IEEE P802.11
Wireless LANs

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| AIML TIG July 2022 Plenary meeting minutes |
| Date: 2022-07-13 |
| Author(s): |
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Abstract

This document contains the minutes for the AIML TIG July 2022 Plenary meeting.

# Monday, July 11, PM3 session (19:30-21:30 ET)

* The Chair, Xiaofei Wang (InterDigital), calls the meeting to order at 19:30 ET.
* Ming Gan (Huawei) is serving as acting secretary in the absence of a permanent secretary
* Note that this is a hybrid meeting, with some participants in person and some participating online through a webex session
* The agenda is [11-22-0847r2](https://mentor.ieee.org/802.11/dcn/22/11-22-0847-02-aiml-aiml-tig-july-2022-agenda.pptx)
* Motion #1: Approve Agenda:
* Move to approve the agenda for AIML TIG as contained in [11-22-0847r2](https://mentor.ieee.org/802.11/dcn/22/11-22-0847-02-aiml-aiml-tig-july-2022-agenda.pptx)
	+ Moved: Marc Emmelmann
	+ Seconded: Rui Yang
	+ Discussion: None
	+ Approved with unanimous consent.
* Chair’s reminder on meeting and patent policies.
* The chair called for essential patents, and none was indicated.
* The chair reminded attendees that participation is on an individual basis.
* The chair reminded attendees of IEEE copy right policies
* Chair’s reminder on registration for the plenary meeting.
* Chair reminds participants to record their attendance.
* Chair went over operating rules for the AIML TIG.
* Leadership election
* The chair indicated there are two candidates volunteered for vice chair; but only one is currently eligible due to registration and participation requirements
* Motion #2: AIML Vice Chair Election
* Move to elect Ming Gan (Huawei) as the vice chair for AIML TIG
	+ Moved: Rui Yang
	+ Seconded: Sang Kim
	+ Discussion: more clarification on one of the volunteer candidates could not fully participate in AIML TIG meetings.
	+ Approved with unanimous consent
* Technical Presentations
* Presentation #1: Discussion on connection between AI/ML and WLAN, Zinan Lin (InterDigital), [11-22/0950r2](https://mentor.ieee.org/802.11/dcn/22/11-22-0950-02-aiml-discussion-on-interaction-between-ai-ml-wireless-lan.pptx)
	+ Comments: The last two bullets of Way forward in slide 10 may belong to the work of task group.
	+ Discussion on how data is handled; whether just a set of APs or peer to peer; it likely depends on the use case
	+ Discussion applying clustering on CSI and how AI/ML is different than, e.g., application layer functions; use AI/ML as an example, AI/ML can give shortcut for performance gains
	+ Discussion on the gain for CSI compression. Refer to the reference at the end of this presentation for the gain for these two shown methods of CSI, there is about 30% gain.
	+ In reference 11, this paper shows only SU-MIMO, the index feedback could be extended to MU-MIMO, use slection in MU-MIMO may benefit for index feedback
	+ PER formance is 3dB worse than baseline, there is throughput gain.
	+ 3GPP chose CSI as No. 1 use case, but this is not the only feature that AI can help.
	+ Discussion on other compression feedback methods. For the channel feedback, the presentor doesn’t compare the shown scheme with subband beamforming as mentioned Wookbong and Shimi in TGbe.
	+ Discussion on deep neural network. The presentor clarifies that she didn’t try deep neuron network, which requires much training data
	+ For CSI, it doesn’t bring backwards compatibility issue. For channel access, AI may bring unfairness issue for legacy STAs and new devices that are AI/ML capable
* Recessed at 21:00 ET

