IEEE P802.11
Wireless LANs

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| AANI May 2019 Meeting Minutes |
| Date: 2019-05-16 |
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Abstract

Minutes from the AANI SC meetings held during the 802.11 WLAN Working Group Session on 13-17 May 2019, in Atlanta, GA, USA: Monday, 14May PM2 (notes provided by Leif Wilhelmsson), Tuesday 15 May AM1 (notes provided by Roger Marks), Thursday, 17 May AM1 (notes provided by Dorothy Stanley), and Thursday, 17 May PM2 (notes provided by Alan Berkema).

Notes merged and edited into this document by Joseph Levy (InterDigital) AANI SC Chair.

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# Monday, 13 May 2019, PM2

**Administration:**

**Chair: Joseph LEVY, InterDigital**

**Secretary Acting: Leif WILHELMSSON, Ericsson AB**

**Meeting called to order by Chair 16:00 EDT, in the Peachtree meeting room, Hyatt Buckhead Atlanta.**

(about15 persons in the room.)

**Meeting Agenda:**

The meeting agenda is shown below, and published in the agenda document: [11-19/0618r1](https://mentor.ieee.org/802.11/dcn/19/11-19-0618-01-AANI-aani-sc-agenda-may-2019.pptx)

1. **Call for Secretary**
2. **Administrative: Reminders, Rules, Guidelines, Resources, Participation, Approval of Minutes**
3. **Background/Status**
	1. Chair’s Status General
	2. Chair’s Status Regarding the submission of an 802.11ax/EUHT IMT-2020 proposal to ITU-R WP5d
	3. Contributions on Proposal Status:
		1. 11-19/0855 – “Comments on Proposal to Submit IEEE 802.11ax and EUHT to ITU for IMT-2020”
		2. 11-19/0889 – “Response to the comments on Proposal to Submit IEEE 802.11ax and EUHT to ITU for IMT-2020”
4. **Technical Discussion / Contributions**
	1. 11-190/869 – “Current Status of submission about EUHT”
5. **Straw Poll**

The Chair asks for someone to be secretary. Nobody volunteers.

The Chair goes through slide 3 – Reminders and Rules.

The Chair goes through the agenda for the week (slides 4 and 5).

The Chair goes through slides 6-8, covering Guidelines for IEEE-SA meetings, links to relevant sources, and Participation in IEEE 802 meetings.

The Chair again asks for someone to act as secretary. Leif Wilhelmsson (Ericsson) agrees to be secretary for this session.

Question/Comment (Q): Do you plan to have a vote on whether to have an IMT-2020 proposal?

Answer (A): The agenda calls for motions on Thursday during the PM2 meeting. What those motions are will depend on what happens during the week and what is proposed by the members in the Thursday PM2 meeting.

The Chair goes through slide 9 and asks if there are any questions or comments on the meeting minutes or the teleconference minutes.

The Chair asked if there is any objection to approve the minutes.

No objections, and the minutes are approved.

The Chair announced that Nendica will meet on Tuesday in the evening session time slot. Roger Marks will chair the session.

The Chair reviewed the background as to why there are four AANI sessions this meeting. In summary Jun Lei (Nufront) contacted the Chair of 802.11 for *“exploring the possibility of further cooperation and integration between EUHT wireless communication technology and the IEEE 802.11 Working Group. As a result, IEEE and Nufront can submit the joint proposal to ITU as 5G standard”*

Q: I just want to confirm that this procedure is correct (slide 15). I wonder about the process in this group

A: The intention is to have a motion within this group and then bring it to the WG.

Q: Who can vote on this?

A: All can vote.

Q: 802.18 does not have a role in the approval process?

A: I don’t believe 802.18 formally has a role, but I believe it is desirable to involve also 802.18.

Q: I believe we also need to consider the time-line.

A: I agree, the time-line is a challenge. We may be able to do it, but it also depends on the decision of this group and the 802.11 WG.

Q: What do we actually decide in this group?

A: We can agree/disagree on the technical contents and we can also come with suggestions for the WG but the WG decides.

A I believe the group can prepare motion text for the WG.

