IEEE P802.11  
Wireless LANs

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| IEEE 802.11 TGbp Ambient Power Communication  March 2025 Plenary Meeting Minutes  Atlanta, USA | | | | |
| Date: 2025-03-13 | | | | |
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Abstract

Rev 0: This document contains the IEEE 802.11 TGbp March 2025 Plenary meeting minutes.

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

All times are given in local time of the meeting venue (i.e., EDT / UTC-04)

# Monday PM1 (2025-03-10T13:30)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r3).

* Chair calls the meeting to order at 13:30.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).
* Chair reviews the current TGbp session submission list (slides 13 to 16), the meeting agenda for the week (slide 17), and the distribution of submissions to the meeting slots (slide 18).

## Agenda

Chair presents the agenda of the session (slide 20).

* 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
* Approve TG minutes
* SFD (11-24/1613r5) motions
* Contribution discussion (PHY) [20 mins for each w/o prior request]
  + 11-25/0265, Single Side Band Backscatter Modulcation, Nelson Costa (Haila)
  + 11-25/0266, PSK Modulation for Long-Range Backscatter, Nelson Costa (Haila)
  + 11-25/0305, AMP-Downlink-and-Backscattering-Carrier-Waveform, Rui Cao (NXP)
  + 11-25/0306, AMP-Backscattering-PPDU-and-SYNC-design, Rui Cao (NXP)
* Any other business?
* Recess

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

No discussion, no objection, agenda approved.

## Motion: Approve TGbp Meeting Minutes

Approve the meeting minutes for TGbp meetings during 802 Jan interim session and TGbp TCs before Mar 2025 plenary session as below:

* https://mentor.ieee.org/802.11/dcn/25/11-25-0146-00-00bp-2025-01-interim-meeting-minutes.docx
* https://mentor.ieee.org/802.11/dcn/25/11-25-0240-02-00bp-teleconference-minutes-february-march-2025.docx

Moved: Sebastian Max

Seconded: Weijie Xu

Result: Approved with unanimous consent

## SFD Motion

Approve the updated 11bp SFD as included in:

* https://mentor.ieee.org/802.11/dcn/24/11-24-1613-05-00bp-specification-framework-for-tgbp.docx

Discussion:

Q: In the abbreviation section, why are already known and existing abbreviations repeated here? MAC, PHY, TSF can be removed.

A: Agree, will update and upload a r6.

First contribution is lifted up, SFD motion will be done after the first contribution. No objection to change the agenda.

## Contributions

### Presentation of IEEE 802.11-25/0265, Single Side Band Backscatter Modulcation, Nelson Costa (Haila)

Q: Following up from the previous presentation. Was that always SSB?

A: SSB is a simple extension. Previously the discussion was on DSB.

Q: Is harvesting during the modulation a must?

A: It was specifically asked if harvesting during the modulation is possible.

Q: Slide 9. Different impedances / inductors. How difficult is that to do on a chip?

A: Can be implemented, we've designed our own chip with sufficient accuracy.

Q: It's hard to get accuracy, with large capacitors/inductors. How accurate (in frequency) do they need to be? It must match regular Wi-Fi.

A: Don't know number by hard. But the accuracy has more to do with phase accuarcy. E.g., QPSK, has 45 degree to play with. This can be easily achieved. For BSPK it's even better.

Q: Energy harvesting in parallel consumes 3dB.

A: It's adjustable, does not have to be 3dB.

Q: Ok, a portion of energy. But the energy harvesting will also change the phase.

A: Phases are reactive components. The energy harvesting will only reduce the amplitude, using careful design.

Q: Circuit must be very accurate in phase, is this an issue for an AMP STA?

A: We compare to OOK circuit. This also has one branch. Process must be precise enough on the chip.

Q: Slide 6. There's a missing "real", the actual transmit signal is real.

A: I can share more information.

## SFD Motion

Approve the updated 11bp SFD as included in:

* https://mentor.ieee.org/802.11/dcn/24/11-24-1613-06-00bp-specification-framework-for-tgbp.docx

Moved: Yinan Qi

Seconded: Solomon Trainin

Result: Approved with unanimous consent

## Contributions (continued)

### Presentation of IEEE 802.11-25/0266, PSK Modulation for Long-Range Backscatter, Nelson Costa (Haila)

Q: To perform phase shifting the boundary must be detected, how is this done?

A: It's in a follow-up contribution.

C: The four phase clock generation requires a lot of power. It has advantages, but it does not come for free. It's too much for AMP tags.

C: Would like to see power-consuming blocks in the AMP tag, and what is the dominating block.

A: There's no quadrature-anything in the approach.

### Presentation of IEEE 802.11-25/0305, AMP-Downlink-and-Backscattering-Carrier-Waveform, Rui Cao (NXP)

No time for Q&A, Chair suggests approaching Rui directly or send an eMail to the reflector.

### Presentation of IEEE 802.11-25/0306, AMP-Backscattering-PPDU-and-SYNC-design, Rui Cao (NXP)

Q: Slide 6. 2% false alarm rate, this is on noise?

A: Reader is sending a DL control, then waiting for the backscatter, but the tag does not respond.

Q: What about raising the threshold at the reader?

A: It's Manchester encoding, so the threshold cannot be tuned much.

Q: Slide 7. Payload 1000b. Duration will be 4µs for 250kb/s. Is that practical?

A: It's only for simulation, might be wrong for low-rate case.

Q: Payload size will influence results.

A: Correct, we've done 100b, the conclusion does not change.

Q: How does the hardware change the chip rate?

A: On the tag side just change the clock rate. OOK modulation, so just change the symbol rate.

Q: For DL we will use different sync.

A: For UL the sync is not for coex, it's only to synchronize.

Q: Slide 8. Rx power -35dBr means SNR=0dB?

A: Roughly. There are more factors, and other translations. See slide 7 for noise floor.

No time for further Q&A, please contact Rui.

## Recess

The chair announced the session recessed at 15:30.

# Monday PM2 (2025-03-10T16:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r3).

* Chair calls the meeting to order at 16:00.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 24).

