IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| The AIML Letter of Comments on BEREC Report | | | | |
| Date: 2023-01 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Tongxin Shu | Huawei | Huawei Base, Shenzhen, China |  | shutongxin@huawei.com |
| Peng Liu | Huawei |  |  |
| Ziyang Guo | Huawei |  |  |
| Xiaofei Wang | InterDigial Inc. | 111 West 33rd Street  New York, NY 10120  USA |  |  |

Abstract

This document contains the comments on the EU BEREC report.

Dear BEREC,

Artificial Intelligence Machine Learning (AIML) Topic Interest Group (TIG) within the IEEE 802.11 working group (WG) [1] was initiated in May 2022 to explore use cases of Artificial Intelligence/Machine Learning (AI/ML) that are applicable to IEEE 802.11 systems and devices as well as the technical feasibility of features enabling the support of AI/ML. The topic interest group is expected to complete its technical report to the IEEE 802.11 WG on the topic in March 2023. The report is expected to include AIML use cases, requirements and features analysis, and technical feasibility analysis for IEEE 802.11.

The AIML TIG has been studying a number of use cases for IEEE 802.11 networks with Key Performance Indicators (KPIs) and standard impacts, including AIML-based CSI feedback compression [2], distributed channel access [3] and AIML model sharing [4].

The IEEE 802.11 AIML TIG would like to provide our comments on the “BEREC Report on the impact of Artificial Intelligence (AI) solutions in the telecommunications sector on regulation”, as there have been similar discussions within the IEEE 802.11 AIML TIG on a use case that is also addressed by your report. In addition, the AIML TIG would like to invite the BEREC to consider other use cases that are being studied by the AIML TIG for IEEE 802.11 networks and devices operating in the unlicensed spectrum.

1. **Comments on 5.3.2 Related applications**

* **Deep reinforcement learning for dynamic spectrum access**

As the dynamic spectrum sharing has been selected as one of the use cases in the BEREC report, a corresponding comment is that,

**Research on Deep reinforcement learning (DRL)-based distributed spectrum access in the unlicensed band is quite active.** **In some research [5][6], the DRL-based mechanism shows higher spectrum efficiency and lower latency than conventional distributed mechanisms on unlicensed band, which rely on randomization to mitigate collisions.**

1. **Comments on 5.3.3. Conclusions and regulatory implications**

Concerning the conclusions and regulatory implications of the dynamic spectrum sharing use case, a comment from us is that,

**Local regulations on unlicensed band should consider to allow AI/ML-based channel access mechanisms.**

In some research [5][6], AI-based channel access has also showed much performance gain on unlicensed band. We recommend that “BEREC Report on the impact of Artificial Intelligence (AI) solutions in the telecommunications sector on regulation” can also include the dynamic spectrum access topics on unlicensed band.

**Conclusion**

The IEEE 802.11 AIML TIG thanks the BEREC for providing the comprehensive report, and would like the BEREC to kindly consider the comments regarding the dynamic spectrum use case mentioned above, as well as other use cases being studied by the AIML TIG for IEEE 802.11 networks and devices operating in the unlicensed spectrum.

Respectfully submitted

The IEEE 802.11 AIML TIG

**References:**

1. IEEE 802.11 Artificial Intelligence Machine Learning (AIML) Topic Interest Group. <https://www.ieee802.org/11/Reports/aiml_update.htm>
2. 11-22-1934-05-aiml-proposed-ieee-802-11-aiml-tig-technical-report-text-for-the-csi-compression-use-case
3. 11-22-2119-03-aiml-proposed-ieee-802-11-aiml-tig-technical-report-text-for-the-distributed-channel-access-use-case
4. 11-23-0050-02-aiml-proposed-technical-report-text-for-aiml-model-sharing-use-case
5. Z. Guo, Z. Chen, P. Liu, J. Luo, X. Yang and X. Sun, “Multi-Agent Reinforcement Learning-Based Distributed Channel Access for Next Generation Wireless Networks,” in IEEE Journal on Selected Areas in Communications, vol. 40, no. 5, pp. 1587-1599, May 2022, [doi: 10.1109/JSAC.2022.3143251](doi:%2010.1109/JSAC.2022.3143251.).
6. W. Wydmański and S. Szott, “Contention window optimization in IEEE 802.11ax networks with deep reinforcement learning,” in Proc. 2021 IEEE Wireless Commun. Netw. Conf. (WCNC), 2021, pp. 1–6, [doi: 10.1109/WCNC49053.2021.9417575](doi:%2010.1109/WCNC49053.2021.9417575).