



DEPARTMENT OF TRANSPORTATION

Billing Code No. 4910-9X

Office of the Secretary

[Docket No. DOT-OST-2018-0210]

Notice of Request for Comments: V2X Communications

AGENCY: Office of the Secretary, Department of Transportation (DOT)

ACTION: Notice of Request for Comment

SUMMARY: Over the past several years, the Department of Transportation and its operating administrations have engaged in numerous activities related to connected vehicles, including vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-pedestrian (V2P) communications, collectively referred to as “V2X” communications. Recently, there have been developments in core aspects of the communication technologies that could be associated with V2X. This notice requests comment on how these developments impact both V2X in general and the Department’s role in encouraging the integration of V2X.

DATES: You should submit your comments within 30 days after the date of publication in the Federal Register. See the SUPPLEMENTARY INFORMATION section on “Public Participation,” below, for more information about written comments.

ADDRESSES: Comments should refer to the docket number above and be submitted by one of the following methods:

- Federal Rulemaking Portal: <http://www.regulations.gov>. Follow the online instructions for submitting comments.
- Mail: Docket Management Facility, U.S. Department of Transportation, 1200 New Jersey Avenue SE., West Building Ground Floor, Room W12-140, Washington, DC 20590-0001.

- Hand Delivery: 1200 New Jersey Avenue SE., West Building Ground Floor, Room W12-140, Washington, DC, between 9 a.m. and 5 p.m. ET, Monday through Friday, except Federal Holidays.

Instructions: For detailed instructions on submitting comments and additional information on the rulemaking process, see the Public Participation heading of the SUPPLEMENTARY INFORMATION section of this document. Note that all comments received will be posted without change to <http://www.regulations.gov>, including any personal information provided.

Privacy Act: Except as provided below, all comments received into the docket will be made public in their entirety. The comments will be searchable by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an associations, business, labor union, etc.). You should not include information in your comment that you do not want to be made public. You may review DOT's complete Privacy Act Statement in the Federal Register published on April 11, 2000 (65 FR 19477-78) or at <https://www.transportation.gov/privacy>.

Docket: For access to the docket to read background documents or comments received, go to <http://www.regulations.gov> or to the street address listed above. Follow the online instructions for accessing the dockets.

FOR FURTHER INFORMATION CONTACT: Please contact us at automation@dot.gov or Sujeesh Kurup (202-366-9953) for policy issues or Timothy Mullins (202-366-9038) for legal issues.

SUPPLEMENTARY INFORMATION

Over the past several years, the Department of Transportation (Department or DOT) and its operating administrations have engaged in numerous activities related to connected vehicles, which generally encompass vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-pedestrian (V2P) communications, collectively known as “V2X.” These activities are based on the Department’s view that V2X technologies have the potential for significant safety and mobility benefits, both on their own and as complementary technologies when combined with in-vehicle sensors supporting the integration of automated vehicles and other innovative applications such as platooning.

The agency’s connected vehicle activities have primarily centered on utilizing Dedicated Short-Range Communications (DSRC), which is consistent with the longstanding and current Federal Communications Commission (FCC) allocation of the 5.9 GHz radiofrequency band, as discussed below. Most prominently, the National Highway Traffic Safety Administration (NHTSA), an operating administration of DOT, issued a notice of proposed rulemaking (NPRM) to mandate V2V communications for new light-duty vehicles and to standardize the format and performance requirements of V2V messages.¹ The NPRM identified DSRC as the primary communication medium, but also included provisions for other mediums if they could meet certain “performance and interoperability requirements, which are based on the capabilities of today’s DSRC-based V2V communications.”² In addition to the NHTSA NPRM, the Department, State and local governments, and industry are taking many other actions in developing and deploying V2X technologies. For example, General Motors recently announced that it will be expanding DSRC-based V2X deployment on future Cadillac vehicles, following-

¹ NHTSA, “Federal Motor Vehicle Safety Standards; V2V Communication,” 82 Fed. Reg. 3854 (Jan. 12, 2017).