* 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
  + 11-25/0307, UL Monostatic and Bistatic Range Extension Considerations, Dror Regev (Huawei)
  + 11-25/0321, Follow-up on Sync field for AMP PPDU, Ke Wang (OPPO)
  + 11-25/0317, AMP UL Transmission, Yinan Qi (OPPO)
  + 11-25/0324, Challenges in Downlink Bandwidth Control in 1 Mb/s PPDU, Steve Shellhammer (Qualcomm)
  + 11-25/0325, AMP Downlink Bandwidth Control using OFDM Spreading Waveform, Steve Shellhammer (Qualcomm)
* 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 802.11-25/0307, UL Monostatic and Bistatic Range Extension Considerations, Dror Regev (Huawei)

Q: Tradeoffs for active BS devices. 1) what about just using active tx, how does that affect the range? 2) What about the precision?

A: Active tags have their own 2.4GHz oscillator. I'm not assuming that.

Q: Amplifying backscatter has the issue of required calibrations / adaptations to correctly align the frequency response with the incoming CW.

A: Proposal is based on papers and references. There may be problems with unstable amplifiers, oscillators. There are other solutions, however, with using wide-band and low-power amplifiers. There's more than one solution. Your concern is correct, but it refers only to a specific design / topology backscatter amplifier.

Q: Do you amplify 80MHz?

A: Yes, can be even much more than that. No LC component.

### Presentation of IEEE 802.11-25/0321, Follow-up on Sync field for AMP PPDU, Ke Wang (OPPO)

Q: What is the success criterion in all the analysis?

A: See slide 20. Depends on the bandwidth, number of allowed sampling errors.

Q: So, for a certain sampling rate there are certain number of sampling points that can be errors?

A: Yes. For the 2MHz case there should not be a samping error.

Q: What is the noise signal bandwidth? 20MHz, 80MHz?

A: We assume 20MHz, I think.

C: We should do 80MHz, as suggestion.

C: How to model the energy detector? Can't just sample. I like to have more details to be able to re-create the simulation results.

A: Need to model the signal in the RF domain.

Q: Slide 9. You say IF receiver converted to baseband. IF is the opposite of baseband.

A: All the simulation is done in the baseband, no upconverted.

### Presentation of IEEE 802.11-25/0317, AMP UL Transmission, Yinan Qi (OPPO)

Q: Slide 5. We had simulations with different results. For MC, no coding was seen. CC 3dB coding gain, 6-8dB SNR improvement. Why not add FCC for all MCS?

A: Yes, can be considered.

Q: Slide 6. For 4Mb/s we cannot do that, chip duration will be very short, BW > 20MHz.

A: That might be a problem.

Q: UL configuration. Useful from the application point of view, but complicates the design. We need UL SIG field. Very complicated.

A: There's a trade-off. If the AP has no knowledge the safest way is to configure lowest data rate. But then there's no usage of the high rate.

Q: Slide 9. Duration of the excitation field. Is that only for backscatter devices?

A: For WPT, the duration energizing signal can also be optimized.

Q: UL data rate can be set by the STA. But all UL is triggered. How can the AP set the TXOP duration if it does not know the data rate?

A: AP will configure a long TXOP to guarantee even the lowest UL rate will fit.

Q: About the coding, slide 5. How would the receiver convert OOK to soft information to feed into the decoder?

A: Need to check with my colleague.

Q: Slide 5 and 6. Do you replace Manchester with CC?

A: No, FEC is on top.

Q: Why add FEC to high data rate, instead of drop to low data rate?

A: One can do both.

### Presentation of IEEE 802.11-25/0324, Challenges in Downlink Bandwidth Control in 1 Mb/s PPDU, Steve Shellhammer (Qualcomm)

Q: Slide 5. Problem is the Barker code, resulting in 44MHz. Just use half of the Barker code per OOK symbol.

A: Yes, that's a possibility. Similar to what we do with the OFDM sequence, will be discussed in the next presentation.

C: Agree we can use 5.5b for the first OOK symbol, then 5.5b for the second, then there's no problem. We can also use a different code than the Barker code.

### Presentation of IEEE 802.11-25/0325, AMP Downlink Bandwidth Control using OFDM Spreading Waveform, Steve Shellhammer (Qualcomm)

Q: On the spectrum. How is the filtering done?

A: Sampling with 60MHz, then Butterworth filter on top.

Q: PA model?

A: No model. 20dBm should be ok, assume an AP.

C: If we have an existing waveform maybe it's good to converge on it. There are many different ways to optimize.

Q: On the sequence, BPSK. Can we use other kinds, QPSK?

A: Yes, we could need to consider the PA, so using BPSK is more common. Also narrowed it more by using only 50 tones instead of 52. The tones are not decoded, so corrupting some of the tones is not an issue.

C: Time domain power should be constant as well.

Q: Slide 6. Different slices for OFDM symbols. Why not use one slice?

A: Hard to make a good OFDM symbol for 0.5µs OOK. Instead, modulate OFDM symbol with OOK, will just get slightly wider, which is not a problem. Regular 4µs OFDM symbols are used.

## Recess

The chair announced the session recessed at 18:00.

# Tuesday AM1 (2025-03-11T08:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r3).

* Chair calls the meeting to order at 08:00.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 26).

* 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
  + 11-25/0316, Follow-up on AMP PPDU Design, Yinan Qi (OPPO)
  + 11-25/0315, Further discussion on downlink sync field design, Bin Qian (Huawei)
  + 11-25/0338r0, AMP Data Communication in Sub-1 GHz, Panpan Li (Huawei)
  + 11-25/0339r0, AMP DL OOK Generation, Panpan Li (Huawei)
  + 11-25/0369r0, Signal Design for Wideband Multi-Carrier OOK, Leif Wilhelmsson (Ericsson)
* 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 802.11-25/0316, Follow-up on AMP PPDU Design, Yinan Qi (OPPO)

Q: Slide 5. Length does not include the duration of the excitation field, has coexistence problems.

A: We don't know how long the excitation field is. If we configure a very long one we waste resources. Another way is to not configure it. We can figure out the coexistence issue.

Q: I think the AP knows the duration of the excitation field. AP can set the length properly.

A: Yes, but there are two cases. There might be cases that the AP has no knowledge of the UL parameters.

Q: Also concerns on coexistence. If the length only indicates the packet duration until the end of the first data part, other legacy STAs may sense the medium idle and the interfere with the backscattered UL transmission.

A: We need to find a solution to support flexible length excitation fields.

Q: Chip durations. Aren't you compromising capacitor charge?

A: It will reduce the complexity of the AMP STA. It's beneficial for energy saving.