Q: I am reading that the proponents want a joint submission, but if there is no support for this there is no need to spend time on this.

A: Let’s come back to that at an appropriate point in the agenda.

The Chair reviewed what needs to be provided for an IMT-2020 proposal (slide 18).

The Chair reviewed a suggested time-line for a submission (slide 19).

**Presentations:**

**11-19/0855r2, “Comments on Proposal to Submit IEEE 802.11ax and EUHT to ITU for IMT-2020” Hassan Yaghoobi (Intel) Presented by Robert Stacey**

The contribution is co-signed by Jim Lansford (Qualcomm) and Prabodh Varshney (Nokia). The core message provided is:

*Despite 3GPP lack of interest in collaboration with IEEE 802, the overall level of interest remains very low and therefore a competing submission is not recommended.*

To further motivate the recommendation, the presenter provided background for how the submission for 802.16 was done and reviewed the work that has gone into the 3GPP’s submission, as a reference as to what the process should be.

The Presenter also argued that a submission should only include technology that are familiar to 802.11 membership. EUHT was not developed in open way.

Comment: I believe the presentation points out in good way how late we are.

Comment: I chair one of the 13 independent IMT-2020 evaluation groups. We started 2,5 years ago with 3GPP. It will take a very long time to do self-evaluation and I therefore support the conclusion of the presentation.

Comment: First, I would like to thank the contributors for all the work they did, but unfortunately, I have to agree with the conclusions in this presentation.

Comment: I would like to comment why it takes so long time for 3GPP, it is because they developed the standard in parallel. In contrast EUHT is not a new technology, so we have done evaluation of our technology during several years. We are also cooperating with people involved in IMT-2020 evaluations on e.g. channel models.

Q: I wonder what we would achieve with this proposal? What is the goal of a submission?

A: To get access to spectrum designated for IMT-2020.

Q: Is there any spectrum today that would be interesting for 802.11? Is there any unlicensed spectrum?

A: No unlicensed spectrum.

Q: How could you simulate many years ago when the requirements were not available?

A: The proposal contains many key components that could be anticipated, e.g. high bandwidth, MU-MIMO, increased number of streams etc., so it is possible to be well prepared.

Q: Is the idea that one needs to combine IEEE technology and EUHT technology in order to be IMT-2020 compatible?
A: No.

Q: Why is there then a joint submission?

A: Enough test cases need to be addressed, and this is why a joint proposal is needed.

Q: If EUHT technology is so good, why do you need Wi-Fi?

A: In theory we can meet all the requirements. However, for indoor and dense urban we believe Wi-Fi can be a better choice, and this is why we believe it is good to have a joint proposal.

Q: Has the positions changed for people in the group? When there was time we did not do anything, but now we are only saying that it is not possible because of the time-line.

A: In the past we did not believe it was a value of having a submission. This has not changed.

Q: Would the group be interested in an evaluation, even if there would not be any formal submission?

Comment: I believe evaluations are very important as such. They are very useful, but not for a submission. (Note: This comment was not from the presenter)

Q: What does the Nufront get out of joint a joint proposal? 802.11 is open for participation, People from Nufront are welcome to join and promote their technology in this way.

[11-19/0889r1](https://mentor.ieee.org/802.11/dcn/19/11-19-0889-01-AANI-response-to-the-comments-on-proposal-to-submit-ieee-802-11ax-and-euht-to-itu-for-imt-2020.pptx)**, “Response to the comments on Proposal to Submit IEEE 802.11ax and EUHT to ITU for IMT-2020”, Jun Lei (Nufront):** Jun Lei presents an overview of EUHT.
NOTE: 11-19/0889r1 has an error in the header, indicating that it is document 11-19/0626r1, which it is not. [11-19/889r2](https://mentor.ieee.org/802.11/dcn/19/11-19-0889-02-AANI-response-to-the-comments-on-proposal-to-submit-ieee-802-11ax-and-euht-to-itu-for-imt-2020.pptx) was posted after the meeting correcting this error, the content otherwise is the same.

Q: Why is ITU designation beneficial to IEEE?

A: We believe it better to attack and to also go after licensed spectrum, rather than letting 3GPP dominate. The requirements are ready. We have worked on this for a very long time.

