

Re: Public Consultation re the 64 GHz to 71 GHz Frequency Band

Dear Commissioner President,

IEEE 802 LAN/MAN Standards Committee (IEEE 802 LMSC) thanks the Instituto Federal de Telecomunicaciones (IFT) for providing an opportunity to comment on the IFT's Public Consultation re the 64 GHz to 71 GHz Frequency Band.

IEEE 802 LMSC is a leading consensus-based open standards development committee for networking standards that are used by industry globally. It produces standards for networking devices, including wired and wireless local area networks ("LANs" and "WLANs"), wireless specialty networks ("WSNs"), wireless metropolitan area networks ("Wireless MANs"), and wireless regional area networks ("WRANs"). Technologies produced by implementers of our standards are a critical element for all networked applications today.

IEEE 802 LMSC is a committee of the IEEE Standards Association and of Technical Activities, two of the Major Organizational Units of the IEEE. IEEE has about 400,000 members in over 160 countries and its core purpose is to foster technological innovation and excellence for the benefit of humanity. IEEE is also a major accredited standards development organization whose standards are recognized worldwide. In submitting this document, IEEE 802 LMSC acknowledges and respects that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802 LMSC. Therefore, this submission should not be construed as representing the views of IEEE as a whole¹.

IEEE 802.11 Support for 60 GHz Band

The draft IEEE P802.11 standard² defines operation in the 57 GHz to 71 GHz band (a.k.a. the 60 GHz band) as licensed exempt spectrum. Wi-Fi Alliance started certification of Wi-Fi CERTIFIED WiGig devices³ in October 2016. WiGig technology is based on IEEE 802.11ad-2012 standard, supporting the operation from 57 GHz to 66 GHz that was later extended by IEEE 802.11ay-2021 standard to cover the entire 57 GHz to 71 GHz band. Additionally, the IEEE 802.11ay-2021 standard includes mechanisms for channel bonding and MU-MIMO technologies which results in higher transmission rates and range. Channel bonding allows up to four 2.16 GHz channels to be bonded together which would result in much higher throughput. IEEE 802.11ay supports channel bonding combined with other features such as higher number of spatial streams and higher QAM modulation provided an increase in the peak data rate from 7 Gb/s to 176 Gb/s. Figure 1 shows IEEE 802.11 channel plan from the 57 GHz to 71 GHz band.

¹ This document solely represents the views of IEEE 802 LMSC and does not necessarily represent a position of either the IEEE or the IEEE Standards Association or the IEEE Technical Activities.

² "IEEE Draft Standard for Information Technology -- Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks -- Specific Requirements - Part 11: Wireless Local Area Network (LAN) Medium Access Control (MAC) and Physical Layer (PHY) Specifications," in IEEE P802.11-REVme/D7.0, August 2024, vol., no., pp.1-6213, 30 July 2024. (Of note is that IEEE Std 802.11ad-2012 and IEEE Std 802.11ay-2021 are now incorporated into the draft IEEE 802.11-2024 standard.)

³ See Wi-Fi Alliance: Discover Wi-Fi CERTIFIED WiGig, <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-wigig> [accessed: 24 September 2024].

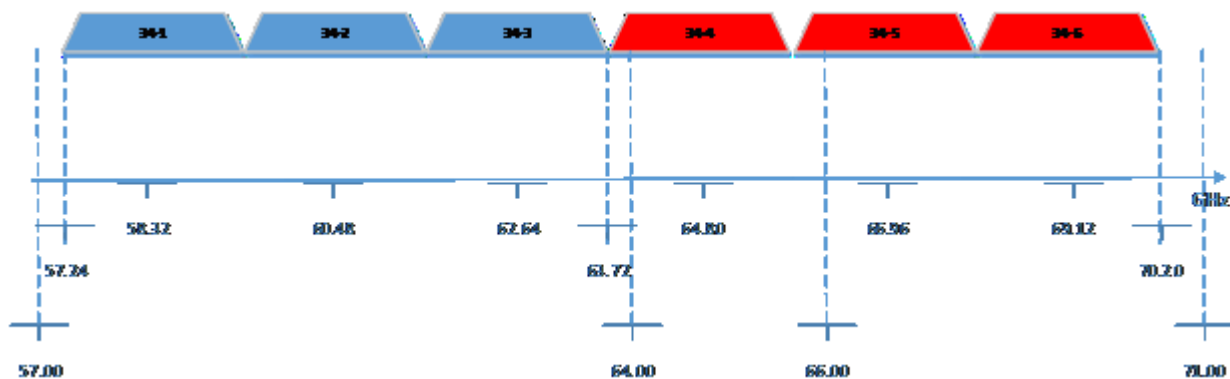


Figure 1. IEEE 802.11 channel plan from 57 GHz to 71 GHz

Authorization of the 64 GHz to 71GHz band as license exempt spectrum enables four channel bonding to be utilized in Mexico.

The resulting peak data rate in Wi-Fi CERTIFIED WiGig™ devices expands and enhances the Wi-Fi® experience in applications including virtual reality, multimedia streaming, gaming, wireless docking, and enterprise applications that require high speed, data-intensive connections.