Q: What kind of information is sent by the tag?

A: The AMP STA reports energy/power related information.

### Presentation of IEEE 802.11-25/0315, Further discussion on downlink sync field design, Bin Qian (Huawei)

Q: On the CDF (slide 9). Does it show the probability to correlate on the data and the same sequence? Is the for the DL?

A: Yes, for DL. Result is the cross-correlation between data and sync.

Q: But when you pick up the sync, why would you sync on the data?

A: If the sync is short, and the autocorrelator's output is below the threshold, we'll continue to try.

Q: So the assumption is that the sync was missed?

A: Yes. This will also provide guidelines to set the threshold, e.g. length=16, threshold=0.8 is a safe threshold.

Q: For active tx we're aligned. For backscattering, slide 4, the last point on the high SNR that does not hold for the bi-static case.

A: Coverage 2m or 3m. The SNR is not the problem.

C: Slide 9. Maybe also consider the noise-only case.

Q: Confused chip and bit. Simulation has 16b, each chip is 2b?

A: 1b, this is just OOK, not Manchester encoded.

### Presentation of IEEE 802.11-25/0338r0, AMP Data Communication in Sub-1 GHz, Panpan Li (Huawei)

Q: Slide 6. Use of "RFID Bands" is probably necessary. Would this limit the solution to backscattering?

A: No, the discussion applied to both.

Q: So, in China/EU an active transmitter is allowed in these bands?

A: Yes.

Q: Slide 5, PPDU format. Use of similar PPDU DL format. The exication can be used to activate the devices, but in sub-1GHz we have WPT. Maybe we can have a separate design for this?

A: Agree, details can be changed. We have WPT-PPDU in sub-1GHz.

Q: Using RFID band in China, the channel bw can be up to 250kHz. Why choose less?

A: This comes from the EU RFID bands.

### Presentation of IEEE 802.11-25/0339r0, AMP DL OOK Generation, Panpan Li (Huawei)

Q: Slide 5. Can you explain where the difference comes from? SNR is defined at the receiver, one is 5dB worse.

A: We observe the time-domain waveform. DSSS is flat, constant envelope. MC-OKK is not, using our sequence to generate it.

Q: So, with the same energy in the signal the difference in the PAPR will give 5dB difference?

A: Yes.

C: Similar, if the energy is normalized, we don't expect this gap.

Q: UL side, non-coherent detector? This is probably the reason for the gap. With coherent detector both will perform the same. Also, for DSSS, a further filter is needed to comply with the spectrum limit, which will bring the curves closer together.

C: Similar comment. Maybe we need to agree on how to do simulations, envelope detector, etc. I can drive something like that.

C: We agree with the results, time-domain DSSS waveform is flatter. But we can check that and align simulation assumptions.

Q: DSSS uses 22MHz?

A: Yes.

Q: The after the backscattering it will be more than 22MHz, so is there power leakage?

A: Yes, we need to make it smaller, need to change some of the settings.

### Presentation of IEEE 802.11-25/0369r0, Signal Design for Wideband Multi-Carrier OOK, Leif Wilhelmsson (Ericsson)

Q: Like the metric, makes sense. Slide 8/9, did not understand if MAP adds up to 20dBm.

A: There's no need to go higher than 20dBm, it will be capped anyways. In the FT\_metric (slide 6) it should better be the max(20dBm, MAP). We found sequences with MAP=20.1dBm, but then PAPR was 1.7dB, resulting in a worse result. Of course it's an ad-hoc metric.

Q: Different waveforms for 250kb/s and 1Mb/s?

A: Yes.

Q: So different designs of the different data rates?

A: Yes, see slide 13.

Q: Metric is reasonable, but MAP and PAPR is not linear correlated.

A: No, it's not, but I needed a metric to penalize high PAPR.

Q: May also have an impact on the receiver for the backscattering. A lot of details.

A: But if PAPR is not penalized, just fill up 20MHz and use a high-order filter. But this ruins the PAPR. I'm using 3rd order Butterworth, just pushing down first bounce.

Q: It might be product specific, should be left for implementation. Standard should define a baseline.

A: Similar in WUR, we did not specifiy how to generate the signal.

Q: Try to avoid 11ba route...

Q: Bandwidth of the design signal, 20MHz. Two presentations yesterday also design 20MHz. In WUR it's only 4MHz due to power efficiency.

A: Design in 11ba was maybe a mistake. Bandwidth in 11ba should have been wide. It's such a difference in performance. Wideband gives frequency diversity, we've seen 10dB difference. Wideband has a big advantage.

Q: Performance-wise I agree. Narrowband can reduce the power consumption.

A: Not sure about that. We assume no filter, first thing that is hit is the ED, this should not consume more power for a wideband signal. There should be no impact.

Q: Filter at the transmitter. Is there a guard band?

A: Receiver has no filter, AMP STA has no channel-selective filter. Tx mask is to avoid spreading to other Wi-Fi channels.

C: Agree with assumption about ED. There will be no filter, this will be too power hungry and complex.

C: Receiver will have some form of clock sync. Do you analyze sensitivity of the time-offset of the waveform, if it is 3µs or 4µs off, how much energy do we lose?

A: This is just the waveform for OOK, the receiver performance / sensitivity does not depend on how the OOK is generated.

Q: But if the signal is wideband there's the danger that energy is reduced.

A: That comes back to the PAPR. See Slide 8, lower figure. It's along the unit circle. The simulation runs with 80MHz.

Q: ED receiver, wideband signal, there's a lot of noise comming in. It's not practical to have a receiver in 2.4GHz without a filter. There should be some form of bandwidth limit.

A: I can see the issue. But that's a more fundamental problem, independent how the signal is generated. I'm not looking at this problem.

## Recess

The chair announced the session recessed at 10:00.

# Tuesday PM2 (2025-03-11T16:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r3).

* Chair calls the meeting to order at 16:00.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 28).

* 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
  + 11-25/0400r0, Sync field design considerations, You-Wei Chen (MediaTek)
  + 11-25/0440, Follow-up on AMP DL OOK generation, Ke Wang (OPPO)
  + 11-25/0096, Active AMP STA polling procedure, Liwen Chu (NXP)
  + 11-25/0264, Long-Range Backscatter Protection Mechanisms, Kamran Nishat (Haila)
  + 11-25/0268, Long-Range Backscatter Device Capabilities, Nelson Costa (Haila)
* 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 802.11-25/0400r0, Sync field design considerations, You-Wei Chen (MediaTek)

Q: Slide 6. Last bullet point, agree with sync can be the same for all data rates. Can you further elaborate? Do you use the same sequence for all rates?

