IntelliDrive[SM] Enabling Devices with DSRC Workshop Summary

May 6, 2010, 1:00pm – 5:00pm
ITS America 20th Annual Meeting & Exposition
Houston, Texas

Background

The IntelliDrive[SM] Program is interested in accelerating vehicle-to-vehicle communications using dedicated short range communications (DSRC) between different types of devices. IntelliDrive[SM] efforts have made a DSRC 5.9 GHz network available for a range of applications that address active safety by providing crash warnings designed to reduce or eliminate vehicle crashes.

The ITS JPO seeks to better understand the potential for devices to be enabled with the DSRC technology to communicate vehicle-to-vehicle information and messaging. In addition, the ITS JPO seeks to understand the major issues facing manufacturers and the role of the Federal government to address those issues or overcome deployment hurdles. To achieve these outcomes, the ITS JPO hosted an open "Enabling Devices with DSRC" Workshop ("workshop").

The workshop was held on May 6, 2010 following the closing plenary session of the ITSA 20th Annual Meeting & Exposition at the Hilton Americas in Houston, TX from 1:00pm – 5:00pm CST. The workshop was open to all interested parties in the automotive, telecommunications, consumer electronics, and other industries. It attracted over 60 participants, including device manufacturers, applications developers, and industry representatives. The summary of the discussion is available below. Selected questions and answers from the workshop are listed in Appendix A. Presentation slides will be available on the IntelliDrive[SM] website at: www.intellidrive.org.

Speakers

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Synthesis

The purpose of the workshop was to solicit input from stakeholders and interested parties on the potential use of nomadic DSCR enabled devices for the IntelliDrive^{SM} program. The workshop presentation discussed the ITS JPO's interest in accelerating the market for DSRC enabled devices and specific initiatives under the V2V Safety program that would be of interest for the DSRC device industry. The presentation addressed several major topics which included: a) the Evolution of VII into IntelliDrive^{SM}, b) the V2V Safety Program, c) the Safety Pilot, d) the Sources Sought Notice (SSN) and d) results from interviews with stakeholders in the DSRC device industry. Much of the discussion centered on upcoming Safety Pilot activities and the requirements expressed in the Sources Sought Notice.

Safety Pilot

The purpose of the Safety Pilot is to demonstrate the 'real world' capability of V2V implementation and assess driver acceptance of vehicle based safety systems. Using aftermarket devices and retrofit systems, the pilot attempts to explore V2V capability in different test environments. Consisting of two main activities, driver clinics and the model deployment, the Safety Pilot will provide field data to support the 2013 regulatory V2V decision, while leveraging data for V2I safety and non-safety applications, such as mobility, environment, and weather. Driver clinics would include performance testing in different geographic environments, using small numbers of light vehicles and nomadic devices. The model deployment would involve testing a 'critical mass' or large number of vehicles and devices by creating a "highly saturated" operating environment. It would also include a mixture of integrated safety systems using nomadic devices, cars, trucks, buses, and transit vehicles.

Workshop attendees were interested in a range of issues, especially regarding scalability and procurement. One issue of interest was in how scalability and interoperability would be addressed in the Safety Pilot and whether there would be multiple device suppliers used. In response, the ITS JPO discussed its plan to use multiple vendors in the Safety Pilot and to procure thousands of units. Using different vendors would also test interoperability between devices. Scalability concerns would be addressed under V2V roadmap activities and in the Safety Pilot. A technical team had already evaluated the appropriate size of the model deployment to address scalability and support safety benefits assessment. There were several questions regarding the type of vehicles used in the Safety and whether DSRC enabled devices had to work in all models. The ITS JPO expressed its expectation that DSRC enabled devices should be able to operate in most vehicles or the 80th percentile of vehicles and that CAMP would be supplying a limited number of integrated safety system vehicles for the Safety Pilot. Other areas of interest included: test plan specifications, future V2I efforts and CAMP technical work.

