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Response to: Notice of Request for Comments: V2X Communications
Docket No. DOT-OST-2018-0210

The Georgia Department of Transportation (GDOT) commends the efforts the U.S. Department of Transportation (U.S.DOT) has made in leading the evolution and adoption of connected vehicle technologies. GDOT is in agreement with U.S. DOT that the technology has the potential for significant safety and mobility benefits.

GDOT, in its own efforts and in partnership with AASHTO, has begun to realize these benefits through pilot deployments of Dedicated Short-Range Communications (DSRC) operating in the 5.9 GHz safety spectrum, as well as the beginnings of its systemic deployment of DSRC equipment in the metro Atlanta area. With over 54 intersections operating signal timing and phasing applications currently and an additional 1,700 intersections to be equipped and operating by June 2020, GDOT wholly believes this technology will be transformational to operations of our state highway network.

In specific response to the Request for Comments, GDOT offers the following responses to the nine questions asked in the docket

1. Please provide information on what existing or future technologies could be used for V2X communications, including, but not limited to, DSRC, LTE C-V2X and 5G New Radio. What are the advantages and disadvantages of each technology? What is the timeframe for deployment of technologies not yet in production? Please provide data supporting your position.

   Safety critical applications operating of vehicles will only be functional and effective when they can operate within a technology framework that provides direct peer-to-peer/device-to-device connections with no latency. The only existing technology that has demonstrated the ability to successfully accomplish this action is 5.9 GHz Dedicated Short Range Communications (DSRC). It is GDOT's opinion that any existing or new technology must adhere to these same requirements of no latency, open access, and peer-to-peer/device-to-device direct communications. Safety critical applications in vehicles should in no way be dependent upon service charges or intermediate service providers.

Other applications, including traveler information systems, do not require the same level of time sensitive or direct communications engagement; therefore, these applications can easily be provided through a broad spectrum of existing technologies. It is GDOT's opinion that non-safety critical applications can already successfully be delivered through existing low latency technologies, such as 4G LTE.

2. Of the V2X communications technologies previously discussed, at present only DSRC is permitted to be used in the 5.9 GHz spectrum band for transportation applications. If that allocation were to be changed to allow any communication technology for transportation applications, could DSRC and other technologies (e.g., C-V2X, 5G or any future technology) operate in the same spectrum band or even the same channel without interference? Why or why not? If there are any technical challenges to achieving this goal, what are they and how can they be overcome?

   It is GDOT's opinion that the entire allocation of the 5.9 GHz spectrum band for transportation applications is necessary for the successful application of safety critical applications. Introducing additional technology into this spectrum will create the probability of data interference and the high potential to interrupt and interfere with safety critical applications, thus rendering them ineffective. Even more so, interruption or interference with safety critical messages could create hazards or incidents to users by providing false or incomplete information. Any introduction of additional technologies into this spectrum for transportation purposes must have its guarantee that it will in no way interfere with proven safety critical applications of DSRC.

3. To what extent is it technically feasible for multiple V2X communications technologies and protocols to be interoperable with one another? Why or why not? Can this be done in a way that meets the performance requirements for safety of life applications, as they were discussed in the V2V NPRM? What additional equipment would be needed to achieve interoperability or changes in standards and specifications? What is the projected cost of any necessary changes? How soon can these changes and equipment prototypes be available for testing?

   GDOT will rely on technical experts to conclude the feasibility of communications technologies interoperability. Based on our experience, there are currently

insurmountable challenges to provide this interoperability between different communications and protocols.

4. To what extent is it technically feasible for different generations of the same V2X communications technologies and protocols to be interoperable with one another? Why or why not? Can this be done in a way that meets the performance requirements for safety of life applications? What additional equipment or changes in standards and specifications would be needed to achieve interoperability? What is the projected cost of any necessary changes?

   GDOT will rely on technical experts to conclude the feasibility of communications technologies interoperability. Based on our experience, there are currently insurmountable challenges to provide this interoperability between different communications and protocols.

5. Even if they are interoperable across different technologies and generations of the same technology, would there be advantages if a single communications protocol were to be used for V2V safety communications? What about other V2X safety applications, such as those involving V2I and V2P communications?

   It is GDOT's opinion that a single communications protocol is necessary to ensure interoperability of safety critical communications technologies across state lines and between vehicles manufactured by others. Open standards between manufacturers in the traffic industry in the past have not lived up to their promise of interoperability. There are already enough challenges in creating standards for a single communications protocol; the introduction of multiple protocols and vendor specific proprietary objects will surely render the technology useless.

6. How would the development of alternative communication technologies affect other V2I and V2P communications, such as those supporting mobility or environmental applications? Do these applications have the same or different interoperability issues as V2V safety communications? Do different V2X applications (e.g., platooning) have different communication needs, particularly latency?

   It is GDOT's opinion that alternative communications technologies could enhance the safety and mobility benefits of V2X applications; however, it is our understanding that manufacturers (such as vehicle OEMs) are reluctant to utilize unproven technologies for safety critical applications. Therefore, the introduction

of alternative technologies would likely set back the deployment of life-saving technology by decades. This can be evidenced by the slow deployment of DSRC: the spectrum was allocated in 1998; it was not until the late 2010's that we began to see the technology be announced to be installed in vehicles.

Different V2X applications do have different communications needs, specifically to latency. All safety critical applications require zero latency, while traveler information based applications have no real latency requirements.

7. Do different communication technologies present different issues concerning physical security (i.e., how to integrate alternative communication technologies into vehicle systems), message security (i.e., SCMS design or other approaches), or other issues such as cybersecurity or privacy? Would these concerns be affected if multiple but still interoperable communication technologies are used rather than one?

   It is GDOT's understanding that cybersecurity issues would be common regardless of communications technologies. It is GDOT's understanding that the introduction of multiple communications technologies would add many additional hurdles to providing uniform security credentialing between vehicles, infrastructure, and others.

8. How could communications technologies (DSRC, C-V2X, 5G or some other technology) be leveraged to support current and emerging automated vehicle applications? Will different communication technologies be used in different ways? How?

   Current communications technologies can immediately be implemented to provide both proven and theoretical safety and mobility applications. GDOT is already operating signal phasing and timing based applications at 54 intersections in metro Atlanta, with another 231 to be operating in the next two months, and an additional 1,500 by June 2020. The applications currently deployed necessarily rely on no-latency DSRC, but there are many other non-safety critical applications related to traveler information that could be deployed immediately through other communications technologies. It is expected that a dual technology approach, where safety critical applications operate independently on dedicated short-range communications spectrum, and non-safety critical applications operate within other technologies, would support the needs of GDOT in efforts involving connected vehicles.

9. How could deployments, both existing and planned, assess communications needs and determine which technologies are most appropriate and whether and how interoperability could be achieved?

   GDOT welcomes the use of its existing deployment of 5.9 GHz DSRC roadside equipment to be used as a test bed for real world applications to determine communications technology interoperability and for determining the appropriateness of technologies.

GDOT appreciates USDOT's continued leadership to help clear the way for the safe and timely adoption of CAVs. More specifically, we applaud USDOT’s efforts to further explore V2X development and technology compatibility issues.