

Re: Call for opinions on the Frequency Reorganization Action Plan (FY2024 edition)

Dear Respected Officer,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks Ministry of Internal Affairs and Communications (MIC) for providing an opportunity to comment on the public consultation “Call for opinions on the Frequency Reorganization Action Plan (FY2024 edition)”.

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.

Please find below the responses of IEEE 802 LMSC to this consultation.

6425 MHz to 7125 MHz for license-exempt operations

IEEE 802 LMSC appreciates MIC’s identification of 6 GHz regulatory expansion as a priority initiative for the action plan. In considering further allocation in the 6425 MHz to 7125 MHz frequency band, IEEE 802 LMSC respectfully asks MIC to consider the following points.

The ITU World Radiocommunications Conference 2023 (WRC-23) explicitly recognized that the 6425 MHz to 7125 MHz frequency band is used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs). Many countries including the USA, Canada, Brazil, South Korea, Kazakhstan, and Saudi Arabia have already allocated the entire 6 GHz band (i.e., 5925 MHz to 7125 MHz band) for license-exempt operation. Availability of the entire 6 GHz band for license-exempt use will create economies of scale and produce a robust equipment market, benefitting Japan’s businesses, consumers, and economy, while providing significant societal benefits.

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.

In January 2024, Wi-Fi Alliance introduced² Wi-Fi CERTIFIED 7™ based on IEEE Std 802.11be-2024 technology³. With Wi-Fi 7 products already in the market, Wi-Fi deployments are going through a second generation upgrade supporting the entire 6 GHz band globally⁴. IEEE Std 802.11be-2024's global 6 GHz channelization is designed to accommodate multiple 160 MHz and 320 MHz channels throughout the 5925 MHz to 7125 MHz band, where available. MIC's current designation of 500 MHz of the 6 GHz band from 5925 MHz to 6425 MHz for license-exempt operation provides for only one 320 MHz channel, while the 5925 MHz to 7125 MHz band would allow three such channels to support Gigabit connectivity in Japan. For example, enterprise deployments and scaled deployment of advanced applications, such as mixed reality in education and health industries, require multiple 320 MHz channels to fully utilize the advantages of the technology. To enable Wi-Fi 7 with multiple of 320 MHz channels and multi-gigabit services, IEEE 802 LMSC supports and respectfully encourages MIC's plan to authorize 1 GHz of spectrum for Wi-Fi in the entire 6 GHz band.

The use of AFC technology for outdoor and indoor operations

Automatic Frequency Control (AFC) technology is a technique that may be used to protect incumbent services for outdoor and indoor operation at standard power (SP) level. IEEE 802 LMSC believes that an AFC system can provide effective automated spectrum sharing to enable essential Wi-Fi technology applications and use cases not only for outdoor operation but also indoor operation for the SP level over the entire 6 GHz band. Depending on the AFC system parameter setting and targeted incumbent protection criteria, only a fraction of requested spectrum by AFC devices will become available by AFC systems on average. Therefore, to make the SP mode and AFC system effective, IEEE 802 LMSC strongly recommends MIC to authorize SP mode and AFC both on the 6 GHz band (i.e., 5925 MHz to 6425 MHz) and the 6.5 GHz band (i.e., 6425 MHz to 7125 MHz) simultaneously.

The USA⁵ and Canada⁶ have already authorized SP operating mode and started certification of AFC systems. The certification process for AFC systems and devices is based on the industry developed recommended compliance specifications^{7,8}. A number of AFC devices and fixed client devices are already certified.

IEEE 802 LMSC notes the presence of different types of incumbent services, including fixed service and broadcasting services in the 6 GHz band in Japan. Our understanding is that existing

² See Wi-Fi Alliance: Wi-Fi Alliance® introduces Wi-Fi CERTIFIED 7™, <https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-introduces-wi-fi-certified-7> [accessed: 25 October 2024].

³ See IEEE Approved 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), <https://standards.ieee.org/ieee/802.11be/7516/> [accessed: 25 October 2024]. With introduction of 320 MHz channel bandwidth, Wi-Fi 7 doubles throughputs relative to Wi-Fi 6E and significantly improves latency for Extended Reality (XR), bringing determinism through enablement of Multi-Link Operation (MLO) over multiple bands in 2.4 GHz, 5 GHz, and 6 GHz bands. Wi-Fi 7 also provides higher efficiency, relative to Wi-Fi 6E, through offering of 4096 QAM. In addition, spectrum puncturing improves flexibility in utilizing spectrally efficient wide channel bandwidth, e.g., 160 MHz and 320 MHz, while protecting incumbent operation in the band.