Sources Sought Notice

Discussion at the workshop focused primarily on clarifying the Sources Sought Notice (SSN) that had been recently released (as of April 29th). The intent of the SSN is for the US DOT to identify companies able to produce a 5.9GHz device to support a future solicitation of a large number of devices needed for the upcoming model deployment activity. Companies identified through the SSN will be assessed through its responses and product testing to become part of a qualified products list, where only those on the list

will be sent a solicitation for the model deployment. The model deployment will be competitively awarded and multi-modal in nature. The SSN is listed under DTFH61-10-R-00026 and is open for 30 days. It is available on the FHWA Federal Business Opportunities website: https://www.fbo.gov/index?s=opportunity&mode=form&id=a8418665b1ad9bdb8a5da88eedc49d64&tab=core&_cview=0

Device manufacturers within the audience wanted clarification on the SSN requirements for the 5.9GHz devices and asked questions on specific technical capabilities requested in the SSN. One key issue related to the positioning ability of DSRC devices. The ability of a device to accurately report the location of the center of the vehicle was identified as a crucial characteristic the ITS JPO was interested in. Devices must be able to accurately understand its relative position to the center of the vehicle. It is less important to understand the location of the device within the vehicle. Other issues raised about the SSN referred to the provisioning/test interface needed for devices. Device manufacturers must be able to provide provisioning updates and maintain them. The ITS JPO also recognized that the SSN was light vehicle centric at the moment, but that the need for devices to understand the dimensions of the vehicle to accommodate larger heavy vehicles would need to be addressed and better articulated. Other comments addressed the need for a certificate authority to distribute credentials as well as to identify faulty messages. In response, the ITS JPO discussed its current efforts in researching different certificate authority options and the need for credentials at the time of manufacture.

Industry Interviews

Interviews with various stakeholders from the DSRC device industry were conducted over the last several months in order to collect input on accelerating the market for DSRC enabled devices for V2V. Interviewees included representatives from device manufacturers and vendors and were asked their perspective around three main areas, technology issues, business challenges, and cultural challenges facing the industry as well as their business. The summary of the interview results will be available on the IntelliDrive^{SM} website at: www.intellidrive.org.

Comments regarding industry interview results centered on the need for clarifying the reasons behind interviewee responses as well as their greater context. One issue raised was on the number or availability of chip manufacturers able to produce DSRC devices. Contrary to interview responses, workshop attendees believed that locating DSRC chip manufacturers was not a business challenge and that they were easily available. Other comments referred to the importance of identifying privacy and security challenges. The ITS JPO confirmed that privacy and security issues were a key component of all current research activities and that future workshops would be held to specifically evaluate these topics.

US DOT Actions

At the end of the workshop, the ITS JPO asked the audience to provide input on the role of the Federal government and whether the US DOT was taking appropriate actions to address challenges for accelerating DSRC for V2V Safety. Workshop attendees were clear in their response, saying that the Safety Pilot and its model deployment was an appropriate and “accelerated” first step towards achieving real world results for DSRC enabled devices. The US DOT actions in procuring and testing devices were on the correct path.

Appendix A: Select Audience Questions

Question: Will you be providing a certificate authority in your model deployment because signing a message assumes security credentials? How is that going to work?
ITS JPO: Yes, we are looking into this. There will be a process for creating, distributing credentials for a certificate authority.

Question: Will you be using over the air revocation and what will be the process for this?
ITS JPO: We have not come to a conclusion on that yet, but we are certain that a certificate authority will be a part of this.

Question: For the maintenance of security credentials what type of interface is necessary?
ITS JPO: We know we need credentials at the time of manufacture. So far, we believe there are going to be 3 types or class of devices that we be evaluated: a) consumer grade, b) a purpose designed device intended for temporary installation, and c) a purpose designed device for long term installation. We want to look at all different types.

Question: In provisioning an interface that needs to be available for the device – what will be the backend service for provisioning? Who will do this? Will you or, will the device supplier have to do provisioning backend?
ITS JPO: We are expecting the device manufacturer to be able to provide provisioning updates. The device manufacturer will have to provide some mechanism for updating and maintaining provisioning updates.

