IEEE 802.18

Radio Regulatory Technical Advisory Group

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| Reply Comments on FCC19-138 NPRM Revisiting Use of the 5.850-5.925 GHz Band |
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Abstract

r06: 01apr: clean copy of r05 after review with .18 ad hoc

r05: 31mar: updates from 3 EC members and review with .18 ad hoc on updates.

r04: 20mar, .18 teleconference, 3 editorial edits brought up, grammar in section 4 and added exec summary up front. also correct section numbering

r03: 19 mar, cleaner copy of r02, ready for final review and approved, (with editorial edits allowed.)

r02: 18mar, .18 ad hoc – starting with a semi-clean copy for r01 and added last two sections before conclusion and other edits throughout.

r01: 17mar, .18 ad hoc – many different sections and areas of edits and updates.

r00: 16mar, .18 ad hoc - initial draft to get started

**Before the**

**Federal Communications Commission**

**Washington, D.C. 20554**

In the Matter of )

)

Use of the 5.850-5.925 GHz Band ) ET Docket No. 19-138

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**Reply Comments of IEEE 802**

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# Introduction

IEEE 802 LAN/MAN Standards Committee (LMSC) is pleased to provide reply comments on the above-captioned proceeding to the NPRM on the use of the 5850-5925 MHz Band dated 06 February 2020 in the United States Federal Register.

IEEE 802 LMSC is a leading- consensus-based industry standards body, producing standards for wireless networking devices, including wireless local area networks (“WLANs”), wireless specialty networks (“WSNs”), wireless metropolitan area networks (“Wireless MANs”), and wireless regional area networks (“WRANs”). We appreciate the opportunity to provide these reply comments to the Commission.

IEEE 802 is a committee of the IEEE Standards Association and Technical Activities, two of the Major Organizational Units of the Institute of Electrical and Electronics Engineers (IEEE). IEEE has about 420,000 members in about 190 countries and supports the needs and interests of engineers and scientists broadly. In submitting this document, IEEE 802 acknowledges and respects that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802. Therefore, this submission should not be construed as representing the views of IEEE as a whole.[[1]](#footnote-1)

# Executive Summary

With the release of FCC NPRM 19-129 (E.T. Docket 19-138), the United States Federal Communications Commission has requested comments and reply comments regarding assessing the 5.9 GHz band rules and proposing appropriate changes to ensure the spectrum supports its highest and best use. In this NPRM it is proposed to: “… continue to dedicate spectrum—the upper 30 megahertz portion of the band—for transportation and vehicle safety purposes, while repurposing the remaining lower 45 megahertz part of the band for unlicensed operations to support high-throughput broadband applications.”

In the following pages IEEE 802 will address several key points as they relate to the DSRC technology, its evolution, as well as make recommendations for Commission’s consideration.

First, DSRC is not outdated; it incorporates the same state-of-the-art 802.11 technology that is in many products on the market today. Furthermore, the IEEE 802.11 WG is in the process of developing next generation V2X technology, IEEE P802.11bd, as an amendment to the IEEE 802.11 standard that ensures backward compatibility and coexistence with current DSRC deployments.

Second, DSRC has been and continues to be deployed. There are over a hundred sites around the US and thousands of vehicles outfitted with DSRC, all successfully executing ITS safety and efficiency services.

Third, IEEE 802 believes C-V2X is not superior to DSRC as it has several shortcomings that make DSRC better-suited for deployment of ITS safety and efficiency services. For example IEEE 802 believes IEEE 802.11 Working Group practice of insuring same channel backwards compatibility and the same coexistence for evolving IEEE 802.11 technologies is greatly superior than the proposed C-V2X evolution plan for Release 14 LTE V2X to 5G NR V2X that does not provide same channel backward compatibility nor same channel coexistence .

Fourth, IEEE 802 recommends that the V2X technology of choice for the ITS band 1) must be the subject of a mature set of standards, 2) must be proven through real-world testing to work effectively in ITS environments, and 3) must be future-proof by having a well-defined evolutionary path that maintains backward compatibility and coexistence with previous generations, including coexistence with DSRC that already occupies the ITS band.

The IEEE Std 802.11p-2010 amendment, now incorporated into IEEE Std 802.11-2016, provides core technology for Dedicated Short-Range Communication (DSRC). The term "OCB" (outside the context of a BSS (Basic Service Set)) was introduced in IEEE Std 802.11p, which specified "Wireless Access in Vehicular Environments". The OCB specifications within IEEE Std 802.11 continue to support DSRC-compatible operation.

