IEEE 802.18

Radio Regulatory Technical Advisory Group

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| Reply Comments on FCC 21-264 NPRM  Amendment of Section 15.255 of the Commission’s Rules  FCC Seeks to Enable State-of-the-Art Radar Sensors in 60 GHz Band | | |
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| Reply Comments of IEEE 802-60 GHz motion sensing FCC NPRM ET 21-264 | | |
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Abstract

r00: 15 sept21: initial draft

r01: 21 sept21: includes editorial changes

r02: 27 sept21: includes new text on LBT and 2/4 GHz operation

**Before the**

**Federal Communications Commission**

**Washington, D.C. 20554**

In the Matter of )

)

Amendment of Section 15.255 of the ) ET Docket No. 21-264

Commission’s Rules )

**Reply Comments of IEEE 802**

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Standards Committee

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xx October 2021 *[Note: to be filled in when the letter is finalized]*

The IEEE 802 LAN/MAN Standards Committee (LMSC) is pleased to submit the following reply comments in response to the Commission’s NPRM proposing to allow greater flexibility for radar operations in the 57 to 64 GHz band while continuing to ensure that this unlicensed band continues to support multiple communications technologies, such as IEEE 802.11ad, IEEE 802.11ay, and IEEE 802.15.3c (“IEEE 802-based 60 GHz technologies”)[[1]](#footnote-2) without interference.

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.[[2]](#footnote-3)

**SUMMARY**

IEEE 802 supports the FCC objective to provide greater flexibility of use in the 57 to 64 GHz band by proposing to allow radar use at higher power levels while ensuring co-existence with other unlicensed services[[3]](#footnote-4). As others have noted on the record, the current proposed rules contain a loophole with respect to the 10% duty cycle limit for radar operation which would cause interference to the operation of IEEE 802-based 60 GHz technologies.[[4]](#footnote-5) IEEE agrees with others on the record that to ensure fair coexistence between radar operation at higher levels and IEEE 802-based 60 GHz technologies, the FCC must close the 10% duty cycle loophole by implementing the “2 ms condition,” as it has in its most recent waiver decisions,[[5]](#footnote-6) into its final rules.

IEEE also agrees with others on the record[[6]](#footnote-7) that, in the interest in providing flexibility for radar manufactures to choose appropriate technical parameters to support a range of applications, the FCC may consider establishing emission limits tailored to radar operations at specific bandwidths and/or to specific applications, such as vehicle in-cabin radar operations. Furthermore, the FCC may also consider requiring radar devices to employ a contention-based mechanism such as listen before talk (LBT). In the latter case, the Commission must ensure that the contention-based mechanism is effective in providing the same level of protection as exists between unlicensed communications devices such as IEEE 802-based 60 GHz technologies today.

**DISCUSSION**

**The 10% Duty Cycle Proposal Contains a Loophole that Would Allow a Much Higher Effective Duty Cycle.**

IEEE 802 believes that the duty cycle definition in the Commission’s NPRM contains a loophole. Specifically, the duty cycle definition in the proposed rule permits a radar device to meet the 10% duty cycle limit with, for example, a 10 µs transmission ‘on-time’ and a 90 µs ‘off-time,’ which would effectively block or corrupt communications in the same room or vehicle. This is because the short radar ‘off-time,’ which is on the order of a fraction of a millisecond, will effectively prevent communication applications from accessing the medium for much longer periods of time, or repetitively interrupt and corrupt the communication sequences which generally requires certain minimum time to complete.  As a result, applications that make use of IEEE 802-based 60 GHz technology would experience an increase in latency, which would be particularly harmful to highly immersive AR/VR/XR applications.  It should be noted that the impact of the duty cycle loophole is exacerbated by the fact that Frequency-Modulated Continuous Modulated (FMCW) radar systems sweep the entire 57 to 64 GHz band and transmit without any form of channel sensing.  Therefore, the duty cycle terms for radar systems must be defined such that any transmission gap below such off-time limit is deemed to be part of the transmission ‘on-time,’ i.e. any radar ‘off-time’ period between two successive radar pulses that is less than 2 ms shall be considered ‘on time’.

To address the issue identified above, IEEE 802 agrees with commenters that the FCC should adopt the additional “2 ms condition” that it has included in its most recent waiver grants[[7]](#footnote-8) (#2 below) on any higher power radar system it proposes to permit within the 57 to 64 GHz band, as set out in #1 below:

1. A radar device may operate in the 57 to 64 GHz band at a maximum +13 dBm EIRP, +10 dBm transmitter conducted output power, and +13 dBm/MHz power spectral density, so long as the radar device does not exceed a transmit duty cycle (i.e., on-time/[on-time + off-time]) of 10% in any 33 ms interval (i.e., the device will not transmit longer than a total of 3.3 ms).
2. Any radar transmission off-time period between two successive radar pulses that is less than 2 ms shall be considered transmission on-time for purposes of computing the duty cycle.

This additional condition is necessary to ensure that radar devices do not transmit with an effective duty cycle in excess of the 10% limit and thus lock out communications applications in the 57 to 64 GHz band.

IEEE 802 also agrees with commenters[[8]](#footnote-9) that the FCC may consider other spectrum sharing approaches for some radar operations and applications. These include:

1. The FCC may consider establishing emission limits tailored to radar operations at specific bandwidths such that radar devices that do not occupy the entire 7 GHz may operate under more flexible rules. Specifically,

Radar devices that operate between 57 and 59.4 GHz are not subject to the “2ms condition” set out in #2 above.

