

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

**Proposed Response to India TRAI Consultation on Leveraging
Artificial Intelligence and Big Data in Telecommunication Sector**

Date: 2022-11-04

Author(s):

Name	Company	Address	Phone	email
Hassan Yaghoobi	Intel Corp.			hassan.yaghoobi@intel.com

This contribution proposed a response to India TRAI consultation on “Leveraging Artificial Intelligence and Big Data in Telecommunication Sector”.

Notice: This document has been prepared to assist IEEE 802.18. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

Electronic Filing
Shri Asit Kadayan, Advisor (QoS)
Telecom Regulatory Authority of India,
on email: advqos@traai.gov.in

November 18, 2022

Re: Consultation on “Leveraging Artificial Intelligence and Big Data in Telecommunication Sector”

Dear TRAI,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks TRAI for issuing the consultation and the opportunity to provide feedback on “Leveraging Artificial Intelligence and Big Data in Telecommunication Sector”. The Consultation is an important mechanism for soliciting feedback that will provide TRAI with the information necessary.

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 also produce standards for wired ethernet networks, and technologies produced by implementers of our standards are critical for all networked applications today.

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 400,000 members in over 160 countries. IEEE’s core purpose is to foster technological innovation and excellence for the benefit of humanity. 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 whole¹.

In the past ten years, the IEEE 802 LMSC has overseen the development of standards (including both IEEE Std. 802.11ac-2014 [1] and IEEE Std. 802.11ax-2021 [2]) that operate in unlicensed bands and are capable of providing gigabit throughput, i.e., provide physical layer throughput over 1 Gb/s. The current Wi-Fi 6 and Wi-Fi 6E technologies [3] are developed based on the IEEE Std. 802.11ax-2021 standard. IEEE P802.11be [4] is expected to provide physical layer throughput capacity at gigabit speeds and it is the basis that the upcoming Wi-Fi 7 technologies [5] utilize for development. These IEEE 802 technologies have become an integral part of global citizens’ lives, known best as “the 5 GHz network”. Next generation technologies utilizing both 5 GHz and 6 GHz bands in order to satisfy new requirements in internet of things or lower latency and jitter requirements for applications such as home video, video conferencing or video gaming are already developed and continue to be improved by our hundreds of standards development contributors.

The next generation of WSN will increasingly play a role in the handset market segment. The secure digital transition of India’s households, public sector and industry will critically depend on opportunities for to benefit from emerging technologies like high-precision positioning, object sensing, increased security and privacy by design feature and many other features already under development in IEEE 802. Notably, IEEE Std 802.15.4 serves billions of devices worldwide using unlicensed spectrum for many applications such as IoT sensors, monitoring, control, real-time location services, and secure access control. A major revision to the IEEE Std 802.15.4-2020 standard has commenced, rolling up several published amendments since 2020, including IEEE Std 802.15.4z-2020 [6], which defined enhanced UWB technology. IEEE Std 802.15.4z-2020 is already widely being used in consumer, automotive, commercial, and industrial markets. In addition to the revision to IEEE Std 802.15.4-2020 a new amendment on "Next generation UWB", which

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.

will be rolled up in a future revision to IEEE 802.15.4, is being developed in task group IEEE 802.15.4ab [7] to further enhance UWB capabilities for better performance, greater precision, and new uses such as presence detection and other sensing applications.

In light of the important role IEEE 802 technologies play in Indian network ecosystems and as related to the needs of citizens of India, IEEE 802 LMSC would like to highlight the importance of license exempt designation. Developments in Wireless Access Systems (WAS) including Radio Local Area Networks (RLAN) such as Wireless Local Area Networks (WLAN) (IEEE 802.11) and Wireless Specialty Networks (WSN) (IEEE 802.15) technologies are crucial components in realizing the National Digital Communications Policy (NDCP) 2018 [8], seeking unlocking of the transformative power of digital communications networks for achieving the goal of digital empowerment and improved well-being of the people of India. More specifically, IEEE 802 technologies are critical in realizing Connect India mission to create broadband for all and the goal of 10 million public Wi-Fi Hotspots.