A: Yes.

Q: And the chip duration, will it change?

A: We did not consider this yet.

Q: Last slide. 3 DL sync. 2 UL sync. In the DL we don't want false alarm on the others. Should we pick the backscatter first, or the others? How do we ensure that they don't false alarm?

A: Design should be together.

### Presentation of IEEE 802.11-25/0440, Follow-up on AMP DL OOK generation, Ke Wang (OPPO)

Q: IF receiver, do you have any frequency plan in mind, how to generate the other LO, IF filtering, sampling. Why not simply use a more sensitive ED receiver?

A: We think of many cases. IF can have low energy consumption.

C: For IF you need a ~2.4GHz LO, that consumes a lot of power.

A: IF receiver gives better sensitivity, for larger distances.

C: It's fine to have a guard band. This is not a matched filter. Rx filter can be 4MHz for 20MHz signal. The requirement is the tx mask. I don't see why a narrowband signal is needed.

A: Maybe 10MHz is enough.

C: There's no need for a guard band.

Q: Receiver will listen on the entire 2.4GHz spectrum, there's no filter. But you can build a higher performance one. I don't see the reason for narrow bandwidth.

A: Need to discuss the receiver, for example IF receiver. Needs to be room for an advanced receiver.

C: Bandwidth needs to be wide enough to maximize the power under regulations.

C: ED receiver that listens to the full band, noise power goes up. Furthermore, interference from other channels is an issue. It would be not not to open up the full bandwidth. Don't know how to achieve this with low power consumption.

C: Suggest to have a discussion on the different receiver architectures.

Q: It's about active tags, DL. Tx power of the AP is 20dBm, tag tx power is -20dBm (optimistically). Why should the DL power be the limiting factor?

A: DL signal carries the power to the tag. UL receiver at the AP is very good.

### Presentation of IEEE 802.11-25/0096, Active AMP STA polling procedure, Liwen Chu (NXP)

Q: What is the CRC?

A: A device identifier. We referred to Gen2 protocol. The tag has a 16b CRC in the memory.

Q: Slide 3. Slot is identified by the CRC. But the CRC belongs to the tag.

A: We assume two devices have the same CRC code.

Q: CRC identifies the client. Slide 9. Second bullet, second sub-bullet. Here the CRC is used to identify the slot.

Q: AMP reader transmits in the trigger frame the CRC?

A: Yes.

C: Suggest adding at least a figure to make it understandable.

Q: Without association. Is the CRC allocated by the AP to the client?

A: No. In the query state the tag will announce the CRC code.

Q: Then what's the difference between association and without association?

A: The random number cannot be used in the following TXOP.

C: Packet fragmentation by the tag. We think that the tag will have difficulty to do fragmentation. This requires processing, memory.

C: To transmit, slot indications are needed from the reader. If the receiver is not reliable, any reception of a specific trigger does not mean the following one is also received.

C: Lot of information. In general, agree with the direction of query and information if the information is long.

Q: Slide 3. Slot id can be used for the identification?

A: Similar to a random number.

### Presentation of IEEE 802.11-25/0264, Long-Range Backscatter Protection Mechanisms, Kamran Nishat (Haila)

Q: Slide 5. Who is sending the AMP protection?

A: It's sent by the AP.

Q: Slide 7. What is the gap between the control frame and CTS-to-Self? What is the typical value?

A: Time for the receiver to change the channel. Up to a ms.

Q: If the delay is in the order of hundrets of µs, the channel is idle. Any other STA may jump in. How to ensure that the channel is still available?

A: It has a lot of time to reserve the channel, until the start of the backscatter transmission.

C: Frequency shift is a lot of waste, occupy two channels for one data transmission.

C: Consideration on the gap time, other STAs will jump in.

C: Also, problems with several TXOPs.

Q: Is this targeting mono- or bi-static?

A: Bi-static.

C: So, initiator is on channel 1, that needs sync with the receiver on channel 11, as well as with the tag. Concern about the synchronization.

Q: Is the initiator during the CTS-delay still on channel 1?

A: No.

C: There's no guarantee that both channels can be held at the same time.

A: Things are loosely coupled. The TXOP only has to overlap with the excitation field.

C: No sync strict needed, but channels need to be idle at the right time. Would be good to understand the probability.

Q: Response frames, last two slides. Is that a kind of ack?

A: Yes. Also useful to calibrate delay, channel conditions, etc.

### Presentation of IEEE 802.11-25/0268, Long-Range Backscatter Device Capabilities, Nelson Costa (Haila)

No time left for Q&A.

## Recess

The chair announced the session recessed at 18:00.

# Wednesday AM1 (2025-03-12T08:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r4).

* Chair calls the meeting to order at 08:00.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 30).

* 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
  + 11-25/0292, Review EPC Gen2 for Long-Range Backscatter, Kamran Nishat (Haila)
  + 11-25/0263, Provisioning Protocol for long range AMP IoT devices, Guy-Armand Kamendje (Haila)
  + 11-25/0334, Channel access for Active Tx non-AP AMP STAs - follow-up, Rojan Chitrakar (Huawei)
  + 11-25/0335, Channel access for Backscatter non-AP AMP STAs - follow-up, Rojan Chitrakar (Huawei)
  + 11-25/0340, Trigger based TDM multiple access, Chuanfeng He (OPPO)
* Any other business?
* Recess

Chair calls for approval of the agenda of the TGbp session. Agenda slightly adjusted as first presenter is not yet online. Final agenda as shown above.

No discussion, no objection, agenda approved.

## Contributions

### Presentation of IEEE 802.11-25/0292, Review EPC Gen2 for Long-Range Backscatter, Kamran Nishat (Haila)

C: Agree with conclusions. Similar challenges apply to active transmitters.

Q: What's the motivation to follow the EPC protocol?

A: Many member in the group support EPC, it's good to use and then extend. But it has problems.

Q: Is the assumption still that it's a dual-mode tag for long-rang backscattering?

A: If we want to make a long-range dual-mode tag, which has advantages, then there will be challenges.