# Wednesday, July 13, AM2 Sesstion (10:30-12:30 ET)

* The Chair, Xiaofei Wang (InterDigital), calls the meeting to order at 10:31 ET.
* Vice Chair Ming Gan (Huawei) is serving as acting secretary.
* Note that this is a hybrid meeting, with some participants in person and some participating online through a webex session
* Agenda:
* Chair reviews proposed agenda contained in [11-22-0847r3](https://mentor.ieee.org/802.11/dcn/22/11-22-0847-02-aiml-aiml-tig-july-2022-agenda.pptx).
	+ Discussion: None
	+ Agenda approved with unanimous consent.
* Chair’s reminder on meeting and patent policies.
* The chair called for essential patents, and none was indicated.
* The chair reminded attendees that participation is on an individual basis.
* The chair reminded attendees of IEEE copy right policies
* Chair’s reminder on registration for the plenary meeting.
* Chair reminds participants to record their attendance.
* Technical Presentations
* Presentation #2: Applying ML to 802.11: Current Research and Emerging Use Cases, Szymon Szott (AGH University), [11-22/979r1](https://mentor.ieee.org/802.11/dcn/22/11-22-0979-01-aiml-applying-ml-to-802-11-current-research-and-emerging-use-cases.pptx).
	+ Discussion whether the two items on slide 19 are within scope of 802.11. ML algorithm is not in the scope of 802.11 and the logic is not part of standard. Interfaces may be needed for AI/ML implementations.
	+ Discussion why just RL (reinforced learning) is considered. Rate selction needs check allowed parameters and provides corresponding interfaces. RL is an example, could be any other ML approach
	+ Discussion how AI/ML may work when there is a mixture of legacy and AI/ML capable STAs. The existing reseach doesn’t have good answer for whether STA with AI infringes the throughput of legacy STA or not. With good algorithm, there is no impact on legacy STA’s throughput.
	+ The presentor is not familiar with AI assisting with decoding frames, and will provide answer offline after consulting with other co-authors.
	+ Discussion how AI/ML can assist with beamforming. ML could use camera to select beam sector and also can use history data
	+ WG Chair encourages the presentor to continue to contribute to the AIML TIG.
	+ Comments on most of research focuses on centralized ML. Federated learning or similar schemes should be within scope of the TIG.
	+ Author to provide list of literatures on Federated learning for wireless
	+ Parameter exchange with peers depends on the use cases.
	+ Rate selection and CW adjustment are good examples of parameter selection.
	+ Discussion on rate selection improvement. Author to provide data on improvement using rate selection offline.
	+ Discussion on overhead analysis when using AI/ML. Author refers to reference 5 for the overhead analysis.
	+ There is overhead for trained model of CW, especially for dense scenario
	+ Discussion on using AI/ML to improve performance for multi-link. The presentor haven’t done research on multi-link operation with AI, but expects it may be related to channel bonding, will get back if there is progress.
	+ Comment that gap analysis for implementing AI to 802.11 should be provided.
* Presentation #3: AIML TIG Technical Report Draft , Xiaofei Wang (InterDigital), [11-22/987r0](https://mentor.ieee.org/802.11/dcn/22/11-22-0987-00-aiml-aiml-tig-technical-report-draft.doc).
	+ The chair clarifies that the report draft is meant to provide a frame work so that TIG members can contribute directly to the technical report in the future. The chair invites comments and changes to the technical report draft so that it can be updated and be presented at coming teleconferences or meetings.
	+ Discussion whether gap analysis of applying AI/ML to 802.11 may belong to the section of standard impact or not.
	+ Discussion that standards impact may depend on use cases and hence use cases should be the focus for now.
	+ Backgroup info about machine learning should be helpful in this document
	+ Performance evaluation could be included in the report document, such as in the technical feasibility section. However, performance evaluation is not required in the TIG phase.

* Next steps
* The chair calls for contributions for AIML use cases for 802.11 and technical feasibility analysis; potentially in the form of Technical Report sections
* 2 meeting slots will be requested for AIML TIG during the September 2022 Interim meeting
* Teleconference schedules:
	+ 1 teleconference on Aug 8, 2022 at 10 am ET for 1 hour
	+ Participants have no objections or comments regarding the teleconference schedules
	+ The chair to announce the teleconference time using the reflector
* AIML TIG adjourned at 12:01 ET