IEEE P802.11
Wireless LANs

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| 802.11 AMP SG meeting minutes for July 2023 Plenary  |
| Date: 2023-7-22 |
| Author(s): |
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Abstract

This document includes minutes of AMP SG Sessions of IEEE July 2023 Plenary.

Version Tracking:

R0: Creating the minutes.

# Monday 10 July 2023 @ 2:00-4:00 am ET

## Opening (IEEE 802.11-23/ 0931 r0)

* 1. Call to order 2:00 am ET.
	2. Chair, Bo Sun (Sanechips), instructed members to record attendance in IMAT.
	3. Chair introduced the patent policy and meeting rules (slides 2-8).
	4. No response to the call for patents.
	5. Chair introduced IEEE-SA COPYRIGHT POLICY (slides 9-10)
	6. Chair reviewed other Guidelines, Participation and Guideline for Straw Polls (slides 11-13).
	7. Chair reviewed Suggested Best Practices, Registration, Meeting plan, current AMP SG Session submission list (slides 14-17).
	8. Hao Wang (Tencent) is the secretary.
	9. Chair call for approval of the agenda of the AMP session.

## Agenda (IEEE 802.11-23/ 0931 r0)

* 1. Chair presented the agenda: https://mentor.ieee.org/802.11-23-0931-00-0amp-amp-sg-meeting-agenda-for-jul-plenary-2023. (slide 19)
		+ Call meeting to order and remind the group to record attendance on imat.ieee.org
		+ IEEE-SA IPR policies and meeting rules
		+ Approval of agenda
		+ AMP SG timeline review
		+ AMP PAR/CSD initial draft framework (11-23/1006, 11-23/1212)
		+ Contribution discussion
			- 11-23/1135, AMP STA, Sebastian Max (Ericsson)
			- 11-23/1168, AMP PAR Interoperability and Backward Compatibility, Sebastian Max (Ericsson)
			- 11-23/1189, Discussion on AMP Security, Weijie Xu (OPPO)
		+ Any other business?
		+ Recess
	2. No objection, Agenda approved.

## AMP SG Kickoff (IEEE 802.11-23/ 0931 r0)

* 1. Chair presented the AMP SG introduction and time plan.
	2. Chair deferred the approval of the minutes to Wednesday session since the first session is an ad hoc.
	3. Chair briefly reviewed the draft of PAR and CSD in document 11-23/1006 and 11-23/1212, and called for comments.

Comment: re-consider to mention RFID in the PAR since it is not an 802 technology, and replace with a general term.

## Contribution discussion

* 1. Presentation of IEEE 802.11-23/1135-r0, AMP STA, Sebastian Max (Ericsson)

Q(uestion): Three entities shown on the slide, what is the difference between AMP assisting STA and AMP STA?

A: AMP assisting STA is like regular STA but it can receive signals from the AMP STA.

Q: Is it a relay?

A: Don’t want to define capabilities, but in terms of relay capabilities we may define it as AMP relaying STA.

C: The term of assisting is not specific, and we may need a definition for the AMP reader.

Q: It is important to discuss the term. We need to differentiate AMP STA and legacy STA. AMP AP is sufficient, better drop the ‘assisting’. Considering different deployments, AP may directly communicate with the STA, or there is intermediate non-AP STA which provides power source, or there exists a relay for DL and UL data.

A: An AMP AP is not possible, as it always contains a STA.

Q: How about using smartphone to connect the AMP STA, can it be called an AMP assisting AP?

A: Yes, AP must provide connection to the distribution system.

C: Better to involve the ARC people in the discussion and harmonize the baseline definition. We need to understand logical and physical concept, for example device and STA is different. No need to invent new term unless it is absolute necessary. The term assisting is causing confusion.

C: Better to use generic term and deal it later when its function is clear.

* 1. Presentation of IEEE 802.11-23/1168, AMP PAR Interoperability and Backward Compatibility, Sebastian Max (Ericsson)

Q: How the following situation can be covered here, that AP reserve channel for the AMP STA?