The IEEE 802.11 Working Group (WG) is now specifying an IEEE Next Generation V2X (Vehicle-to-everything) amendment with the IEEE P802.11bd project. The IEEE P802.11bd amendment is intended to provide a seamless evolution path from DSRC in the 5.9 GHz DSRC band. Any consideration of the rules governing use of the 5.9 GHz band must recognize the societal value of allowing DSRC and IEEE P802.11bd to operate together in the ITS band. It should be noted that one of the advanced features being specified for the IEEE P802.11bd project is 20 MHz bandwidth operation that co-exists with 10 MHz DSRC specified in IEEE Std 802.11-2016.

# DSRC moving forward

A number of commenters [1, pages 2, 7] [2, page 2] [3, pages 2, 3] have claimed that DSRC is “outdated” and as a consequence has not been deployed. That is simply not the case. First, DSRC is based on the IEEE Std 802.11-2016 OCB operation, and therefore can be built using modern WLAN modules as in phones and laptops today. Secondly, the U.S. Department of Transportation (DOT) in their comments of March 9, 2020 [4] state that “Currently, over 123 sites across the Nation are putting the 5.9 GHz band into use. This number grew from 87 sites in June 2019.” This includes the large number of ITS safety and ITS efficiency services deployed today in the Connected Vehicle Pilot programs in New York City, Tampa, FL, Wyoming, and Columbus, Ohio [5]. DSRC a state-of-the-art technology that has been and continues to be deployed for ITS safety and ITS efficiency services around the world. Furthermore, DSRC is the basis of enhancements under development in the IEEE P802.11bd project.

# Spectrum needed for ITS

While several commenters wrote in favor of retaining the 75 MHz for ITS safety and efficiency services, others wrote in favor of the proposed reallocation. Of those that spoke in favor of retaining 75 MHz for ITS, some indicated a tolerance for C-V2X in a 20 MHz portion of that 75 MHz band. First, IEEE 802 cautions not to infer from such comments a support for C-V2X in a reduced bandwidth ITS band. Second, from a technical perspective, the considerations of which V2X technologies should be permitted in the ITS band are different for a 75 MHz ITS band than for a reduced bandwidth ITS band (e.g. for 30 MHz as the NPRM proposes). In a 30 MHz ITS band, same-channel evolution and spectral efficiency become imperative. IEEE 802 stresses that DSRC has advantages over LTE V2X with respect to both same-channel evolution and spectral efficiency.

The next generation IEEE Std 802.11 technology being developed in the IEEE P802.11bd amendment is intended to provide a seamless evolution path from DSRC in the 5.9 GHz ITS band. Any consideration of the rules governing use of the 5.9 GHz band must recognize that DSRC and IEEE P802.11bd can operate together in the same ITS channels and can coexist and share resources without interfering with each other. This coexistence and resource sharing even extends to the introduction of advanced features such as 20 MHz bandwidth operation, which is currently being developed in the IEEE 802.11bd project.

# DSRC and C-V2X

IEEE 802 disagrees with 5G Americas’s [6, page 5] assertion that 3GPP Release 14 LTE V2X supports a “richer range of services than is possible using DSRC”. DSRC supports every ITS service supported by Release 14 C-V2X sidelink. Moreover [7], DSRC supports a wide range of “advanced V2X” [8] services that 3GPP concedes Release 14 LTE V2X was never intended to support such as vehicle platooning and sensor data sharing. Furthermore, since Release 14 LTE V2X uses only broadcast, without a native unicast capability, a set of basic ITS services supported by DSRC are not directly supported by Release 14 LTE V2X. These include important services related to Infrastructure-to-vehicle warnings (e.g. Wrong-Way Driving Alert [9]), communication to a V2X security credential management system (SCMS), and collection of probe vehicle data.

Several commenters [1, pages 5-7] [2, page 3] [3, page 2] claim that by allocating ITS spectrum specifically to Release 14 LTE V2X, many of the benefits that can be derived from using (5G) cellular connectivity to vehicles accrue. This is inaccurate. Any Release 14 LTE V2X module used for ITS safety and efficiency services in ITS spectrum must be available 100% of the time for ITS services and would not be available to provide cellular connectivity. Cellular connectivity will require separate communication resources (i.e. radios and non-ITS channels). Hence, the advantages of cellular connectivity are orthogonal to C-V2X. The fact that C-V2X is also specified by 3GPP does not mean they are an integrated V2X solution. Cellular connectivity is just as easily coupled with a DSRC ITS safety and efficiency communication module. In fact, all on board units deployed today have cellular interfaces in addition to DSRC ITS communication modules operating in ITS spectrum and as such, are already utilizing the benefits of cellular connectivity when and where appropriate.

