IEEE P802.11
Wireless LANs

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| IEEE 802.11 TGbp Ambient Power CommunicationTeleconference Minutes August - September |
| Date: 2024-08-19 |
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Abstract

This document contains the IEEE 802.11 TGbp minutes for the teleconferences in August and September 2024.

Rev 0: Minutes for the IEEE 802.11 TGbp teleconference on 2024-08-06 added

Rev 1: Revised list of attendees on 2024-08-06

Rev 2: Fixed typo

TG Chair: Bo Sun (Sanechips)

TG Vice Chairs: Steve Shellhammer (Qualcomm)

 Rakesh Taori (Infineon)

TG Secretary: Sebastian Max (Ericsson)

TG Technical Editor: Yinan Qi (OPPO)

Abbrevations:

Q Question

A Answer

C Comment

SP Straw Poll

# Tuesday, August 06 2024, 09:00am - 11:00am (EDT)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-24/1379r1).

* Chair calls the meeting to order at 09:00 EDT.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-8).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 9-10)
* Chair reviews other Guidelines, Participation, Suggested Best Practices (slides 11-12).
* Chair reviews the current TGbp session submission list (slide 13), and the meeting agenda for the telephone conference (slide 16).

## Agenda

Chair presents the agenda of the session: https://mentor.ieee.org/802.11/dcn/24/11-24-1379r01 (slide 16).

* + Call meeting to order and remind the group to record attendance on imat.ieee.org
	+ IEEE-SA IPR policies and meeting rules
	+ Approve meeting agenda
	+ Contribution discussion
		- 11-24/1214, Carrier PPDU Discussion for Long-range Backscatter Operation, Bin Qian (Huawei)
		- 11-24/1345, High-Level Requirements for Downlink PHY in 2.4 GHz, Steve Shellhammer (Qualcomm)
		- 11-24/1381, AMP Device Power Status, Yinan Qi (OPPO)
		- TBD
	+ Any other business?
	+ Recess

Chair calls for approval of the agenda of the TGbp session.

No discussion, no objection, agenda approved.

## Contributions

### Presentation of IEEE 802.11-24/1214r2, Carrier PPDU Discussion for Long-range Backscatter Operation, Bin Qian (Huawei)

Q: Is the proposal applicable in the 2.4GHz band?

A: Yes.

Q: Slide 9. Carrier Symbols, is that a narrowband carrier?

A: Could be existing Wi-Fi PPDU. May also use narrowband. It is open for now.

C: From the European Regulations, maximum transmit power is limited for a narrowband signal, limiting the distance to a few cm.

Q: Backscatter signal requires ~1ms charging according to a presentation in the past meeting for monostatic backscattering. Is this also needed here?

A: Yes. Although topology is different with bistatic backscatter, other procedures will be very similar. Activation of the tag will require energy.

Q: The tag should wait for a certain duration to reduce interference with the signal / the reference symbols. Why not add a wakeup-pattern in the PPDU to signal the tag when to start?

A: Yes, that is also possible. However, complexity is a concern. Tag needs to detect the pattern, increasing the complexity.

Q: Reference symbols – we can also use the Wi-Fi preamble? Why do we need the reference symbols?

A: Reference symbols are dedicated to measure the leaky channel / self-interference.

Q: There might also be a DL part in the PPDU. This can be used to synchronize the tag, then there's no need to use a timer.

A: The DL PPDU is send by the AMP reader, not by the carrier source. So there's a gap from the DL PPDU and the carrier PPDU.

Q: AMP tag can decode the DL PPDU, and then set its timing as given by the AMP reader. Then, the AMP reader controls the carrier source. So the carrier PPDU can be aligned.

A: The clock error of the AMP tag may be very high, 100k ppm. The time drift is significant.

Q: Time difference cause by the clock inaccuracy is ~1µs, it cannot be handled by the AMP reader?

A: Time drift can be up to 10%. So it can be up to ~4µs.

Q: What about charging at sub-1GHz for the bi-static apprach?

A: It could be charged at sub-1GHz. But the input carrier should be at 2.4GHz. Otherwise, a big frequency shift is needed, with high AMP tag complexity.

Q: Slide 6. It looks very similar to close-range (monostatic) backscatter. Can the design be harmonized for both approaches?

A: Yes.

### Presentation of IEEE 802.11-24/1345r0, High-Level Requirements for Downlink PHY in 2.4 GHz, Steve Shellhammer (Qualcomm)

Q: Slide 5. Energy is not harvested from the 2.4GHz radio?

A: Yes, it is not suggested here. No comment here in the presentation from where the energy is from.

Q: SP1. Does it make sense to include a "Legacy Preamble"?

A: Yes, I will update.

Q: SP3. Are there implications of a DL rate of 1Mb/s on the complexity?

A: Symbols are shorter with 1Mb/s, so sampling has to be faster. In a high SNR case, a 1-bit ADC is sufficient. Number of samples remains the same.