Since the introduction of technology in 2016, the primary application for WiGig technology has been for wireless backhaul and connectivity in Internet Service Provider (ISP) and enterprise class backhaul deployments⁴.

To further advance use of the 60 GHz band, the IEEE 802.11 Working Group is currently studying the possibility of developing a new standard titled “Enhancements for Integrated mmWave (IMMW) WLAN”⁵. The scope of this proposed standard is to define one medium access control (MAC) and one physical layer (PHY) specifications for wireless connectivity for fixed, portable, and moving stations (STAs) within a local area. This proposed standard would also offer regulatory bodies a means to standardize access to the frequency bands between 42 GHz and 71 GHz frequency range for the purpose of local area communication.

In particular, this proposed standard defines modifications to both the IEEE Std 802.11 PHY and MAC that allows Wireless Local Area Network (WLAN) non-standalone operation in the license exempt bands between 42 GHz and 71 GHz using single-user (SU) OFDM based transmissions. It leverages or reuses existing PHY and MAC specifications defined for operation in the 2.4 GHz to 7.25 GHz (sub-7 GHz) license exempt bands, and requires that an IEEE 802.11 device supporting this proposed standard also supports at least one of the sub-7 GHz license exempt bands. It expands the multi-link operation defined in the draft IEEE P802.11be standard⁶ to support non-standalone operation in the license exempt bands between 42 GHz and 71 GHz.

Use of WLANs based on IEEE 802.11 technology continues to grow and diversify over many market segments including residential, enterprise, and industrial. More stringent requirements are

⁴ Some examples of the existing applications can be found at <https://wifinowglobal.com/news-blog/marine-network-services-for-ships-and-yachts-airvine-could-be-key-to-next-generation-networking/>, https://www.arubanetworks.com/assets/ds/DS_AP387.pdf, <https://www.ispsupplies.com/brands/cambium-networks/cambium-cnwave> [accessed: 24 September 2024].

⁵ See IEEE 802.11 Working Group: Status of IEEE 802.11 Integrated Millimeter Wave (IMMW) Study Group (SG), https://www.ieee802.org/11/Reports/immw_update.htm [accessed: 24 September 2024].

⁶ “IEEE Draft Standard for Information technology--Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment: Enhancements for Extremely High Throughput (EHT),” in IEEE P802.11be/D7.0, August 2024, vol., no., pp.1-1089, 1 August 2024.

emerging to meet the demands of new applications (e.g., augmented and virtual reality, proximity ranging and sensing) both in terms of throughput, latency bounds and accuracy. The very large bandwidth available in the license exempt bands between 42 GHz and 71 GHz, combined with the widely used 2.4 GHz, 5 GHz and 6 GHz bands, offers a great opportunity to help meet these requirements even in the densest environments. Enabling non-standalone operation in the license exempt bands between 42 GHz and 71 GHz in a cost effective manner is required such that as many devices can benefit from it.

Another current IEEE 802.11 project is IEEE P802.11bf “Enhancements for Wireless Local Area Network (WLAN) Sensing”. This standard defines modifications to the IEEE 802.11 medium access control layer (MAC) and to the Directional Multi Gigabit (DMG, i.e., IEEE 802.11ad) and enhanced DMG (EDMG, i.e. IEEE 802.11ay) PHYs to enhance Wireless Local Area Network (WLAN) sensing (SENS) operation in license exempt frequency bands between 1 GHz and 7.125 GHz and above 45 GHz including 57 GHz to 71 GHz. This standard is intended to enhance WLAN sensing and augments PHY and MAC capabilities defined in the draft IEEE P802.11 standard.

Sensing applications are applicable to personal computers, enterprise networking devices, consumer electronic devices, home networking equipment, mobile devices, wireless sensing equipment including for behavior recognition, vehicular, smart homes, and security applications. Measurements obtained with WLAN sensing can be used to enable applications such as presence detection and gesture classification, among others.

IEEE 802 LMSC Support for Designation of 64 GHz to 71 GHz as License Exempt Spectrum

IEEE 802 LMSC recognizes and applauds IFT’s effort to classify the frequency band 64 GHz to 71 GHz as license exempt spectrum. This decision would enable growing applications that rely on the mmWave spectrum based networks and would also advance frequency sharing and co-existence between various license exempt technologies based on the family of IEEE 802 standards.

IEEE 802 LMSC also supports the IFT proposal in Annex 1 “TECHNICAL OPERATING CONDITIONS FOR THE USE OF THE FREQUENCY BAND 64-71 GHz” in alignment with the technical requirements of other regulatory bodies, such as the FCC 15.255 of Part 15⁷.

Conclusion

IEEE 802 LMSC thanks the IFT for the opportunity to provide this submission and supports the IFT proposal to classify the frequency band 64 GHz to 71 GHz as license exempt spectrum.

Respectfully submitted,

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⁷ See Code of Federal Regulations: §15.255 Operation within the band 57-71 GHz, <https://www.ecfr.gov/current/title-47/chapter-1/subchapter-A/part-15/subpart-C/subject-group-ECFR2f2e5828339709e/section-15.255> [accessed: 24 September 2024].