Question: How is the location of the equipment within the vehicle addressed?
ITS JPO: We are not interested in the location of equipment but in the location of the center of vehicle. Everyone must be able to accurately understand where the device is relative to the center of the vehicle.

Question: Can you discuss self certification mentioned in the solicitation?
ITS JPO: We will want public acceptance criteria. We are expecting that the device meets the criteria and that you can submit results, similar to car parts suppliers.

Question: Now that we are combining CVOs, cars, are you also expecting that devices will not only provide the location of the center of the vehicle, but also the dimensions?
ITS JPO: We are very light vehicle centric right now, but we hope to articulate these needs better. This will be covered in the solicitation. We will be buying several thousands of these, so we do need to have this information available for the exercise.

Question: Can you explain where the 5cm requirement came from? What is the safety benefit here?
ITS JPO: This refers to the relative position of the device to the center of the vehicle. We are looking for accuracy in the position of the center of the vehicle and not really concerned with the location of the device in the vehicle. We understand that not everyone can have absolute accuracy – but we are asking that the device meets this requirement. There will also be another round of discussion – in coincidence

with the ***Telematics Update*** in June in Detroit. This will be after the sources sought notice closes. But you (audience) need to identify yourselves before the solicitation closes out.

Question: I am surprised to see interoperability in the presentation because this has already been demonstrated. The test beds in Michigan have already created an environment where this works. Can you elaborate on why this topic is listed in your presentation?
ITS JPO: From our discussions with different stakeholders and manufacturers, this was brought up as an issue. As a result, we decided to include it but are open to your thoughts and ideas on this topic. Also, just to be clear, there is concern about interoperability between message payloads not necessarily interoperability between devices.

Question: In the proof of concept testing, we had one supplier of devices, which was an issue. Will you do the same for the Safety Pilot?
ITS JPO: For the Safety Pilot, we are planning on using multiple vendors, not just one. This will also help to test and ensure interoperability.

Question: I disagree with your statement on the "limited" number of DSRC chip manufacturers. Why was this brought up as an issue? From my perspective, there are hundreds of chip manufacturers and anyone of those manufacturers can develop a DSRC chip. A DSRC chip is an adaptation of an existing chip and is not overly unique. The 802.11P is based on 802.11A.
ITS JPO: That was brought up during some of our interviews, however, that is important feedback for us to know. That is the type of input or information that we are looking for because it will help us better understand these issues and challenges.

Question: What role, if any is the FCC playing in devices?
ITS JPO: One company has demonstrated a device that is considered "FCC-certified." They forged new ground on getting FCC certification and have been through this process once. They are the first company that we are aware of that has looked into this issue.

Question: I am hearing concerns about scalability of the DSRC system. Since there will be a large number of devices needed in procurement, will scalability be addressed here?
ITS JPO: There will be a scalability activity under the V2V roadmap. OEMs will be ramping up with 200 units and the Safety Pilot will have units in the thousands. By 2012, we should have device updates, vehicle updates, and technical work performed by CAMP to use as an opportunity to update both in-vehicle and nomadic devices to reflect scalability.

Question: Europe has had similar questions about scalability. They're thinking that a bigger pilot is needed to fully answer that question. They currently have a plan where units are in the 10,000s and so they are realizing that this is needed to address scalability. This is much larger than what the DOT is doing, what's your take on their efforts?
ITS JPO: It depends on what they're trying to focus on. We have had a technical team look at the size of the model deployment activity to support benefits assessment.

Question: What is CAMP doing under the V2V Safety Pilot and how does their work fit into the rule-making decision?
ITS JPO: CAMP is providing vehicles and doing some technical work. CAMP is not an overseer or conductor of the Safety Pilot, but will contribute to operational aspects of the pilot. CAMP is doing off road technical work. The Safety Pilot is doing a 'real world' demonstration, whereas CAMP is not involved in this aspect. They represent separate activities.

Question: 50 or 100 vehicles will need to have embedded equipment. Can you talk about the safety applications that will be on the 50-100 vehicles? Also, who will be doing this?
ITS JPO: CAMP is going to be developing the safety applications for those vehicles. They have already identified a group of about a dozen V2V safety applications that could be tested. CAMP will also supply those 50-100 vehicles.

