office (GAO) report, the American Association of State Highway and Transportation Officials (AASHTO) Footprint Analysis, the National Cooperative Highway Research Program (NCHRP) Cost-Benefit Analysis, as well as from our research work with industry partners to include the Crash Avoidance Metrics Partnership (CAMP) and the Vehicle Infrastructure Integration Consortium (VIIC) and through our international cooperation efforts.

Recommendation 17. The Department should encourage and incentivize additional DSRC pilot deployments at the state and local level (rural, urban and regional). Such DSRC pilots would educate local officials and local publics about the benefits of DSRC-based systems. Multi-modalism is a desirable feature of such pilots.

Department's Response to Recommendation 17. The Department concurs and is planning to launch a Connected Vehicle pilot program that will focus on a host of

transportation applications to include: mobility, road-weather, freight, emergency first responder, environmental, and other transportation management applications. This program is envisioned to be multi-modal in nature, include the use of DSRC technology, and funds a series of projects at various locations around the country. A Request for Information (RFI) was released in late January to gather information from stakeholders regarding this activity. More information will be forthcoming in 2014 once all RFI responses have been analyzed.

Background: Implementation – be it of ITS or any other innovation – involves an understanding of local operating conditions. Innovation studies have identified two models of innovation: a *local/incremental* model and a *laboratory/advanced* model. Both models are important.

The federal ITS program excels at the laboratory/advanced model. Yet many ITS implementations are local in origination. An example of this might be electronic toll collection. U.S. DOT should develop mechanisms to support the local/incremental model of innovation.

Recommendation 18. The ITS JPO should continue its efforts to connect Federal and state and local agencies. Given their key role in ITS implementation, state and local officials should have the most effective voice possible in U.S. DOT technology programs. Hierarchical federal program structures should be complemented by peer-to-peer program structures (AASHTO and Traffic Management Center (TMC) operators association), and both types of programs should connect.

Federal programs should continue to seek ways to connect with state and local peer-to-peer associations and with non-traditional stakeholders such as National Association of Counties, Conference of Mayors, League of Cities, and Governors Association). Outreach to deployers should focus on ready-to-deploy technologies.

Department's Response to Recommendation 18. The Department concurs. The ITS JPO often partners with state and local agencies to field test and demonstrate different ITS solutions. Just recently, the ITS JPO released a procurement to provide Integrated Corridor Management Deployment Planning grants to state and local agencies to support the concept development and analysis of integrated corridor management solutions for different communities. The ITS JPO also partners with the state DOT-led pooled fund studies to support the analysis of ITS solutions. Most recently, we provided funding to a ten state partner pooled fund study to look at connected vehicle applications that apply to intersections. In the coming year, we are looking to add outreach to new stakeholder groups such as those mentioned above.

Background: NHTSA rule-making procedures offer an excellent framework for continued progress toward Connected Vehicle implementation. The Connected Vehicle program has gone from the lab to the field test, and now the challenge is to advance it to widespread implementation. Although initial development has been led by the public sector, final implementation will occur in the private sector. The NHTSA proceedings provide a useful venue for all stakeholders to interact and to articulate and evaluate their commitment to Connected Vehicle implementation.

Recommendation 19. U.S. DOT should further its capacity to identify and to promote local innovations. U.S. DOT should provide seed grants and other support for successful innovations, even if they originate outside of the federal program.

Department's Response to Recommendation 19. The Department concurs and plans to continue to expand opportunities for private sector and state and local agencies to participate in Connected Vehicle testing and development through expansion of test beds and pilot testing wherein Connected Vehicle innovations can be vetted for efficacy and interoperability.

Background: The best-known DSRC-necessary Apps are those in the Safety Pilot demonstration. We believe there are additional DSRC-necessary apps that will yield additional benefits. By identifying as many apps as possible in this category, the JPO will more fully identify the benefits of DSRC. Moreover, by identifying DSRC-necessary Apps that function even without significant market penetration, JPO can highlight applications with nearer-term benefits than some of the safety apps.

Recommendation 20. When reporting on the Connected Vehicle program the ITS JPO should use the analytical category "DSRC-necessary Apps". DSRC-necessary Apps are application-layer programs whose functioning demands the characteristics of the DSRC network (high speed, security, privacy, no subscriber fee, and no opt-in).

ITS JPO should identify all known or planned DSRC-necessary apps. It should seek to stimulate further development of such applications. DSRC-necessary apps that can operate in (near) stand-alone mode should be identified.

Department's Response to Recommendation 20. The Department partially concurs. Identifying application categories might be more appropriate since there will be many variations on particular applications. Likely DSRC necessary application categories would include multi-vehicle crash avoidance applications, signalized intersection crash avoidance applications, commercial vehicle inspection or enforcement support applications. All of these categories of applications could operate in (near) stand-alone mode. All include the need to communicate with a (rapidly) moving vehicle. Most other application categories can be accomplished by multiple communication media.