IEEE P802.18
Radio Regulatory Technical Advisory Group (RR-TAG)

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| Proposed response to Saudi Arabia CST’s consultation on spectrum outlook 2024-2027 |
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This document contains a proposed response to Saudi Arabia Communications, Space & Technology Commission (CST)’s consultation on “Spectrum Outlook for Commercial and Innovative Use 2024-2027”.

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Electronic filing October 7, 2024

Re: Spectrum Outlook for Commercial and Innovative Use 2024-2027

Dear President,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks Communications, Space & Technology Commission (CST) for providing an opportunity to comment on the public consultation “Spectrum Outlook for Commercial and Innovative Use 2024-2027”.

IEEE 802 LAN/MAN Standards Committee (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 whole[[1]](#footnote-1).

Please find below the responses of IEEE 802 LMSC to Questions 78 and 83 of this consultation.

**Question 77: Should CST** **Reintroduce Fixed Services (FS) point-to-point links in the 6 GHz band?**

IEEE 802 LMSC does not have any opinion about the reintroduction of Fixed Services (FS) point-to-point links in the 6 GHz frequency band but would like to comment that standard power access points (i.e., fixed client devices), which are controlled by Automatic Frequency Coordination (AFC) systems that support higher power level, are considered in fixed point-to-point applications operating in the license-exempt 6 GHz band.

As it is commented in response to Question 78, AFC systems are designed to protect FS in the 6 GHz band.

**Question 78: Is there a need to update the regulations for the use of fixed wireless links to include the 6 GHz frequency band?**

IEEE 802 LMSC recognizes and applauds CST’s effort to propose authorizing WLAN in the 6 GHz frequency band to operate outdoor via relaxed licensing through the Automatic Frequency Coordination (AFC) system.

AFC technology is considered as a mitigation technique to protectincumbent services for outdoor and indoor operation at standard power (SP) level. IEEE 802 LMSC believes that an AFC system, as an effective automated spectrum sharing technology, is critical in enabling essential Wi-Fi technology applications and use cases not only for outdoor operation but also indoor operation at SP level.

The USA and Canada have already authorized SP mode and started certification of AFC systems. The certification process for AFC systems and devices is based on the industry developed recommended compliance specifications[[2]](#footnote-2),[[3]](#footnote-3). On 21 August 2023, Innovation, Science and Economic Development Canada (ISED) approved[[4]](#footnote-4) an AFC system for operation in Canada. On 23 February 2024, Federal Communications Commission (FCC) announced[[5]](#footnote-5) approval of seven AFC systems for commercial operation in the USA. A number of AFC devices and fixed client devices are already certified.

IEEE 802 LMSC noted the presence of different types of incumbent services, including satellite, and fixed deployments in the 6 GHz band in Saudi Arabia. Our understanding is that existing AFC systems are designed with specific flexibility built-in to enable the system to customize 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 considering any local regulation from CST. 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 as well as neighboring countries incumbent services at the borders.

Protection of non-terrestrial satellite incumbent services are being accommodated by putting regulatory restrictions on the antenna/radiation mask of outdoor SP access points to limit the interference to satellite receivers. IEEE 802 LMSC would like to mention that, in order to properly implement AFC system and SP mode to protect the incumbent services, incumbent system database of fixed services and some other auxiliary databases need to be available[[6]](#footnote-6).

AFC systems are designed to operate in an automated way both for frequency coordination and the frequent update of available frequencies and permissible transmit power level to incumbent system database. This means that not only harmful interference to fixed services can be protected by AFC systems, any expansion of such incumbent services over time can be achieved without a need to redesign the AFC systems.

**Additional comment**

As we understand indoor SP mode could be an important feature in Saudi Arabia because of extensive indoor WLAN facilities, IEEE 802 LMSC recommends to CTS to include indoor SP mode for its proceedings for AFC systems and SP regulation. AFC systems are designed not only to enable the SP mode for outdoor operation but also to improve the performance of WLAN indoor. Considering that, IEEE 802 LMSC recommends CTS to consider authorizing indoor SP mode and allowing AFC systems to incorporate associated Building Entry Loss (BEL) in AFC system’s calculation. As an example, FCC already accepts request for inclusion of BEL through various waiver requests[[7]](#footnote-7).

**Question 83: What frequency bands above 100 GHz do stakeholders believe are most important to consider for availability?**

IEEE 802 LMSC recommends CST to allow license exempt operations between 252 GHz and 450 GHz, which includes spectrum identified for the use of TeraHertz communications by the World Radiocommunications Conference (WRC) 2019 per Radio Regulation (RR) No. 5.564A[[8]](#footnote-8).

IEEE 802 LMSC has been leading the standards development of TeraHertz communications since 2008. Of particular note is IEEE Std 802.15.3-2023, which defines physical layer (PHY) and medium access control (MAC) specifications for high data rate wireless connectivity (typically over 200 Mb/s) with fixed, portable, and moving devices via the 2.4 GHz, 60 GHz, and 300 GHz radio transmissions in a Wireless Speciality Network (WSN) using low-power and multiple modulation formats. The standard specifies two PHY modes in the frequency range between 252 GHz and 450 GHz for switched point-to-point links to enable data rates of up to 100 Gb/s using eight different bandwidths between 2.16 GHz and 69.12 GHz. Targeted applications supported by this standard include wireless backhaul/fronthaul links, wireless links in data centers as well as short-range applications such as kiosk downloading, intra-device and close-proximity communication.

**Conclusion**

IEEE 802 LMSC thanks CST for the opportunity to provide this submission and kindly requests consideration of our response to the use of AFC systems for both outdoor and indoor operations, and license exempt operations between 252 GHz and 450 GHz for the use of TeraHertz communications.

Respectfully submitted,

By: /ss/.

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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. [↑](#footnote-ref-1)
2. 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 September 2024]. [↑](#footnote-ref-2)
3. See Wireless Innovation Forum: Specifications, <https://6ghz.wirelessinnovation.org/baseline-standards> [accessed: 25 September 2024]. [↑](#footnote-ref-3)
4. 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 September 2024]. [↑](#footnote-ref-4)
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 September 2024]. [↑](#footnote-ref-5)
6. See Intel’s White Paper: Spectrum Sharing Using Frequency Coordination, <https://www.intel.com/content/www/us/en/wireless-network/spectrum-using-automated-frequency-coordination.html> [accessed: 25 September 2024] [↑](#footnote-ref-6)
7. 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 September 2024] [↑](#footnote-ref-7)
8. The frequency bands, which cover 137 GHz spectrum, are 275 GHz to 296 GHz, 306 GHz to 313 GHz, 318 GHz to 333 GHz, and 356 GHz to 450 GHz. [↑](#footnote-ref-8)