C: Appreciate more details on the issues. For example, slide 7, last bullet, would like to know more details on the problem.

C: We're aware of the challenges. We don't intend to limit this to UHF, extensions should be allowed.

C: Encapsulation of a protocol that is not part of .11 is dangerous, for legal reasons and for certification reasons. How to certify a product with an encapsulated protocol? Suggest to use ideas, principles, etc., but not encapsulate.

C: Challenge of channel access – yesterday a solution was presented, this contradicts your own presentation.

A: In the presentation yesterday, we are sending CTS-to-self on both channels, ensuring free channels. Here we are talking about the other channels which are not occupied by the reader.

### Presentation of IEEE 802.11-25/0263, Provisioning Protocol for long range AMP IoT devices, Guy-Armand Kamendje (Haila)

Q: Slide 7. What is the G\_ID?

A: The gateway id, an identifier for a specific gateway in a deplyoment. There might be multiple gateways in a deployment to talk to the tags.

Q: Uniqueness of the tag is provided by the keys?

A: Yes, the public key defines the identity of the tag. We send the hash because it is shorter.

### Presentation of IEEE 802.11-25/0334, Channel access for Active Tx non-AP AMP STAs - follow-up, Rojan Chitrakar (Huawei)

Q: Slide 5. If a STA is not received at the first AMP-Poll, it tries again at the second AMP-RePoll?

A: The STA picks a certain number, at which slot to transmit, e.g. 19. However, the AP will stop the first phase at slot 10, to avoid too much slot drift. So, it will transmit at the second one.

### Presentation of IEEE 802.11-25/0335, Channel access for Backscatter non-AP AMP STAs - follow-up, Rojan Chitrakar (Huawei)

Q: Slide 6. Is this extension for other types of tags or to extend EPC?

A: There could be cases where we want to expand UHF. But this is still for backscatter tags.

Q: CRC is the address of the tag, there can be tags with the same CRC. What happens in this situation?

A: This is not the CRC mentioned yesterday in Liwen's contribution. This is not what is meant here.

Q: EPC over AMP is application specific traffic, which is EPC data? Then we refer to the spec without copying it into our spec?

A: Yes. No need to duplicate this in .11.

Q: Encapsulation of RFID commands. Is it the expectation that all AMP devices will understand that?

A: AMP STAs need to understand the AMP structure. We don't want to take the whole RFID standard, only taking five (slide 4) would suffice. The goal is not to redefine what UHF already has.

Q: Agree, but we should not have too many options.

Q: Slide 5. Timing parameters. It may be better to stick with the Wi-Fi parameters.

A: Agree, the table here is from Rui. We need to study further.

C: Logical interface of RFID should be reused. In general, everything that Wi-Fi does not define should be used. For the channel access we can discuss.

Q: Slide 8, new extension frame. Does this contain both PHY param and capability request?

A: No, these are examples for different sub-types.

### Presentation of IEEE 802.11-25/0340, Trigger based TDM multiple access, Chuanfeng He (OPPO)

C: Slide 10. Also for active tx we cannot assume a high-accuracy clock throughout the TXOP. We prefer 10^4ppm, and guard intervals.

C: Slide 6. Q transmitted by the trigger for the STAs. Do you also consider an exponential backoff as in .11 to change the size depending on previous failures?

A: For a retransmission the random number will be renewed, with a new Q.

Q: Slide 7. This is in one TXOP?

A: There are multiple triggers from the AMP AP. Each trigger session is in a separate TXOP.

Q: Do you expect the AMP STA to remember the random value across multiple TXOP? Once they lose energy they will lose this information.

A: AMP STA has enough power storage to remember the counter over multiple triggers.

C: Slide 5. The trigger carries the time stamp. Not sure that this is the right frame, as it always needs to be decided by every STA.

## Recess

The chair announced the session recessed at 10:00.

# Wednesday PM2 (2025-03-12T16:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r4).

* Chair calls the meeting to order at 16:00.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 32).

* 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
  + 11-25/0341, Details of Duty-cycle operation for AMP, Chuanfeng He (OPPO))
  + 11-25/0342, TSF for trigger based AMP communication, Chuanfeng He (OPPO)
  + 11-25/0353, UL Access for AMP: Follow up, Sanket Kalamkar (Qualcomm)
  + 11-25/0322, Access message for AMP, Weijie Xu (OPPO)
  + 11-25/0285r1, SP Timing Synchronization with AMP Beacon, Ian Bajaj (Huawei) [updated, 10 mins]
  + 11-25/0251r1, Slotted vs Pure Aloha for Active Transmitter AMP Use Cases, Amichai Sanderovich (Wiliot) [updated, 10 mins]
* 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 802.11-25/0341, Details of Duty-cycle operation for AMP, Chuanfeng He (OPPO)

Q: Slide 4. What is the need for the multiple triggers. If I want to get data from the client, I can simply send a trigger at that time. Why do we need so many periodic triggers?

A: AP cannot predict transmission from the AMP STA. It has to periodically send the trigger. This is the assumption on the AP side.

Q: So, the AP does not know how frequently it has to schedule the UL transmission?

A: Yes.

A: Device is unknown by the AP. But the AP has to read 1000s of devices. It does not know the awake time of the device. Then, the device belongs to a trigger session, it only has to wake up for these triggers.

Q: Does AP know how frequently to schedule the devices?

A: The duty cycle of the STA can be determined by the AP.

Q: If the AP knows when to schedule, it can simply send the trigger frame.

A: All this is for the inventory procedure.

Q: Slide 4. Minimum length of NSP should be the period of the target trigger. At least one target trigger should lie in the NSP. If the STA does not receive the target trigger, it will lose sync.

A: The AMP STA's period can be less than the frequency, to reduce power consumption.

Q: Slide 5, what is carried in the target trigger. My concern is that this becomes quite heavy.

A: We'll discuss trigger size in our next submission. The TSF limit is several seconds, or minutes. We don't need many bits.

Q: Slide 3, bottom. The energy harvesting is going on all the time?

A: Yes.

Q: What is the interval of the trigger frame?

A: AP can send it very frequently, several 100s of µs.

Q: So like a beacon?

A: Not sure beacon exists for AMP. But it has similar features.

### Presentation of IEEE 802.11-25/0342, TSF for trigger based AMP communication, Chuanfeng He (OPPO)

C: Slide 5. SP power consumption 10µs. This is only for rx, tx will be 10x higher.