When it comes to concern about EUHT, it is not a proprietary technology. EUHT was presented to IEEE in 2011 and a lot of 802.11 members are familiar with the technology as well as the process.

The idea is to have a joint proposal, with complementary technologies.

Q: On slide 6, you present a very challenging future for 802.11. Even if we have access to licensed spectrum, it is not clear to me that we want to put 802.11 there. So, it is not clear to me what we gain from this. Would it not have been better to submit the EUHT technology to 802.11?

A: I believe 802.11 can be used in licensed bands as well. I don’t believe you design a standard for licensed bands. I believe it is possible to build something much less expensive than what 3GPP can provide. An example is private networks.

Comment: I don’t agree that licensed is simple.

Comment: I believe it is because we have missed the train that we are doing self-evaluations.

Q: We have asked 3GPP to make 802.11 to be part of the submission, why can’t we ask Nufront the same question? (The question is meant for the group rather than the presenter.)

Q: You said this is the last time for 802.11, why do you say this is the last chance?

Q: There is nothing like a last chance… Do you planning on bringing any contribution to EHT? I believe you should so that it becomes more integrated into 802.11 technology

A: We will do that.

Comment: I agree that we have looked at EUHT many years ago, and the way I recall it is that it was similar to 11ac. However, we saw coexistence issues and other technical issues.

Response: We have adopted the technology, OFDMA, MU-MIMO, handover for fast moving devices.

Comment: We are looking into how to integrate your technology into a single device, so it is not such a great idea to just glue them together and hope there will be no coexistence issues. I believe there is an obvious issue in that the 802.11 brand may suffer significantly if we have a joint proposal that is not sufficiently good.

Q: Maybe this is actually a good time to have a SP whether we should invite Nufront for an IMT-2020 application?

Chair: I would like to follow the agenda, but the intention is to have the SP before 6 pm.

Q: I repeat my question why this is different than asking 3GPP?

A: I believe this is a question everyone has to answer for themselves.

Q: Based on your description it sounds like you need two phones, and decide which one to use depending on the environment. 11ax for urban and EUHT and rural?

**11-19/0869r0, “Current Status of submission about EUHT**”, **Jun Lei (Nufront):**

This is a continuation of what has been discussed in teleconferences. The conclusion is that all requirements can be met and that all documents are complete.

**The Chair called for a Straw Poll:**

Stating that assuming all documentation is in order and available for review.

Do you support submitting a joint 802.11ax and EUHT IMT-2020 proposal?

Yes: 4, No: 11, I need more information: 0, Abstain: 0

Room Count: 15, 802.11 voting members: 9

Q: Why do we need another meeting?

Chair: Because we have more contribution to go through and we have an approved agenda.

Q: I wonder, would 802.11 oppose if Nufront would submit a proposal on their own?

Some discussion whether this really is something that 802.11 could oppose.

The meeting time expired, ending the discussion.

The meeting is recessed at 6.01pm

# Tuesday, 14 May 2019, AM1

**Administration:**

**Chair: Joseph LEVY, InterDigital**

**Secretary Acting: Roger MARKS, EthAirNet Associates**

**Meeting called to order by Chair 08:05 EDT, in the Peachtree meeting room, Hyatt Buckhead Atlanta.**

He noted that Roger Marks of EthAirNet Associates had agreed to record minutes until 09:00.

The Chair reviewed Slides 1-3 of slide set 0618r2. On Slide 4, the Chair proposed an amendment to the prior agenda in order to include presentation of 802.1-19-0038-00-ICne.

The Chair reviewed Slides 4-8.

Roger Marks presented 'IEEE 802 “Network Enhancements for the Next Decade”
 Industry Connections Activity
(Nendica):
 Status Report' (document [802.1-19-0038-00-ICne](https://mentor.ieee.org/802.1/dcn/19/1-19-0038-00-ICne-nendica-meeting-overview-2019-03-14.pptx) in the IEEE 802.1 Mentor document area), with follow up discussion regarding the vision for the outcome of Nendica work.