A: This is the requirement that PAR should follow. But what you mentioned is the solution, and it is bound by the baseline standard.

Q: Agree on the use of coexistence. But fairness implies that the new tech is not compatible with the legacy well, and it will be a burden for the TG to approve that the new standard achieves this goal. I am not sure if the AMP STA in a low power transmission is fair to the legacy device. Suggest not to put fairness in the scope. In general, backward compatibility mentioned in the PAR means the preamble format can be recognized by the legacy system. Maybe on the AP side, it will provide understandable preamble for the legacy system can treat properly.

A: If not put fair in the scope, it may draw complaints.

Q: Regarding the term coexistence, it is bound to AP or both AP and STA?

A: By definition, coexistence means both system operate on the same band without causing harm to each other.

Q: My understanding of coexistence means following the regulation, and agree with the previous commentor that back compatibility means the requirement of sending compatible preamble.

A: Don’t think coexistence involves regulation requirements, only bound to 802.11 requirements.

Q: If the AMP tx power is fairly low, it also can be counted as coexistence.

A: Yes, but the wording suggests solution rather than requirements.

C: Coexistence can be interpreted in different form, and agree that the requirements in the PAR shall explain the relationship between new amendment and legacy 802.11 only.

C: Chair suggest to have more offline discussion and bring motion to the last session this week.

## Recess

* 1. The chair announced the session recessed at 3:57 pm ET.
	2. Next session will be on July 12th.

# Wednesday 12 July 2023 @ 4:30-6:30 am ET

## Opening (IEEE 802.11-23/ 0931 r1)

* 1. Call to order 10:30 pm ET.
	2. Chair, Bo Sun (Sanechips), instructed members to record attendance in IMAT.
	3. Chair introduced the patent policy and meeting rules (slides 2-8).
	4. No response to the call for patents.
	5. Chair introduced IEEE-SA COPYRIGHT POLICY (slides 9-10)
	6. Chair reviewed other Guidelines, Participation and Guideline for Straw Polls (slides 11-13).
	7. Chair reviewed Suggested Best Practices, Registration, Meeting plan, current AMP TIG Session submission list (slides 14-17).
	8. Hao Wang (Tencent) is the secretary.
	9. Chair call for approval of the agenda of the AMP session.

## Agenda (IEEE 802.11-23/ 0931 r1)

* 1. Chair presented the agenda:
		+ Call meeting to order and remind the group to record attendance on imat.ieee.org
		+ IEEE-SA IPR policies and meeting rules
		+ Approval of agenda
		+ Approve AMP SG meeting minutes
		+ Contribution discussion
			- 11-23/1140, Considerations for AMP Devices, Amichai Sanderovich (Wiliot)
			- 11-23/1192, Distributed Microphone Smart Home Application for AMP IoT devices, Vytas Kezys (Haila)
			- 11-23/1195, Thoughts on AMP IOT and PAR, Bin Tian (Qualcomm)
			- 11-23/1189, Discussion on AMP Security, Weijie Xu (OPPO)
			- 11-23/1190, Further Discussion on AMP PAR, Yinan Qi (OPPO)
			- 11-23/1271, AMP PAR Scope Modification Suggestions, Rakesh Taori (Infineon Technologies)
		+ Any other business?
		+ Recess
	2. No objection, Agenda approved.

## Approve AMP SG meeting minutes

* 1. Motion to approve the AMP SG meeting minutes since May Interim

Approve the meeting minutes for AMP SG meetings during 802 May interim session and for AMP SG teleconferences after 802 May interim session as below:

* + - https://mentor.ieee.org/802.11/dcn/23/11-23-0939-00-0amp-amp-sg-may-interim-minutes.docx
		- https://mentor.ieee.org/802.11/dcn/23/11-23-1017-00-0amp-amp-sg-telecon-minutes-june-13th.docx
		- https://mentor.ieee.org/802.11/dcn/23/11-23-1078-00-0amp-amp-sg-telecon-minutes-june-27th.docx

Moved: Harry Hao Wang

Seconded: Weijie Xu

Result: Approved with unanimous consensus

## Contribution discussion

* 1. Presentation of IEEE 802.11-23/1140, Considerations for AMP Devices, Amichai Sanderovich (Wiliot)

C: I have concern on clock accuracy, 1000ppm may reduce the power consumption but not enough for some frequency band. It’s for backscatter only?