Question: With different kinds of cars, do you plan to look at the link between how the devices behave in a car versus how it behaves in a test chamber? Also, do you have any specifications on the kind of car that you will be using, because some cars will have a metallic layer or metallic film on the windows, which can challenge signal transmission?
ITS JPO: We are testing it based on the perspective of the receiver. We want to make sure that people who are building this equipment need to tackle the problem of identifying the center of the vehicle. Also, we are going to go for the 80th percentile of vehicles. We are expecting people (device manufacturers) to accommodate the majority of vehicles and not necessarily all of them.

Question: You are testing to ensure that messages can be received, certain messages may be longer. If you can send a short message, can you send a longer message – will that work and will this be tested?
ITS JPO: V2V Safety is about crash prevention, not necessarily about after crash information. The standards developed have been created to go up to a certain message size. When you talk about the length of the message, it is constrained by the purpose of crash prevention, so it is unlikely that we are not looking at very long data transmissions. In addition, we will be dealing with those issues in V2I activities that are planned to follow these V2V activities, but we do want to understand our primary issues first.

Question: What is the test plan for the Safety Pilot? You mentioned that there will be a certification of messages and revocation in some form. Will there be purposely disabled messages from faulty messages and/or how will misbehavior be tested?
ITS JPO: We would like to test first that everything (equipment, data transmission) works. Once we have established this, then we are going to look at misbehavior. We want to have authentication messages happening and we want the equipment to understand this complexity, but the emphasis of the test will be on 'correctly' operating messages.

Question: Will you be testing whether we can pull 'right' messages out and filter out 'bad' messages?
ITS JPO: Not initially, we want to start with 'correctly operating' messages and understanding the implementation of this process first.

Question: Nothing I've heard here relates to V2I, are we abandoning this concept? Are we going to be able to get messages to go somewhere else, besides just adjacent vehicles?
ITS JPO: We have not abandoned V2I. In fact, we have a V2I program. In the Safety Pilot, we are planning for a limited amount of infrastructure to generate the Signal Phase and Timing (SPaT) messages that enable V2I safety applications. The information we gather from the Safety Pilot will help us understand V2I issues and will guide future efforts in this area.

Question: It seems that you will need infrastructure nodes to address security issues, will this open the door to V2I activities?
ITS JPO: We are looking at this and again, we are looking at V2I. We are looking at a corridor situation to use SPAT and will be testing this. Regarding the issue of security, the team is working on that, and we are not sure yet, whether it will require new infrastructure or what type of infrastructure. There will be some infrastructure in the Safety Pilot to test security and the use of infrastructure nodes. However, this will also be influenced by policy issues, such as security and privacy. Also, just to clarify, the word infrastructure does not necessarily mean DSRC. We will look at other existing wireless technologies as well.

Question: Is toll collection recognized as a safety application?
ITS JPO: No, this is not included in V2V Safety and the Safety Pilot will not include this.

Question: Are you planning on including a requirement that devices will be working with a channel switching scheme?
ITS JPO: Since we're not interested in receiving specific messages right now, we are not concerned with a channel switching scheme. For the time being, we are interested in crash avoidance, which will concentrate on one channel. We are not exercising channel switching capability. This issue will need to be resolved, but not at this point.

Question: It seems that existing infrastructure is not as secure and that cellular is not secure for authenticating certificates. How do you reconcile this?
ITS JPO: No, we believe cellular would work for existing infrastructure. We believe that it will be secure enough.

Question: Will you consider a class 0 device that doesn't have positioning but makes its presence known?
ITS JPO: No, this class 0 device will not be considered. The messages will become too close together and we don't want to get into this type of situation.

Question: What is the role of the DOT on how it will approach privacy and security?
ITS JPO: We are currently looking into this. We are performing an analysis on what the privacy concerns are, if any. We are also performing a 'tradeoff analysis' on the level of security and its associated risks. We will be holding workshops with privacy groups to address this. There will also be a workshop in July, where we will discuss relevant policy issues.