The Chair reported the results of a straw poll held during the prior day's meeting, as recorded on Slide 21. The Chair proposed to repeat the straw poll. Several participants questioned the value of repeating the poll or indicated that they were opposed to repeating it. The Chair noted that the possibility of repeating the poll was raised at the prior day's meeting. The Chair proceeded to conduct the straw poll, posing the question as:

"Assuming all documentation is in order and available for review. Do you support submitting a joint 802.11ax and EUHT IMT-2020 proposal?"

It was noted that the straw poll results stated on Slide 21 indicated a different version of the question, including only the second sentence, excluding the conditional. The Chair stated that the prior day's straw poll had included the conditional, though it was not recorded on Slide 21.

The Chair conducted the straw poll, with the result:

Yes 6/ No 3/ Abstain 2 - Room Count 12/ 802.11 Members 7

Jun Lei (Nufront) briefly introduced the content of IEEE 802.11-19-0870-00 ("Submission documents of EUHT") and listed its embedded documents. Several participants noted that they were unable to extract the embedded documents. Discussion ensued regarding the appropriate format for distributing a set of files. The results of the discussion were inconclusive. The Chair offered to assist in preparing a revised document with more widely supported extraction possibilities.

Sindhu Verma (Broadcom) presented IEEE 802.11-19-0871-00 "802.11ax for IMT-2020 eMBB Dense Urban". It concluded that 802.11ax meets the salient IMT-2020 requirements for the eMBB Dense Urban test environment, with the exception of the mobility requirement, which had not yet been completed but is in progress.

Sindhu Verma (Broadcom) presented IEEE 802.11-19/0888r0 “Discussion on IMT-2020 mMTC and URLLC requirements”