A: 1000 ppm is the basic requirement, enough for reception on Sub-1Ghz, and transmission on 2.4Ghz, but for other cases additional calibration may be required.

C: Similar comments, from standard point of view, we should care more about the accuracy over the air not the implementation error.

A: 1000ppm accuracy can be achieved on 2.4Ghz band, but for Sub-1Ghz calibration may be needed.

C: 1000ppm is the initial accuracy which can be improved by calibration. For UL better accuracy will help to reduce the interference. Consider a relaxed requirement for the AMP STA due to the limit of design simplicity and power efficiency.

* 1. Presentation of IEEE.11-23/1192, Distributed Microphone Smart Home Application for AMP IoT devices, Vytas Kezys (Haila)

Q: These are different requirements. How does the data compression compare to the transmission in terms of power consumption.

A: Haven’t prepare for feasibility yet.

Q: Smart home use cases are hot and better to integrate device together. Locate the person in your use case is interesting. But the privacy is an issue, send information to cloud is a concern.

A: Yes, home hub is part of the solution and stop the audio to be sent out.

Q: Activate MIC needs more power.

A: The first usage of backscatter is for this kind of use case.

Q: Collision may happen if the MIC transmit at the same time.

A: There has to be some higher level coordination.

Q: I assume the system is triggered by voice, not the DL. How is the backscatter triggered?

A: Backscatter is kind of poll service, DL trigger for all STA at the same time is needed.

Q: Is this contribution related to the PAR?

A: Better not to rule out this use case.

Q: What kind of application do you think of, collect the sound over the space for what purpose?

A: Typical smart home application, control through the hub etc.

* 1. Presentation of IEEE. 11-23/1195, Thoughts on AMP IOT and PAR, Bin Tian (Qualcomm)

Q: Two comments on the suggest PAR, one is related to the part of connecting to legacy 2.4Ghz. I think it has been already defined and no need to mention it in the PAR.

A: A lot of things need to be defined in order to connect to legacy 2.4Ghz device.

Q: Two is related to the backward compatibility, if adding layers to existing devices backward compatibility is guaranteed, any devices support the legacy standard.

A: Open to discuss. My view is that as the new system deployed, legacy may not fully understand it. I’m not talking about HE or EHT, but AMP AP is supposed to understand 11ac or 11n signals.

Q: Only AMP AP needs that?

A: Yes, not applied to all AMP devices.

Q: Question concerns the second bullet. A link shows between AMP device and AP on slide 5. It is for the UL or the DL?

A: It’s bi-direction. This AP is a legacy AP.

Q: How it get deployed? AP and energizer will be in the same box?

A: I suggest to re-use the existing AP infrastructure and add the energizer box. If the standard works well, it may work with energizer from a different vendor.

Q: Where and how the energizer is deployed?

A: Yes, there should be some guideline for the energizer deployment.

Q: The RF link may provide power on sub-1Ghz, what is the standard and regulation for it?

A: It’s the reason I put wireless power transfer here because different people may have different opinion about wireless power transfer.

Q: I am wondering if the second bullet should be in the scope. Same for the third bullet, since we will not be discussing functions like 11bf and 11az. And I suggest to remove backward compatibility.

A: There are a broad types of use cases for AMP, not just reader and tag. The second bullet is meant to make AMP appeal to the broad market, not targeting the RFID.

Q: I think it make sense to leverage the existing legacy system. The legacy device may be helpful to manage the power assumption of AMP STA.

A: Yes, the PHY part of wireless power transfer is something we need discuss.