² *Id.* at 3881.

up the first U.S. production V2X deployment in the 2017 Cadillac CTS,³ and Toyota announced it would begin offering DSRC-based V2V technology on selected models beginning in 2021.⁴

There has also been considerable progress by State and local governments in deploying V2X technology, in addition to DOT-funded deployment programs, such as the Ann Arbor Connected Vehicle Environment, Connected Vehicle Pilots Program, and the Advanced Transportation and Congestion Management Technologies Deployment Program. All told, the Department understands that by the end of 2018, there will be more than 18,000 vehicles deployed with aftermarket DSRC-based V2X communications devices and more than 1,000 infrastructure V2X devices installed at intersections and along roadways in 25 States. Significant work has also been done on the development of the “Security Credential Management System” (SCMS) for V2X communications, both by the Department and industry partners (specifically, the Crash Avoidance Metrics Partnership, LLC (CAMP)), and other private sector organizations.

In addition, there have been developments in core aspects of the communication technologies needed for V2X, which have raised questions about how the Department can best ensure that the safety and mobility benefits of connected vehicles are achieved without interfering with the rapid technological innovations occurring in both the automotive and telecommunications industries.

First, there has been progress in both Cellular-V2X (C-V2X) and “5G” communications, both of which may, or may not, offer both advantages and disadvantages over DSRC. C-V2X is

³ General Motors, “Cadillac to Expand Super Cruise Across Entire Lineup,” Jun. 6, 2018, *available at* https://media.gm.com/media/cn/en/gm/news.detail.html/content/Pages/news/cn/en/2018/June/0606_Cadillac-Lineup.html.

⁴ Toyota, “Toyota and Lexus to Launch Technology to Connect Vehicles and Infrastructure in the U.S. in 2021,” Apr. 6, 2018, *available at* <https://corporate.toyota.com/releases/toyota+and+lexus+to+launch+technology+connect+vehicles+infrastructure+in+u+s+2021.htm>.

based on the LTE (4G) “release 14” standards issued by the 3rd Generation Partnership Project (3GPP)⁵ and is being explored by chip manufacturers.⁶ Also referred to as “LTE C-V2X,” it is being evaluated by some auto manufacturers as an alternative to DSRC.⁷ Standards organizations are also developing the next generation of cellular communications, generally called “5G,” including “New Radio C-V2X” (or NR C-V2X), which will focus on enhanced V2X services in the following four areas: (i) Vehicles Platooning; (ii) Advanced Driving; (iii) Extended Sensors; and (iv) Remote Driving.⁸ Requirements for 5G-based NR C-V2X are expected to be solidified by December of 2019.⁹

Second, in response to interest on the part of certain stakeholders for additional spectrum to support Wi-Fi services and applications, the FCC released an NPRM in February 2013 to amend the Commission's rules governing the operation of Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz band. This NPRM sought public comment on whether the 5.9 GHz band allocated for DSRC might be shared with unlicensed devices—and principally Wi-Fi devices.¹⁰ On June 7, 2016, FCC issued a “Refresh of the Record” for this NPRM asking for additional input as well as prototype devices that would support testing of sharing concepts.¹¹ To assess the feasibility of certain sharing concepts, the Department

⁵ For details on C-V2X, see 3GPP, “Release 14,” <http://www.3gpp.org/release-14>. For industry development of C-V2X definitions, see SAE, CV2X Direct Communication Task Force, <https://www.sae.org/works/committeeHome.do?comtID=TEV5GDC>.

⁶ Qualcomm: <https://www.qualcomm.com/invention/5g/cellular-v2x>

Huawei: <https://www.huawei.com/en/press-events/news/2018/6/Huawei-v2x-strategy-RSU-launch>

⁷ <http://5gaa.org/news/5gaa-audi-ford-and-qualcomm-showcase-c-v2x-direct-communications-interoperability-to-improve-road-safety-2/>

⁸ <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3108>

⁹

[http://www.3gpp.org/ftp/Information/presentations/presentations_2018/RAN80_webinar_summary\(brighttalk\)extended.pdf](http://www.3gpp.org/ftp/Information/presentations/presentations_2018/RAN80_webinar_summary(brighttalk)extended.pdf)

¹⁰ See FCC, “Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band,” 78 Fed. Reg. 21320 (Apr. 10, 2013).