Having exhausted the agenda, the meeting is recessed at 09:40 EDT

# Thursday, 16 May 2019, AM1

**Administration:**

**Chair: Joseph LEVY, InterDigital**

**Secretary Acting: Dorothy STANLEY, HPE**

**Meeting called to order by Chair 08:05 EDT, in the Peachtree meeting room, Hyatt Buckhead Atlanta.**

1. Agenda
	1. Chair reviewed the draft updated agenda, 11-19-618r3, slide 5.
	2. R2 of the agenda is posted, chair will post the r3 upon approval of the agenda.
	3. Chair: Any objections to approving the agenda as shown? No objections.
2. Review of Guidelines and policies
	1. Chair reviewed “Guidelines for IEEE-SA Meetings” Slide 6 of agenda.
	2. Chair reviewed “resource URLs – Slide 7 of agenda.
	3. Chair reviewed “Participation in IEEE 802 Meetings” Slide 8 of the agenda.
3. Discussions and contributions: 11-19-870r1 – (see Slide 27 of the agenda document).
	1. Jun LEI (Nufront) presented 11-19-870r1 – Compliance template
		1. Template identifies categories of compliance
		2. Requirements met by inspection/analysis/simulation.
		3. What is interest of this material in the context of 802.11?
		4. Learn about requirements. 802.11 members are conducting simulations of 802.11ax compliance to the same requirements. During the discussion from Tuesday – review of 802.11ax for URLLC – potential changes for 802.11 identified
			1. Low error floor LDPC code design
			2. Multi-antenna, repetition and interleaving
		5. Do not recommend HARQ, since increases the complexity of the receiver. Actual gain not that much. HARQ under consideration for 11be.
		6. To support high mobility in 6GHz, higher band brings higher Doppler. 11ax inserts mid-amble in data frame to address this.
		7. Mid-amble for channel tracking is 10 or 20 OFDM symbols – pilot symbol inserted. When have different vehicular speeds, need variability in the number of symbols.
		8. MMTC use case – system must work at very low SNRs. Focus on lowest 5% SNR users. Diversity helps, HARQ does not help.
		9. Future 802.11 technology can learn from these results.
		10. Suggest making these noted insights more visible, for example as a presentation in TGbe.
4. Jun LEI (Nufront) presented 11-11-865r0 JTC1 document, see <https://mentor.ieee.org/802.11/dcn/11/11-11-0865-00-0jtc-ieee-perspectives-on-doc-6n14746.ppt>
	1. Review of “Potential Technical Issues” slide
		1. Consider the high-speed train use case. Coexistence is not a large issue in the current proposal. EUHT technology is used for the backhaul only. Not for inside train. Can use different bands.
		2. In EUHT, adopt 78 kHz, performance degradation due to narrow bands is .02-.03db. 802.11ax uses same subcarrier interval. Reduces overhead.
		3. Response to complexity issues – 11ax now supports 1024 QAM. Requirements in IMT met via the throughput provided by these higher code rates. Depends on whether or not the channel is good enough to support the higher modulation and code rate.
		4. Higher modulation does not pose a large complexity issue for the receiver. The complexity is in MIMO detection.
5. Jun LEI (Nufront) presented 11-19-870r1 – Self Evaluation Report
	1. Can learn/better understand characteristics of the system from the self-evaluation process
		1. Peak Spectral efficiency section reviewed.
			1. For 3GPP – terminal side assumes number of transmit antennas is low. 802.11ax and EUHT, can use higher number of antennas. Result is performance beyond IMT requirements.
		2. User experienced data rate section reviewed
			1. This metric applies in the Dense Urban test case only. Challenging to meet.
		3. Latency section reviewed
			1. Not difficult metric to meet. 802.11ax performance is good.
		4. Mobility interruption time
			1. Area where 802.11 standard can be improved in the future.
			2. In eMBB scenario evaluation –need to have system level pathloss, channel fading for each user in the evaluation. For MU-MIMO, scaling can be difficult. Selection of users can result in higher overall capacity. For the ITU mobility evaluation, drop users in the system level platform, but don’t have to schedule them individually. Obtain the average SNR values. Link level simulation is more straightforward. The most difficult work is thus completed in the 11ax simulation which is already completed.
		5. Review of section B.2 “Detailed assumptions and evaluation results for simulation related technical performance requirements”
		6. C: Encourage participation in the 802.11 process with contributions.
6. Jun LEI (Nufront) presented 11-19-870r1 – Link budget template
	1. Review of the spreadsheet
	2. Easy to complete this analysis, can be completed in a day or less.
	3. Presenter is happy to answer any questions on the contribution package, and methodology used.
7. Jun LEI (Nufront) presented 11-19-870r1 – Characteristics template
	1. Contains a detailed system description in the required template format to educate the evaluation groups about the proposal.
		1. High level description – e.g. OFDMA/TDMA/SDMA level, not the detailed technical parameters.
		2. Document covers physical layer, channel tracking capabilities to show support a fast fading channel, handover/mobility, radio resource management, spectrum and duplex high level descriptions, link adaptation and power control.
			1. Can provide references to the standard to reduce the amount of new text required.
			2. Not as much workload as imagined. Full text of standard is already available.
			3. Takes about 1 week to finish a document. Still possible to finish a document in the time available.
			4. The consensus process takes longer than that.
			5. ITU WP5D can reject the proposal for any reason – including grammar issues.
			6. 802.11ax evaluation – would require one more simulation and the document preparation.
			7. Mapping to 3GPP simulation – use some 3GPP channels names. Same terms are used to describe certain function – logical channel name of the function.
			8. Welcome further questions on the document.
8. Chair reviews document 11-19-0240r0
	1. Contains links to the candidate IMT-2020 radio interface(s) submitted by various contributors to date
	2. Contributors were reviewed. All contributions to date include 3GPP components, with very minor variations.
		1. 3GPP (SRIT & RIT), rest are RIT only:
		2. Korea (mostly 3GPP, small change), RIT only
		3. China (mostly 3GPP, small change), RIT only
		4. ETSI&DECT (SRIT, mostly 3GPP) possible new RIT
		5. TSDSI (India, mostly 3GPP), RIT only
	3. Discussion on what permissions been obtained from 3GPP by the other contributors.
		1. All the current submitters are Operating Partners of 3GPP. DECT is part ETSI, and can access the 3GPP technology without additional authorization.
		2. 3GPP submissions support all the use cases. CCSA, Korea, TSDSI for spectrum and marketing reasons, wanted to have their own contribution. Provided letter of support for the 3GPP proposal.
	4. Discussion on the value of the IMT-2020 designation. Points include:
		1. Believe there would have been a marketing advantage – this is why the request to ask 3GPP to include 802.11ax was made by IEEE 802.11.
		2. Advantages are in marketing, labelling, and spectrum access.
		3. Many specific requirements in ITU-process are in line with what 3GPP supports. There are many “magic” numbers in the ITU-requirements are exactly as developed also in 3GPP documents. Many overlapping contributors.
	5. Review of the ETSI/DECT proposal, which is being revised. The ETSI/DECT proposal as submitted to date would fail.
	6. Brief discussion on Working Group motion from the Wednesday plenary and scenario mentioned Monday for Nufront to make an IMT submission on its own, which includes 802.11 components.
		1. Results of Wednesday Plenary motion: There is no consensus for IEEE 802.11 to forward a submission to IMT-2020.
		2. There is an IMT-2020 statement on IPR required in the submission package, is this an issue? Topic for IEEE level, really can’t determine here. Careful to not discuss specific patent related items.
		3. Anyone can submit an IMT-2020 proposal.
		4. If a submission points to an IEEE document, fine. Does not constitute an endorsement from IEEE.
		5. If NuFront does make a proposal of its own, then IEEE does not have the liabilities. If the proposal is approved, will IEEE leverage the designation?
		6. No further discussion
9. Chair recesses the meeting at 9:47am local time