C: I think it worth mentioning wireless power transfer somehow in the PAR, since there are several IEEE specs related. It’d better to provide a marketable package for the AMP standard.

Q: The legacy device needs some software update in order to support AMP. Is this understanding correct?

A: The software update is one possible way.

Chair suggest to arrange PAR related contribution prior to technical submission. Chair encourage more submission on the PAR contents.

## Recess

* 1. The chair announced the session recessed at 6:27 am ET.
	2. Next session will be on July 13th.

# Thursday 13 July 2023 @ 2:00-4:00 am ET

## Opening (IEEE 802.11-23/ 0931 r3)

* 1. Call to order 2:00 am ET.
	2. Chair, Bo Sun (Sanechips), instructed members to record attendance in IMAT.
	3. Chair introduced the patent policy and meeting rules (slides 2-8).
	4. No response to the call for patents.
	5. Chair introduced IEEE-SA COPYRIGHT POLICY (slides 9-10)
	6. Chair reviewed other Guidelines, Participation and Guideline for Straw Polls (slides 11-13).
	7. Chair reviewed Suggested Best Practices, Registration, Meeting plan, current AMP TIG Session submission list (slides 14-17).
	8. Hao Wang (Tencent) is the secretary.
	9. Chair call for approval of the agenda of the AMP session.

## Agenda (IEEE 802.11-23/ 0931 r3)

* 1. Chair presented the agenda:
		+ Call meeting to order and remind the group to record attendance on imat.ieee.org
		+ IEEE-SA IPR policies and meeting rules
		+ Approval of agenda
		+ PAR/CSD Contribution discussion
			- 11-23/1190, Further Discussion on AMP PAR, Yinan Qi (OPPO)
			- 11-23/1220, AMP Device Density, Joerg Robert (TU Ilmenau / Fraunhofer IIS)
			- 11-23/1271, AMP PAR Scope Modification Suggestions, Rakesh Taori (Infineon Technologies)
			- 11-23/1287, Revision Proposal for AMP CSD, Weijie Xu (OPPO)
		+ PAR/CSD SPs
		+ Contribution discussion
			- None
		+ Any other business?
		+ Recess
	2. No objection, Agenda approved.

## PAR/CSD Contribution discussion

* 1. Update of IEEE 802.11-23/1190, Further Discussion on AMP PAR, Yinan Qi (OPPO)

Q: Agree to slide 1-6, but concern on the use of ‘ultra’. Specific value may be needed to justify the term.

A: AMP device should be more power efficient than any of the legacy Wi-Fi devices. 1mW should be the upper limit for the AMP only device. We may further elaborate the second and third bullets.

C: PAR just gets the project start. We don’t need to be specific on certain words which stop the PAR being approved. Get rid of ‘ultra’, and just say one mode for low power communication. We are clear on the goal no matter with ‘ultra low’ or not.

Q: PAR defines two types of devices. Should it define links and specify it in the PAR.

A: It seems additional work load. The second bullet suggest to re-use legacy communication link and improves the power efficiency, thus reduce the work load. The third bullet will only introduce control signaling to balance the work load.

Q: Need more discussion on inclusion of power transfer in the baseline. Better to keep it simple in the PAR.

A: The first and second mode are different. We can first put the agreed part in the PAR.

C: ‘Ultra low power’ sends a clear message. The first paragraph may be changed to say AMP device powered by ambient power with low power density. It could be another approach.

Q: Regarding the wireless power transfer, control and configuration signaling is necessary.

* 1. Update of IEEE 802. 11-23/1220, AMP Device Density, Joerg Robert (TU Ilmenau / Fraunhofer IIS)

Q: What will be the output of the SP since there are conditions that are relevant?

A: The intention is to get the initial number.

Q: It’s the topic we need to discuss in the group. But, I don’t think this should be included in the PAR.

A: We need to mention high density in the PAR.

Q: The way it describes in the SP is difficult to choose. The number depends on several conditions.

A: The intention is to understand what use case does AMP design for, and get a simple answer.