Q: But with a higher sampling rate the power consumption is increased?

A: Yes, but the duration decreases, so we'll save power. Total power consumption will be less.

Q: SP2. Is this targeting the integrated energizer case?

A: Yes. It targets all cases with a ~70dB link budget. Could also be the bistatic backscatter case.

Q: There might be scenarios where a longer sync field / lower rates are needed.

A: We already have the currently defined 11ba sync field with the lower rate in the standard, which can be re-used.

C: Suggestion to rephrase to not exclude longer sync fields / lower rates: "One of the ...".

C: SP2 and SP3: We are evaluating energy consumption of 11ba reception. We have an issue with higher rates. So, such a proposal will not be suitable for all solutions, especially with energy harvesting.

A: Very interesting, like to hear more about the experiments / evaluations.

C: Currently we don't have an SRD as mentioned in some of the SPs.

A: Some of the SPs are for the FRD, for the others we can discuss the timing or reword.

### Presentation of IEEE 802.11-24/1381r0, AMP Device Power Status, Yinan Qi (OPPO)

Q: Slide 4. AC\_BK is agreed. How can there be further sub-categories for AMP? Is that applicable to all device types?

A: Yes, it can be applied to all categories of devices. Might also consider a mixture of backscattering and active transmissions. Backscattering is always controlled by the AP due to the trigger-only mode. So, the AP can choose the device with a low power level. Otherwise, the AMP device might go to sleep.

Q: So, the scheduling is up to the AP? Is there a need to standardize this?

A: How to handle the power status is implementation specific. We need to specify the exchange of the power status information.

Q: Slide 5, regarding the energy storage draining rate. Is this from an AP perspective, can the AP compute the draining rate?

A: If the remaining power is reported frequently, it is no needed. But also the remaining power can be calculated from the current power and the draining rate, if reported to be AP.

Q: Energy storage may drain at a different rate depending on the device type. There are a lot of options.

A: Draining rate should be the base power consumption to keept the device alive.

Q: Some of the features are static, i.e., capabilities. Others are dynamic, for example the current power level, and can be reported. But what if the report of the dynamic values itself consumes energy.

A: Actual power after the report can be different as in the report due to the power consumpted for the reporting. However, details can be considered later. The goal is to optimize the power transmission to the AMP STAs and give the AP sufficient information.

C: Transmission of the report might consume a lot of energy, more than just transmitting the id.

C: Understand report of the energy harvesting rate. But not for the other reports – it will consume too much energy.

A: It depends on how often the report is done. Some reports can be done with a very long interval. For energy transfer the report is needed – otherwise, the energy transfer is done randomly, which is not efficient.

C: Slide 7, channel access priority. This is about the order of the AP triggering the AMP STA, not the channel access priority (which is AC\_BK). Access category is not the right word.

C: Suggest to come up with a "best case" calculation that shows a report as described in the presentation can provide a gain, although it consumes energy.

C: You consider only AP-triggered transmissions. There are use cases which are event-driven (e.g., a doorbell).

C: There might be use cases that use out-of-band methods or "onboarding" to send the capabilities to the AP. We should not mandate any form of reporting.

C: Drain rate may change quickly over time. The reports should be simple.

A: Agree that reporting does not have to be mandatory. In some scenarios there might be no need to report.

## Adjourn

The chair announced the session adjourned at 10:51 EDT.

Next session will be the teleconference on September 3rd.

Next hybrid (face to face & online) session will be the IEEE 802 wireless interim meeting starting from September 8th.

## List of Attendees

Amichai Sanderovich, Wiliot

Bin Qian, Huawei

Bo Sun, Sanechips

Clemens Korn, Fraunhofer IIS/TU Ilmenau

Hui Luo, Infineon

Ian Bajaj, Huawei

Jinho Choi, Samsung Electronics

Joerg Robert, TU Ilmenau / Fraunhofer IIS

Juan Fang, Intel

Junghoon Suh, Huawei

Lei Huang

Mahmoud Hasabelnaby, Huawei

Manideep Dunna, Qualcomm

Osama Aboul-Magd, Huawei

Ouzane Riadh, VESTEL, IMU

Panpan Li, Huawei

Pooria Pakrooh, Qualcomm

Rakesh Taori, Infineon Technologies

Rani Keren, Huawei

Riadh Ouzane, IMU, VESTEL

Rojan Chitrakar, Huawei

Rui Cao, NXP

Sebastian Max, Ericsson

Shimi Shilo, Huawei

Shuqiao Chen, Huawei

Solomon Trainin, Wiliot

Steve Shellhammer, Qualcomm

Taeyoung Ha, Samsung Electronics

Wei Lin, Huawei

Weijie, OPPO

Yaron

Yinan Qi, OPPO

Ying Wang, InterDigital

You-Wei Chen, Mediatek

Zhanjing Bao, TCL

Zhongjiang Yan, Northwestern Polytechnical University