Q: Slide 6. 268s for the longest duty cycle. This is the longest charge hold time, an indication how often the tag is charged by the WPT. But the duty cycle depends on the application. If the application/sensor operates with less than 1Hz, this will not be supported. Thus, the timestamp should be in the beacon.

A: Yes, duty cycle can be several hours / a day. But that's the traffic period. The trigger should be sent frequently. AP does not know when the UL happens.

Q: Agree, trigger can be sent more frequently. But the timestamp only covers 1s of duty cycle.

Q: Size of the capacitor, 24µF, 1.5V. 1.5V implies relatively old process, 90nm, 130nm. But I'm more concerned about the capacitor. This will not fit into a sticker.

A: Not sure about that.

Q: For our use-cases the duty cycle is relatively low. Your proposal brings a lot of overhead.

A: Maybe only parts of the triggers contain the timestamp.

### Presentation of IEEE 802.11-25/0353, UL Access for AMP: Follow up, Sanket Kalamkar (Qualcomm)

Q: Support this approach. Slide 3. Onboarding is optional, maybe also the initial information exchange can be outside of the scope?

A: This is very similar to the actual data communication, with UL trigger and response.

Q: But is it possible that these stages are also outside of the AMP scope?

A: Yes, it is possible.

Q: Slide 5. We've shown where the duty-cylce performs better, depending on application. How does the client know its cycle?

A: Depends on the application, e.g. temperature sensor. Can be configured by the user.

Q: Then the client would send high-layer data to the AP, and the AP would configure a periodic UL procedure to solicit the information.

A: Yes, that's one option. But we don't need the duty cycle information, the AP can also just query the client.

Q: Some use cases need duty cycle; other use cases don't need the duty cycle. Slide 4. AP knows id of the device?

A: Yes, in this example. But also, as given in other examples this is not needed.

Q: If the AP does not know the id, the device has to monitor the trigger all time. We want to avoid that.

A: This can also be driven by the energizer, just energize only a section of the room.

Q: Slide 3. Initial info exchange can be used for security purposes?

A: Phases might not be done in the same TXOP. Assumption is then that the tag has small non-volatile memory. It may lose the information. It depends on the client's capability. It can be set during the offline onboarding.

Q: Slide 5. Tag has low-precision clock. Maybe the tag will miss the trigger frame?

A: If the AP wants to trigger a client, it sends an energizing signal for a sufficient duration.

C: On the SP. Make it clearer that it is for the current TXOP.

### Presentation of IEEE 802.11-25/0322, Access message for AMP, Weijie Xu (OPPO)

Q: CDM access, can you provide example what codes to study? For M-sequence, what is M?

A: In the simulation we use 63. See slide 9.

Q: Cyclic shift of 10, what does that mean?

A: For length of 63, 6 can be generated.

Q: Can you explain the problem that we have with RN16?

A: RN16 can be applied to backscatter device. For AMP we want to improve the performance. If there's a collision (same slot), the AP cannot decode it.

### Presentation of IEEE 802.11-25/0285r1, SP Timing Synchronization with AMP Beacon, Ian Bajaj (Huawei)

Q: Which report are you talking about?

A: We're not talking about reporting here. About the clock drift, the beacon interval must cover the worst drift of the clock, which is 1%.

Q: Which use cases are targeted, and how many devices need to be handled?

A: No specific use case. Can support use case with any service period length, 0ms to 15h. There can be several OSPs, with different intervals, targeting different groups of AMP STAs.

Q: What's the airtime for the beacon?

A: There can be multiple information elements.

### Presentation of IEEE 802.11-25/0251r1, Slotted vs Pure Aloha for Active Transmitter AMP Use Cases, Amichai Sanderovich (Wiliot)

Q: Slide 5. Without slot indication needs growing guard interval. So, there's a chance that the channel / TXOP is lost. Is this a concern?

A: 40µs guard interval. This should be fine for the synchronization.

## Recess

The chair announced the session recessed at 18:00.

# Thursday AM2 (2025-03-13T10:30-04:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/0228r5).

* Chair calls the meeting to order at 10:30.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 34).

* 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
  + 11-25/0398, AMP frames, Alfred Asterjadhi (Qualcomm)
  + 11-25/0320, Follow-up on WPT: Protocol, Waveform and PPDU, Yinan Qi (OPPO)
  + 11-25/0319, Correspondence between Energizers and AMP non-AP STAs, Yinan Qi (OPPO)
  + 11-25/0318, AMP Energizer Control, Yinan Qi (OPPO)
  + 11-25/0336r0, WPT Protocol and Signaling, Ian Bajaj (Huawei)
* 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 802.11-25/0398, AMP frames, Alfred Asterjadhi (Qualcomm)

Q: For WUR, we have wake-up functionality that is part of the legacy STA. We don't have that. Do the ids have the same size as in WUR?

A: The intention is that the frame formats follow WUR. The number of bits set to x is intentional. In WUR, they are based on the association id, which is not the case for AMP. So for AMP we might need different size.

Q: So, you're open to discuss the size?

A: Yes. The scope here is broader.

Q: Why do you require to have the frame control of the same size? We can change the frame control size depending on the frame sub type.

A: Implementation wants a predictable frame size format.

Q: Can the FCS be reduced, less than in WUR?

A: 16b should be fine, especially for higher data rates. I was rather thinking of making it bigger. A 16b FCS was evaluated for false alarms for WUR. We need evidence that lower values are enough.

Q: Can we make the id optional?

A: In ACK we traditionally only have the rx id. We have it in the BlockACK framework, but it might not be necessary. For the trigger, we need to know who is sending the trigger. To a single STA, we need the rx id. Is the discussion based on optimization?

C: No, based on that some use cases don't require id.

C: We emphasize using as little energy as possible.

C: Using WUR, we can borrow the framework, but we don't need to use the frame type. AMP will have a different sync.

A: If the WUR functions are not pertinent to this group, we have the freedom. If AMP has use cases as in WUR we should re-use them. It takes a lot of time to re-desing new frames.

C: In AMP we did not (yet) have this use case.

A: We should not start to design functionality that is already there.

C: Similar comments. For AMP, if we do very similar things than WUR how can we be lower in energy? Second, WUR was never designed for UL. Finally, WUR was designed to have the same reach as the legacy link. Here that does not need to be the case.