⁴ See Wi-Fi Alliance: Wi-Fi 7 market momentum: Wi-Fi 7 is here – is your network ready?, <https://www.wi-fi.org/beamon/chris-hinsz/wi-fi-7-market-momentum-wi-fi-7-is-here-is-your-network-ready> [accessed: 25 October 2024].

⁵ See Federal Communications Commission: OET announces approval of seven 6 GHz band automated frequency coordination systems for commercial operation and seeks comment on C3 Spectra's proposed AFC system, <https://docs.fcc.gov/public/attachments/DA-24-166A1.pdf> [accessed: 25 October 2024].

⁶ See Innovation, Science and Economic Development Canada: List of designated Dynamic Spectrum Access System Administrators (DSASAs), Automated Frequency Coordination System Administrators (AFCSAs), issue 1 of DBS-06, <https://ised-isde.canada.ca/site/certification-engineering-bureau/en/node/116> [accessed: 25 October 2024].

⁷ See: Wi-Fi Alliance: 6 GHz AFC resources, Specifications, test plans, and training modules to enable implementation of the 6 GHz standard power devices under AFC system control, <https://www.wi-fi.org/discover-wi-fi/6-ghz-afc-resources> [accessed: 25 October 2024].

⁸ See Wireless Innovation Forum: Specifications, <https://6ghz.wirelessinnovation.org/baseline-standards> [accessed: 25 October 2024].

AFC systems are designed with flexibility built-in specifically to enable the AFC system to be customized based on local requirements. Therefore, with proper consideration of protection criteria for the incumbent services, we believe that AFC systems can properly implement the frequency coordination and maximum allowable power settings for AFC devices. As an example, in the USA, AFC systems determine frequency and channel availability and maximum permissible power levels for AFC devices considering incumbent fixed services and radio astronomy services. AFC systems already taken into account neighboring countries incumbent services at the borders.

AFC systems are designed to automatically calculate and make available, to AFC devices, available frequencies and corresponding permissible transmit power levels. AFC systems are required to use the updated incumbent system database to keep the calculations and frequency availability up to date as the 6 GHz incumbents links are changed. This means that not only harmful interference to fixed services and broadcasting services are protected by AFC systems, any expansion of such incumbent services over time can be achieved without a need to redesign the AFC systems.

As we believe the indoor SP mode could be an important feature in Japan because of extensive indoor WLAN facilities⁹, IEEE 802 LMSC recommends MIC to include indoor SP mode for its proceedings for AFC systems and SP regulation. AFC systems are designed not only to enable SP mode for outdoor operation but also to improve the performance of indoor WLAN systems. Considering this, IEEE 802 LMSC recommends MIC to consider authorizing indoor SP mode and allowing AFC systems to incorporate associated Building Entry Loss (BEL) in the AFC system calculations. As an example, FCC already accepts request for inclusion of BEL through various waiver requests¹⁰.

Frequency sharing with narrowband devices

While IEEE 802 LMSC supports revision of regulation for very low power devices to facilitate a broader range of applications, we observe that the introduction of narrowband devices with higher power spectral density may potentially introduce excessive interference into license-exempt short range devices. For this reason, IEEE 802 LMSC recommends to consider the implementation of a contention-based protocol for narrowband devices, or require the narrowband devices to follow the same technical regulations of existing license-exempt short range devices operating in the entire 6 GHz band.

Adoption for Client-to-Client communications

Client-to-Client (C2C) communications are critical to efficient spectrum utilization and enabling a diverse set of different Wi-Fi applications, use cases, industry segments and business models in the 6 GHz band across the globe.

IEEE 802 LMSC applauds and appreciates MIC's progress in approving technical conditions on Client-to-Client (C2C) communications as well as the coverage for 320 MHz channel bandwidth in the 6 GHz band published in September 2023. IEEE 802 LMSC would respectfully recommend

⁹ Some examples of deployment where indoor SP is beneficial are where propagation environment requires additional link budget, such as airports, sport venues, concert halls, and warehouses.

¹⁰ See Federal Communications Commission: OET Announces Conditional Approval for 6 GHz Band AFC Systems, <https://www.fcc.gov/document/oet-announces-conditional-approval-6-ghz-band-afc-systems> [accessed: 25 October 2024]

MIC to formally authorize the C2C communications based on already approved technical specifications in the very near future.

Conclusion

IEEE 802 LMSC thanks MIC for the opportunity to provide this submission and kindly requests consideration of our response on allocating 6425 MHz to 7125 MHz for license-exempt operations, initiating authorization proceedings for standard power RLAN under supervision of AFC, and authorizing the C2C communications in the entire 6 GHz band.

Respectfully submitted,

By: /s/.

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