Q: Similar question, the area needs to be specified.

A: Don’t want to define too many details.

Chair run the following SP as requested (multiple selection),

How many devices should we be able to query in a given area? (Time for the query is irrelevant)

Option 1: up to 10;

Option 2: up to 100;

Option 3: up to 1000;

Option 4: up to 10000;

Option 5: more;

Option 6: need further discussion;

Results: 0/0/11/3/1/7, no answer: 14

* 1. Update of IEEE 802.11-23/1271, AMP PAR Scope Modification Suggestions, Rakesh Taori (Infineon Technologies)

C: Need clarification on the nuance about sensing applications. 11bf sensing means using RF signal to sense environment. Do you mean to use AMP signal to sense or to use AMP communication to transfer sensor data?

A: The goal is to enable sensor application by AMP communication.

C: Suggest to change to ‘sensory data’ or ‘sensor application’.

Q: Positional application is different from sensor application. Putting these two applications in the same sentence may cause confusion.

A: Point taken, will work offline.

Q: Three types of sensor data applications defined in the use case. The requirement can be covered by previous PAR proposal on the statement of AMP link. It’s not necessary to add a mode for specific use case. Position is a different use case so need a standalone mode for it.

A: The PAR should capture the minimum requirements for the basic use case.

Q: For different use case, it requires different duty cycle. It’s difficult to define it in the standard.

A: Current keep it TBD until the group agree with the number.

Q: I think the requirement is too detail.

A: It characterize the operation.

C: Comment on two things, 1) instead of ultra low power, phrase it as ‘operate solely by energy harvest’; 2) instead of defining a link, use transmit and receive.

Q: On the first bullet second paragraph, it’s general statement. Maybe we can separate with two modes to highlight different features. Avoid 2.4Ghz and Sub-1Ghz in one paragraph. Sensor application and position application is different.

A: We should not link certain things to certain mode.

Q: From security perspective, does it include security requirement in the PAR?

A: Yes, security has been discussed in the group. But whether or not to include it in the PAR has not been decided yet.

* 1. Update of IEEE 802.11-23/1287, Revision Proposal for AMP CSD, Weijie Xu (OPPO)

No comments.

## PAR/CSD SPs

The group discussed on how to proceed with the baseline. No SP were taken.

## Recess

* 1. The chair announced the session recessed at 3:57 am ET.
	2. Next session will be on afternoon July 13th.

# Thursday 13 July 2023 @ 7:30-9:30 am ET

## Opening (IEEE 802.11-23/ 0931 r3)

* 1. Call to order 7:30 am ET.
	2. Chair, Bo Sun (Sanechips), instructed members to record attendance in IMAT.
	3. Chair introduced the patent policy and meeting rules (slides 2-8).
	4. No response to the call for patents.
	5. Chair introduced IEEE-SA COPYRIGHT POLICY (slides 9-10)
	6. Chair reviewed other Guidelines, Participation and Guideline for Straw Polls (slides 11-13).
	7. Chair reviewed Suggested Best Practices, Registration, Meeting plan, current AMP TIG Session submission list (slides 14-17).
	8. Hao Wang (Tencent) is the secretary.
	9. Chair call for approval of the agenda of the AMP session.

## Agenda (IEEE 802.11-23/ 0931 r3)

* 1. Chair presented the agenda:
		+ Call meeting to order and remind the group to record attendance on imat.ieee.org
		+ IEEE-SA IPR policies and meeting rules
		+ Approval of agenda
		+ PAR baseline SP (11-23/1190r4)
		+ Contribution discussion
			- 11-23/1189, Discussion on AMP Security, Weijie Xu (OPPO)
			- 11-23/1221, Clock generation for X-Band Operation, Joerg Robert (TU Ilmenau / Fraunhofer IIS)
			- 11-23/1232, Power Consumption Calculation, Joerg Robert (TU Ilmenau / Fraunhofer IIS)
		+ Teleconference Plan
		+ Any other business?
		+ Adjourn
	2. No objection, Agenda approved.