IEEE 802 finds a statement from 5G Americas misleading. 5G Americas notes that 3GPP Release 16 5G NR V2X has considered “support of … mechanisms for coexistence between LTE and NR.” [6, page 11] It is important to understand that LTE V2X (Release 14) and 5G NR V2X (Release 16) will not coexist in the same channel. 3GPP’s consideration is only for coexistence in adjacent channels. [13]

The Commission should take into account what this lack of in the same channel evolution and backward-compatibility of LTE-V2X (Release 14) will mean in the future, for example in the year 2030 or 2040. While mobile phones might already support the 6-th and 7-th generation of cellular communication standards, vehicles would need to continue using a 4G-based standard. At that point, redistributing this spectrum to a newer technology would become nearly impossible, as it would require recalling tens of millions of vehicles, while ensuring that this recall is followed by virtually all car owners, because even a small fraction of vehicles transmitting the old waveforms could create harmful interference and substantially reduce traffic safety. The lack of evolution and backward-compatibility may prevent automakers from deploying V2X today.

# Technology Choice

IEEE 802 believes that the criteria for permitting a given V2X technology to use the ITS band, whatever its eventual bandwidth, should be that the technology is:

* Fully standardized
* Proven through testing to work effectively
* Future-proof by maintaining backward compatibility, including compatibility with DSRC which already occupies the ITS band.

IEEE 802 disagrees with 5GAA that the Commission should designate ITS spectrum today for a “5G-based” technology that has not even completed the standardization phase, let alone any necessary steps for testing.[10, page 45] IEEE 802 also disagrees with 5GAA that the Commission should permit all 3GPP sidelink technologies and exclude all non-3GPP technologies.[10, page 46] 3GPP has standardized one V2X technology and is standardizing another (LTE V2X and 5G NR V2X, respectively). They do not coexist in the same channel as AT&T also has stated [11, pages13 and 14], they are not backward compatible, and they lack interoperability. 5GAA’s request that these incompatible technologies be permitted to occupy the same channel is evidence of a lack of commitment to deploy LTE V2X. IEEE 802 believes the criteria for permission to use the band should not be based on the standards organization from which they emerge, but on the objective criteria listed above.

# Support of DoT comments [12]

1. “… being technology-neutral is not the same as being outcome-neutral in determining the appropriate technology to be used for V2X communications, especially those related to critical safety-of-life applications. That is, the Department is supportive of any and all communication technologies that could be used for V2X, but these technologies must be proven to meet safety performance requirements before they can be deployed.”
2. “… the work done to develop DSRC under the existing allocation makes clear that moving from an idea to a band plan and technology suitable for safety-of-life communications is a complex process that takes considerable effort. These complications arise from both the unique aspects of V2X communications and the importance of having confidence that V2X technologies can perform critical safety-of-life applications without challenges from harmful interference, and with the assurance that priority is given to safety communications and that testing results show that all the technologies can actually co-exist within the band. These all underscore that V2X is complicated and that all of these factors must be addressed in any effective band plan.”
3. “… to achieve the reliable connectivity needed to enable safety-of-life communications, V2X must grapple with factors that are, in some respects, more complex than consumer electronic communications.”

IEEE 802 supports the concept of the technology selection process being based on scientific principles and extensive testing. In addition, IEEE 802 supports the concept that V2X is a safety of life system and not a commercial communications system. Hence all deployed devices in a V2X system must be able to communicate over the air using a single standardized protocol. This is much different than what is typical for a commercial communications system, where there is no need for a single air interface standard (e.g. 3GPP 3G (UMTS), 4G (LTE), and 5G (NR) standards can all exist in the same handset, requiring different radios since each standard has unique over the air protocols and wave forms). These 3GPP generations use different sub-bands to allow “coexistence”. This differs greatly from the IEEE 802.11 Working Group definition of coexistence, as IEEE Std 802.11 assumes coexistence is the ability of all generations of technologies deployed per IEEE Std 802.11 being able to share the same frequency and time resources. IEEE Std 802.11 assures through backwards compatibility that sharing is possible even when older radios do not have all the advanced capabilities of newer radios. It is important to allow older radios to continue to operate, while allowing newer radios to use both old and new capabilities.

# Conclusion:

 IEEE 802 believes that the Commission should not allocate ITS spectrum to LTE V2X / 3GPP technologies as they are neither future-proof nor the best technical choice for delivering ITS safety and efficiency services.

IEEE 802 thanks the Commission for providing an opportunity to comment on the NPRM ET Docket 19-138 and respectfully requests these reply comments be considered by the Commission during the final rule making process.

Regards,

By: /ss/ .