In this response, IEEE 802 LMSC would like to provide our response to Question 30 by informing TRAI about relevant IEEE 802 standards activities to the consultation.

Artificial Intelligence Machine Learning (AIML) Topic Interest Group within the IEEE 802.11 working group [9] was initiated in May 2022 to explore use cases of AI/ML that will apply to IEEE 802.11 systems and devices as well as the technical feasibility of these use cases. The topic interest group is expected to complete its report on the topic by March 2023. The report will include AI/ML use cases, requirements and features analysis, and technical feasibility analysis for IEEE 802.11.

During the IEEE 802 November 2022 plenary, there is also an IEEE 802 Tutorial entitled “Wi-Fi Meets ML: Re-thinking Next-generation Wi-Fi Networks”. This tutorial introduces the key AI/ML concepts that are essential to understanding the application of AI/ML, concisely presenting the basics of Supervised Learning, Unsupervised Learning, and Reinforcement Learning techniques. It also describes network architectural aspects to support ML, such as centralized and distributed model training and deployment. The second part of the tutorial describes representative use cases where AI/ML techniques are used to improve IEEE 802.11 performance, covering several examples in detail. Finally, to end the tutorial, a list of open challenges to adopting AI/ML in IEEE 802.11 are discussed.

IEEE 802 would like to invite TRAI to follow IEEE 802 works on the area and incorporate the IEEE 802 views on Artificial Intelligence and Machine Learning into the proceedings in addition to those from 5G. Our response highlights the role of IEEE 802 and RLAN in Connect India mission to create broadband for all for which we believe IEEE 802 technologies to be critical, also in supporting and complementing 5G.

Conclusion

IEEE 802 LMSC thanks the TRAI for providing this invaluable opportunity to provide this submission. IEEE 802 LMSC respectfully provides information about its project in the area of Artificial Intelligence and Machine Learning that will apply to IEEE 802.11 systems and RLAN.

Respectfully submitted

By: /ss/.

Paul Nikolich

IEEE 802 LAN/MAN Standards Committee Chairman

em: p.nikolich@ieee.org

References:

- [1] “IEEE 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,” in IEEE Std 802.11-2020 (Revision of IEEE Std 802.11-2016), pp.1-4379, 26 February 2021, doi: 10.1109/IEEESTD.2021.9363693.
- [2] “IEEE 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 1: Enhancements for High-Efficiency WLAN,” in IEEE Std 802.11ax-2021 (Amendment to IEEE Std 802.11-2020), vol., no., pp.1-767, 19 May 2021, doi: 10.1109/IEEESTD.2021.9442429.
- [3] IEEE 802.11 Enhanced High Throughput Task Group (P802.11be). https://www.ieee802.org/11/Reports/tgbe_update.htm
- [4] Discover Wi-Fi: Wi-Fi CERTIFIED 6. <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-6>
- [5] Wi-Fi 7. <https://www.wi-fi.org/who-we-are/current-work-areas#Wi-Fi%207>
- [6] “IEEE Standard for Low-Rate Wireless Networks--Amendment 1: Enhanced Ultra Wideband (UWB) Physical Layers (PHYs) and Associated Ranging Techniques,” in IEEE Std 802.15.4z-2020 (Amendment to IEEE Std 802.15.4-2020), vol., no., pp.1-174, 25 August. 2020, doi: 10.1109/IEEESTD.2020.9179124.
- [7] IEEE 802.15 WSN™ Task Group 4ab (TG4ab) 802.15.4 UWB Next Generation. <https://www.ieee802.org/15/pub/TG4ab.html>
- [8] National Digital Communications Policy (NDCP), 2018.
- [9] IEEE 802.11 Artificial Intelligence Machine Learning (AIML) Topic Interest Group. https://www.ieee802.org/11/Reports/aiml_update.htm