## PAR baseline SP

* 1. Proposal of IEEE 802.11/23, Further Discussion on AMP PAR, Yinan Qi (OPPO)

Q: There was a SP taken in this morning about the device density. The most selected answer is up to 1000. I have concern on the impact of so many AMP devices to the legacy system. Need more time to evaluate the impact so propose to delay the SP.

A: AMP devices have broad use cases, it doesn’t mean 1000 devices deployed anywhere. AMP devices consume very limited power and transmit in very short time. PAR will contain basic requirements to start the project.

A: The results of previous SP doesn’t mean to have that many devices deployed in any use cases.

A: There are use cases that only use limit number of AMP devices. PAR guarantees fair use of channels.

C: I think AMP devices do not intend to transmit a lot of data. Use cases indicate that data rate is lower than 200kbps. It also requires low control signaling. Energy harvest doesn’t need high bandwidth.

Q: On the second bullet, it is a new tech proposed yesterday. I don’t see tech feasibility for the ambient power only device. I propose to defer the second bullet to the September meeting.

A: I think AMP will bring benefit to broad IoT use cases. The texts are open to change.

The following SP were taken,

Do you agree following sentences as AMP PAR Scope baseline content?

This amendment defines modifications to both the IEEE 802.11 Medium Access Control layer (MAC) and Physical Layers (PHY) to enable operation of ambient powered devices by energy harvesting. This amendment defines:

* + - at least one mode of data communication in sub-1GHz or 2.4 GHz band
		- at least one mode of data communication with legacy WLAN networks in 2.4GHz band
		- at least one mode to support RF energy harvesting in sub-1GHz or 2.4GHz
		- at least one mode to support positioning function

This amendment shall provide coexistence with deployed devices compliant with IEEE Std 802.11™-2020 and operating in the same band.

Note: this baseline version is subject to further changes depending on discussion.

Result: 29Y/19N/3A

## Teleconference Plan

The following teleconference plan is approved:

* + - Aug 8th, 10:00am, ET; 2 hours, webex
		- Aug 29th, 10:00am, ET; 2 hours, webex
		- Sep 5th, 10:00am, ET; 2 hours, webex

## Contribution discussion

* 1. Contribution of IEEE 802.11-23/1189, Discussion on AMP Security, Weijie Xu (OPPO)

Q: What is your consideration on physical layer security?

A: We also consider to use physical layer security which reduces the power consumption. It would be better to re-use AES to balance the work load, but we are open to physical security.

Q: What mode of AES is in use for the evaluation?

A: Not sure at the moment.

Q: In some use cases, multiple sensors may be used to track human viable, does the security method work in the situation?

A: AES 128 is possible, and higher level security needs more discussion.

Q: Suggestion on the evaluation, only AES 128 is mentioned without specific mode like CCMP and GCMP. I suggest to estimate the power consumption of the mode. You also consider the key change, some algorithm uses public key, and it requires different computation tasks. It should be evaluated as well.

A: Yes, further evaluation is needed.

* 1. Contribution of IEEE 802.11-23/1221, Clock generation for X-Band Operation, Joerg Robert (TU Ilmenau / Fraunhofer IIS)

Q: Do you think to use crystal oscillator or on chip oscillator?

A: Avoid to use crystal oscillator to reduce cost.

Q: We need data for each channel on sub-1Ghz band.

A: yes, also need to consider regulation in each region.

* 1. Contribution of IEEE 802.11-23/1232, Power Consumption Calculation, Joerg Robert (TU Ilmenau / Fraunhofer IIS)

Q: I think it’s feasible for the low sensitivity. It’s difficult to compare the interference level between AMP and legacy devices. Not sure about the 1uJ per packet.

A: It’s the realistic value.

Q: Question about the power harvest efficiency. I think 40%-50% efficiency on -20dBm DL signal is possible.

A: Need the reference.

## Closing

* 1. The chair announced the session adjourned at 9:30 am ET.