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[2] Comments of T-Mobile USA, Inc., FCC ET Docket 19-138, March 9, 2020: [https://ecfsapi.fcc.gov/file/1030957937118/T-Mobile%205.9%20GHz%20Comments%20(As-Filed)%203.9.20.pdf](https://ecfsapi.fcc.gov/file/1030957937118/T-Mobile%205.9%20GHz%20Comments%20%28As-Filed%29%203.9.20.pdf)

[3] Comments of The BMW Group, FCC ET Docket 19-138, March 9, 2020: [https://ecfsapi.fcc.gov/file/1031040719061/BMW%20Submission%20ET%20Docket%20No.%2019-138%20(003).pdf](https://ecfsapi.fcc.gov/file/1031040719061/BMW%20Submission%20ET%20Docket%20No.%2019-138%20%28003%29.pdf)

[4] Comments of the NTIA and DOT; [https://ecfsapi.fcc.gov/file/10313251510165/5.850-5.925 GHz Band C ET Dkt No. 19-138.pdf](https://ecfsapi.fcc.gov/file/10313251510165/5.850-5.925%20GHz%20Band%20C%20ET%20Dkt%20No.%2019-138.pdf)

[5] CV Pilot Deployments:

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<https://www.tampacvpilot.com/learn/resources/>

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<https://wydotcvp.wyoroad.info/>

<https://smart.columbus.gov/uploadedFiles/Projects/Smart%20Columbus%20Concept%20of%20Operations-%20Connected%20Vehicle%20Environment.pdf>

[6] Comments of 5G Americas, FCC ET Docket 19-138, March 9, 2020; <https://ecfsapi.fcc.gov/file/1030957873656/5G%20Americas%205.9%20GHz%20Comments%203.9.20%20FINAL.pdf>

[7] "Overall description for RAN aspects for V2X based on LTE and NR (Release 16)", 3GPP TR 37.985, v1.1.0, February 2020, Section 4; <https://www.3gpp.org/ftp/Specs/archive/37_series/37.985/37985-110.zip>

[8] Overall description of Radio Access Network (RAN) aspects for Vehicle-to-everything (V2X) based on LTE and NR (Release 16), 3GPP TR 37.985 v1.1.0, February 2020; <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3601>

[9] Dedicated Short Range Communication (DSRC) Systems Engineering Process Guidance for SAE J2945/X Documents and Common Design Concepts, SAE J2945\_201712, December 2017; <https://www.sae.org/standards/content/j2945_201712/>

[10] Comments of 5G Automotive Association, FCC Docket 19-138, March 9, 2020, [https://ecfsapi.fcc.gov/file/10309096401111/5GAA%20Comments%20(3-9-2020).pdf](https://ecfsapi.fcc.gov/file/10309096401111/5GAA%20Comments%20%283-9-2020%29.pdf)

[11] Comments of AT&T, FCC ET Docket No. 19-138, March 9, 2020, [https://ecfsapi.fcc.gov/file/1030982287529/ATT%20Comments%20(final%2003.09.20).pdf](https://ecfsapi.fcc.gov/file/1030982287529/ATT%20Comments%20%28final%2003.09.20%29.pdf)

[12] the March 9, 2020 letter to The Honorable Ajit Pai Re: Use of the 5.850-5.925 GHz Band ET Docket No. 19-138; FCC 19-129; FRS 16447 85 Fed. Reg. 6841 (Feb. 6, 2020); ([https://ecfsapi.fcc.gov/file/10313251510165/5.850-5.925 GHz Band C ET Dkt No. 19-138.pdf](https://ecfsapi.fcc.gov/file/10313251510165/5.850-5.925%20GHz%20Band%2C%20ET%20Dkt%20No.%2019-138.pdf))

[13] 5G V2X with NR sidelink, 3GPP Work Item Description, RP-190984, June 2019; [https://www.3gpp.org/ftp/tsg\_ran/TSG\_RAN/TSGR\_84/Docs/RP-190984.zip](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.3gpp.org_ftp_tsg-5Fran_TSG-5FRAN_TSGR-5F84_Docs_RP-2D190984.zip&d=DwMFaQ&c=pqcuzKEN_84c78MOSc5_fw&r=z8R-nWJ8GIxwjOjNKhEFByb-tZ6XE3GZXWSggNdVo-w&m=5tBZeYDDn0IcC_78W6FTltdHC0VakGnJ3oDc3qaubd4&s=wFSI3TMipYWANPPpDk8coGUil1ivQA5POXMRx_Grym0&e=)

1. This document solely represents the views of the IEEE 802 LAN/MAN Standards Committee and does not necessarily represent a position of either the IEEE, the IEEE Standards Association or IEEE Technical Activities. [↑](#footnote-ref-1)