¹¹ See FCC, “Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band,” 81 Fed. Reg. 36501 (Jun. 7, 2016).

collaborated with FCC and the National Telecommunications and Information Administration (NTIA) in developing a three-phase spectrum sharing test plan, which remains ongoing.¹² In addition to these activities, there is the related question of whether the existing spectrum framework, focused upon DSRC, should be revised to allow alternative technologies, including those discussed above, to use the relevant spectrum band for transportation purposes.

In light of these developments, the Department is interested in learning more about recent developments in V2X technologies. In particular, the Department wants to hear from stakeholders, and the public generally, whether focusing on DSRC as the primary means of V2V communications is consistent with recent technological developments, as well as with the Department's general desire to remain technologically neutral and avoid interfering with the many innovations in transportation and telecommunication technologies. If technological developments support the use of alternatives to DSRC, the Department would also need to know how to ensure that these alternative technologies are interoperable with each other and DSRC.

We believe the below questions may help guide commenters, but commenters are also free to provide their views on the general issues surrounding V2X communications. To the extent possible, please provide data, technical information, or other evidence to support your comments.

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.

¹² See FCC, Public Notice, "The Commission Seeks To Update and Refresh the Record in the 'Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band' Proceeding," Jun. 1, 2016, *available at* <https://docs.fcc.gov/public/attachments/FCC-16-68A1.pdf>; see also FCC, "U-NII-4-to-DSRC EMC Test and Measurement Plan, Phase I: FCC Laboratory Tests," Oct. 7, 2016, *available at* <https://transition.fcc.gov/oet/et/DSRC-Test-Plan-10-05-2016.pdf>; FCC, U-NII-4 Prototype Device Testing Open House Summary," Oct. 21, 2016, *available at* <https://transition.fcc.gov/oet/et/DSRC-Test-Plan-10-05-2016.pdf>; DOT, "USDOT Spectrum Sharing Analysis Plan: Effects of Unlicensed-National Information Infrastructure (U-NII) Devices on Dedicated Short-Range Communications (DSRC)," Dec. 2017, *available at* https://www.its.dot.gov/research_archives/connected_vehicle/dsrc_testplan.htm.

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.

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?
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?
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?

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?
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?
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?
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?
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?

Public Participation

How do I prepare and submit comments?

Your comments must be written and in English. To ensure that your comments are filed correctly in the docket, please include the docket number of this document in your comments. Please submit one copy (two copies if submitting by mail or hand delivery) of your comments, including the attachments, to the docket following the instructions given above under ADDRESSES. Please note, if you are submitting comments electronically as a PDF (Adobe) file, we ask that the documents submitted be scanned using an Optical Character Recognition (OCR) process, thus allowing the agency to search and copy certain portions of your submissions.

How do I submit confidential business information?

Any submissions containing Confidential Information must be delivered to OST in the following manner:

- Submitted in a sealed envelope marked “confidential treatment requested”;
- Accompanied by an index listing the document(s) or information that the submitter would like the Departments to withhold. The index should include information such as numbers used to identify the relevant document(s) or information, document title and description, and relevant page numbers and/or section numbers within a document; and
- Submitted with a statement explaining the submitter's grounds for objecting to disclosure of the information to the public.

OST also requests that submitters of Confidential Information include a non-confidential version (either redacted or summarized) of those confidential submissions in the public docket. In the event that the submitter cannot provide a non-confidential version of its submission, OST requests that the submitter post a notice in the docket stating that it has provided OST with Confidential Information. Should a submitter fail to docket either a non-confidential version of its submission or to post a notice that Confidential Information has been provided, we will note

the receipt of the submission on the docket, with the submitter's organization or name (to the degree permitted by law) and the date of submission.

Will the agency consider late comments?

U.S. DOT will consider all comments received before the close of business on the comment closing date indicated above under DATES. To the extent possible, the agency will also consider comments received after that date.

How can I read the comments submitted by other people?

You may read the comments received at the address given above under COMMENTS. The hours of the docket are indicated above in the same location. You may also see the comments on the Internet, identified by the docket number at the heading of this notice, at <http://www.regulations.gov>.

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Finch Fulton,

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