C: We still need the WUR functionality as a feature.

### Presentation of IEEE 802.11-25/0320, Follow-up on WPT: Protocol, Waveform and PPDU, Yinan Qi (OPPO)

Q: In the diagram on page seven, you state that energy detection is performed first and afterwards preamble detection is performed. Don’t you do this simultaneously?

A: First, we aim to detect if the channel is free. If the channel is free, we check if a WPT signal is present.

Q: So, the device needs to support reporting channel occupancy levels and the presence of power transfer.

A: It would be acceptable for me if this became an optional feature. However, without this kind of report, the performance cannot be optimized. Thus, I prerfer the proposed mechanis to become a mandatory element.

Q: We are concerned about the feature’s complexity. We want to keep this optional. To protect a device’s privacy, we want to have the ability to not to respond. So, you want this WPT to be detected even when transmitted over other transmissions? It will be transmitted by many devices at the same time.

A: Yes, we need to define how this WPT preamble can be detected separately.

C: I am not sure that we have agreed on an energizer report.

A: There is no agreement at the moment. I will explain why we need this energizer report.

Q: You are talking about non-backscatter devices. Are you also thinking about backscatter devices to report?

A: For backscatter devices it’ll be difficult to achieve this reporting.

C: I have not objection to reporting. However, we have to understand that the energy status needs to be measured. Therefore, a level of accuracy of the report needs to be defined, too. What units want you to be reported? “Joules” does not mean anything to me because all devices have different demands and their implementation differs. The engery status does not come for free and we need to undstand what we want to report.

Q: This will consume energy from non-AP STAs. I am wondering if you are open for piggybacked information?

A: How to report is another question. Reporting can be piggybacked in some uplink transmission. If the AMP device has energy storage capability, it can change the strategy of WPT to be applied. So, this reporing can be quite essential. There is a cost for the reporting but there are benefits, too.

C: Sending the report itself consumes energy. The consumption of this energy needs to be reflected in the report to the AP.

A: Yes, that’s the next level of details we need to discuss.

### Presentation of IEEE 802.11-25/0319, Correspondence between Energizers and AMP non-AP STAs, Yinan Qi (OPPO)

C: It’s an important topic. This helps to reduce interference. If you have individual reporting, the STA furthest away will report the most. The nearest STA may always get charged to the top level. Please consider this.

Q: I agree that this is an important subject. Basically, you are proposing an energy association concept. How do you know about the status of associations?

A: If you know the position, you can estimate which AMP device associates where. If you do not know the position of an AMP device, you need to rely on determining to which energizer an AMP station associates.

C: There are so many challenges, here. You may also create energetic null in certain areas. Just increasing the number of energizes does not help.

C: This is a nice concept. Have you also thought about doing this in application layer and not in the standard? I am not sure that we agreed that the non-AMP STA can decode the WPT preamble.

A: If the position are known to the AP, we don’t care how to get this information. Then, we know which energizer is closest to the AMP device. If it is not known then we need this to be determined by the energizer. That is something that impacts the specification.

### Presentation of IEEE 802.11-25/0318, AMP Energizer Control, Yinan Qi (OPPO)

C: On slide 5, the list of non-AP STAs may need to be updated.

A: Yes, agree. This can be further updated

Q: Does this refer to some power management at energizer?

A: Yes. Like non-AP STAs, the energizer can sleep.

C: Thus, during the sleep period, you cannot wake up the AMP STA.

A: The period can be long but the energizer will need to wake up from time to time.

C: There needs to be frequency-related information: The AP needs to tell energizer what is allowed to transmit from the energizer to the AP.

A: The AP doesn’t need to follow the energizer’s patten. The AP is in control of setting a pattern that the energizer needs to follow. The idea is to explicitly assige a frequency to the energizer.

Q: Could the energizer and AP come from different vendors?

A: Yes, maybe.

### Presentation of IEEE 802.11-25/0336r0, WPT Protocol and Signaling, Ian Bajaj (Huawei)

C: On slide four, the duration should be in µs and not just in ms. Is it possible to have the transmit power provided in dB? Then, it wouldn’t be an absolute value but a relative one.

A: We did not think about µs. Typically conducting WPT at µs-level might not be sufficient. Also, we want to reduce the number of bits needed for signaling. Yes, power could be provided in dB.

Q: What is motivation to have variable power?

A: It could be that the AP needs to restrict the range that the energizer covers. I understand that typically, the device at the farthest distance should be enerigized.

## Recess

The chair announced the session recessed at 12:09.

# Thursday PM1 (2025-03-13T13:30-04:00)

## Opening

The TG Chair, Bo Son (Sanechips), presents the TG bp meeting agenda slides (IEEE 802.11-25/228r5).

* Chair calls the meeting to order at 13:30.
* Chair instructs members to record attendance in IMAT.
* Chair reviews the meeting rules and patent policy (slides 2-6).
* No response to the call for patents.
* Chair reviews IEEE-SA COPYRIGHT POLICY (slides 7-8).
* Chair reviews other Guidelines, Participation, Suggested Best Practices, and Registration (slides 9-12).

## Agenda

Chair presents the agenda of the session (slide 36).

* 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
* SPs and Motions (TG motions refer to 11-24/1322)
* Timeline Review
* Teleconference Plan
* Contribution discussion (if time allows)
* Any other business?
* Recess

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

No discussion, no objection, agenda approved.

## Straw Polls

The chair starts to present from page 37 of 11-25/228r5.

### SP Set #1

SP1—Bin Qian conducts the following straw poll

“Do you agree to add the following content to TGbp SFD?

The AMP-Data field of AMP DL PPDU for backscatter communication uses Manchester encoding.”

[Reference contributions: 11-25/0339r0]

Nobody objects

SP2—Bin Qian conducts the following straw poll

“Do you agree to add the following content to TGbp SFD?

The AMP-Sync field and the AMP-Data field of AMP UL PPDU for backscatter communication use OOK modulation”

[Reference contributions: 11-25/0339r0]

Nobody objects

### SP Set #2

SP1—Rui Cao conducts the following straw poll

“Do you agree to add the following content to TGbp SFD?

The carrier waveform for AMP Downlink PPDU is constructed by repeating one predefined base waveform of TBD micro-second, and additional pseudo-random phase is applied to each base waveform

The base waveform definition is TBD

Note:

The SYNC and Data fields are OOK modulated on the carrier waveform

The Excitation field is not OOK modulated.”