# Thursday, 16 May 2019, PM2

**Administration:**

**Chair: Joseph Levy, InterDigital**

**Secretary Acting: Alan Berkema, HP Inc.**

Meeting called to order by Chair 16:02 EDT, in the Peachtree meeting room, Hyatt Buckhead Atlanta.

The Chair reviewed Slides 1-3

Agenda can be found in Document 19/0618r4 – see slide 5 (copied below for reference)

1. **Continuation of Technical Discussion / Contributions**
	1. 11-19-0901 “Paths to 5G”
	2. 11-19/0870 “Submission documents of EUHT” – Questions (if any)
2. **Straw Polls / Motions**
3. **Future Sessions Planning**

The Chair reviewed Slides 4-8.

The Chair reviewed the proposed agenda, asked for additions and comments, there were none.

The Chair asked if there were any objections to the agenda – there were none.

Agenda Item 1.1: **Paths to 5G see** [11-19/0901R1](https://mentor.ieee.org/802.11/dcn/19/11-19-0901-01-AANI-paths-to-5g.pptx) **– “possible alternatives to advance the standing of IEEE 802.11 as a 5G technology”**

Presented by Roger Marks

Agenda Item 1.2: **Continued Discussion on EUHT**

The Chair called for additional questions or discussion on 11-11-865r0, none was had.

Agenda Item 2: **Straw Polls / Motions**

The Chair called for Straw Polls or Motions, there were none.

Question: When are we going to end this activity?

Answer: Will discuss under the Future Session

Agenda Item 3**: Future Session Planning** - See slide 30 of 19/0618r4

AANI plans to meet in Vienna.

The AANI SC’s work is not unbounded and is contribution driven, contributions should be in the scope of the AANI SC.

The Chair observed that is seems that, AANI and the 802.11 WG does not have the will to make a submission to IMT

An AANI SC goal is to complete the self-evaluation against the IMT 2020 criteria

802.11 will use that information for their own benefit

Use that document to position 802.11 as a 5G technology and put together summary materials

Intend to complete IEEE technology summary by the end of the year

Lengthy discussion on whether to keep the AANI SC going was had

Another member volunteered to contribute 802.11ax evaluation via simulations

Key deliverable is the “self-evaluation”

Question: Should the group narrow the scope to just to item 1 on slide 30

The Chair responded by restating that the group in contribution driven and the group should stay focused on the current scope, items 1 through 3 on slide 30

Much discussion about peer review of the self-evaluation document that AANI will produce and will this be a productive document.

Discussion about the use of 802.11 resources to keep AANI going.

AANI will continue the contribution driven activity to create the self-evaluation document with a completion target of end of 2019.

Having exhausted the agenda, the meeting adjourned at 17:40 EDT.

**References:**