1. The FCC may consider establishing emission limits tailored to radar operations in specific applications, such as vehicle in-cabin radar operations, in which more flexible rules can be adopted. For example,

Radar devices that operate between 57 and 61.5 GHz and that are restricted to vehicle in-cabin use should be permitted to operate with a different duty cycle limit and transmission off-time period definition. In this case, IEEE 802 notes that further technical study is required for the Commission to confirm that the considered flexible rules can effectively ensure coexistence.

1. The FCC may consider defining more flexible rules for radar devices that implement a contention-based mechanism such as LBT. At the same time, IEEE 802 agrees with comments submitted by the Wi-Fi Alliance[[9]](#footnote-10) that the Commission must ensure that the LBT implementation is effective in providing the same level of protection as exists between unlicensed communications devices such as IEEE 802-based 60 GHz technologies today. IEEE 802 also agrees with comments submitted by Facebook, Intel, and Qualcomm[[10]](#footnote-11) that adequately implementing LBT requires a sufficiently sensitive sensing level, a measurement bandwidth, and integration period. In addition, the Commission should require the radar system to perform LBT prior to each radar burst (or transmission sequence), and when the LBT system detects an active medium, the back off scheme (*i.e*., the amount of time the radar waits before attempting to retransmit) should ensure fair spectrum access with other users in the band. IEEE 802 notes that further technical study is required for the Commission to confirm that LBT can effectively ensure coexistence.

# CONCLUSION:

IEEE 802 thanks the Commission for providing an opportunity to submit these reply comments on the NPRM ET Docket 21-264. IEEE 802 supports the FCC goal to expand the use of the 60 GHz spectrum band by allowing other technologies and applications in the band such as the radar use at higher power levels while ensuing fair coexistence with IEEE 802 communication technologies. In order for the above communication technologies to coexist with higher power radars, IEEE 802 strongly recommends that the 10% duty cycle loophole be closed in the final rules by implementing the “2 ms condition” as outlined above. IEEE 802 also agrees with commenters that the FCC may consider establishing emission limits tailored to radar operations with specific bandwidths and/or to specific applications, or radar devices employing a contention-based mechanism such as listen before talk (LBT) as outlined above.

Regards,

By: /ss/ .

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1. *See Amendment of Section 15.255 of the Commission’s Rules*, Notice of Proposed Rulemaking ET Docket No. 21-264, FCC 21-83 (rel. July 14, 2021) (“NPRM”). [↑](#footnote-ref-2)
2. 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-3)
3. IEEE 802 supports the Commission’s proposal to limit higher-power FDS to the lower portion of the 57-71 GHz, specifically 57-64 GHz. As the Commission notes, already-approved proposals were restricted to that band. IEEE 802 also agrees with others on the record that there is no evidence that more spectrum is needed in order to support additional or future FDS applications, and that the use of FDS in only the 57-64 GHz band would also align operations and devices with international standards. [↑](#footnote-ref-4)
4. *See* Comments of Wi-Fi Alliance In the Matter of Amendment of Section 15.255 of the Commission’s Rules, ET Docket No. 21-264 (posted September 20, 2021); *see also* Comments of Facebook, Intel, and Qualcomm In the Matter of Amendment of Section 15.255 of the Commission’s Rules, ET Docket No. 21-264 (posted September 21, 2021). [↑](#footnote-ref-5)
5. *See* FCC OET Letter Granting Petition of Faurecia Clarion Electronics North America regarding 47 CFR § 15.255, ET Docket No. 21-288, DA 21-811 (rel. July 9, 2021); *see also* FCC OET Letter Granting Request by Texas Instruments Incorporated for Waiver of 47 CFR § 15.255(c)(3), ET Docket No. 21-290, DA 21-813 (rel. July 9, 2021); FCC OET Letter Granting Request by Amazon.com Services LLC for Waiver of 47 CFR § 15.255(c)(3), ET Docket No. 21-289, DA 21-813 (rel. July 9, 2021); FCC OET Letter Granting Request by Vayyar Imaging Ltd. for Waiver of 47 CFR § 15.255 rules, ET Docket No. 20-15, DA 21-815 (rel. July 9, 2021); Request by Huyndai Mobis Co., Ltd. for Waiver of 47 CFR §§ 15.255(a)(2) & (c)(3), ET Docket No. 21-287, DA 21-816 (rel. July 9, 2021). For narrow pulse radio radar devices, the IEEE 802 supports the technical parameters in the recent OET Letter Order to Acconeer. *See* FCC OET Letter Granting Request by Acconeer AB for Waiver of 47 CFR § 15.255(c)(3) rules, ET Docket No. 21-48, DA 21-814 (rel. July 9, 2021). [Add cites to comments that recommend the loophole] [↑](#footnote-ref-6)
6. *See* Comments of Wi-Fi Alliance In the Matter of Amendment of Section 15.255 of the Commission’s Rules, ET Docket No. 21-264 (posted September 20, 2021) [↑](#footnote-ref-7)
7. See supra note 3. [↑](#footnote-ref-8)
8. See supra note 5. [↑](#footnote-ref-9)
9. See supra note 5. [↑](#footnote-ref-10)
10. See supra note 3. [↑](#footnote-ref-11)