[Reference contributions: 11-25/0305, 11-25/0325, 11-25/0339, 11-25/0369]

Nobody objects

C: We should limit the scope of your proposed straw poll. This should apply to downlink PPDU and UL PPDU for backscattering, only.

SP2—Rui Cao conducts the following straw poll

“Do you agree to add the following content to TGbp SFD for DL PPDU and UL PPDU for backscattering?

For AMP Manchester encoded OOK of rate 250kbps, each data bit is encoded based on the chip duration of 2us.

For AMP Manchester encoded OOK of rate 1Mbps, each data bit is encoded based on the chip duration of 0.5us.”

[Reference contributions: 11-25/0305, 11-25/0325, 11-25/0339, 11-25/0369]

Nobody objects

C: Please add that this applies to DL and UL PPDU for backscattering.

SP3—Rui Cao conducts the following straw poll

“Do you agree to add the following content to TGbp SFD for DL PPDU and UL PPDU for backscattering?

For AMP Manchester encoded OOK, data bit 1 is encoded as chip bits ‘01’ and data bit 0 is encoded as chip bits ‘10’

Note: same definition as WUR HDR definition.”

[Reference contributions: 11-25/0305, 11-25/0325, 11-25/0339, 11-25/0369]

Nobody objects

### SP Set #3

SP1—Yinan Qi conducts the following straw poll

“Do you agree to add the following content to TGbp SFD?

11bp shall specify, in 2.4 GHz, an AMP UL PPDU for backscatter non-AP AMP STAs that contains an AMP-Sync field and an AMP-Data field.

Note: This AMP UL PPDU is within one excitation field of an AMP DL PPDU.”

[Reference contributions: 11-25/0316r0, 11-25/0027r1, 11-24/1780r2]

Nobody objects

C: I support this proposal. But this is not very clear. The text could be better. I just don’t understand the extent of what you refer to as PHY parameters.

A: We have only one parameter agreed at this time.

SP2—Yinan Qi conducts the following straw poll

“Do you agree to add the following content to TGbp SFD?

The PHY parameters (at least data rate) for AMP UL transmission are indicated by the AMP AP.

Other PHY parameters TBD.”

[Reference contributions: 11-25/0316r0]

Nobody objects

### SP Set #4

SP1—Amichai Sanderovich defers conducting his straw poll

“Do you agree that 802.11bp defines at least one mode of access without the explicit transmission of slot indication in 802.11bp for active transmitter AMP non-AP STAs?”

[Reference contributions: 11-25/0252r1]

### SP Set #5

C: We need to consider security requirements.

C: Some jurisdictions have cybersecurity rules, today.

C: We need to be fully encrypted for our use cases.

C: For the moment we are defining this as TBD.

SP1—Hui Luo conducts the following straw poll

“Do you agree to add the following content to TGbp SFD Security subclause?

IEEE 802.11bp will specify secure data communication methods that do not require maintaining security associations.

Note:

The methods are based on existing 802.11 security protocols.

The security for backscattering AMP devices are TBD.

The details are TBD.”

[Reference contributions: 11-24/0178, 11-24/0526, 11-24/0871, 11-24/1998, 11-24/1242]

Nobody objects

### SP Set #6

C: This is a very sensitive topic and I would like to have more time to discuss this. It is not clear where the masterkey does come from. There are not enough details here.

C: We see some concerns here, too. We kindly request this straw poll to be deferred.

SP1—Sanket Kalamkar defers conducting his straw poll

“Do you agree that 802.11bp defines a mechanism to generate a transient key at the AMP client to support secure communication, where:

An AP transmits a downlink frame containing an ANonce.

After receiving the downlink AMP frame from the AP that contains an ANonce, an AMP client generates an SNonce.

The client generates a transient key using the ANonce, the SNonce, and a Pairwise Master Key (PMK) between the AP and the client.

Note—The mechanism to generate PMK is TBD.”

[Reference contributions: 11-24/2112, 11-24/1998]

Because of the deferral of his previous straw poll, Sanket Kalamkar defers conducting his straw poll SP2, SP3, SP4.

C: What is the clock accuracy? That has implications on operation on slot boundaries.

C: This doesn’t preclude any other procedure. This doesn’t mandate the use of slot-based access.

C: I am speaking in favor of this idea.

SP5—Sanket Kalamkar conducts the following straw poll

“Do you agree that 802.11bp to define a slot-based procedure to enable one or more clients to access the medium to send uplink AMP PPDU(s)?”

[Reference contributions: 11-24/2113]

Members express their opinion. Result: Yes: 57, No: 3, Abstain: 6

C: With broadcast addressing there is no need for multiple receiver IDs.

C: Yes, agree. But it is just a “may” condition.

SP6—Sanket Kalamkar conducts the following straw poll

“Do you agree that 802.11bp defines an AMP Trigger frame that an AP transmits to solicit UL AMP PPDU(s) from one or more 802.11bp clients and may carry the following content?

Transmitter ID

Receiver ID(s)

FCS

Other parameters TBD”

[Reference contributions: 11-24/2112, 11-25/398]

Nobody objects

SP7—Sanket Kalamkar conducts the following straw poll

“Do you agree that an 802.11bp client may use the receive time of the AMP Trigger frame, which solicits UL AMP PPDUs from the client, to determine the timing for transmitting UL AMP PPDUs in the same TXOP?

The definition of receive time is TBD.”

[Reference contributions: 11-25/0353]

Nobody objects

C: This applies to slot-based access, only?

C: Yes, other modes are possible

SP8—Sanket Kalamkar conducts the following straw poll

“Do you agree that when the AP solicits UL AMP PPDUs from 802.11bp clients using a slot-based procedure, the AMP Trigger frame shall carry the following parameters?

Number of slots for UL PPDU transmissions in that TXOP

Other parameters TBD”

[Reference contributions: 11-24/2113, 11-25/0353]

Nobody objects

C: Does this refer to an MPDU or to a PPDU?

C: There are no acknowledgments for PPDUs. We have checks for the MPDUs. You can acknowledge MPDU, only.

SP9—Sanket Kalamkar conducts the following straw poll

“Do you agree that 802.11bp defines an AMP Ack frame that an AMP AP transmits to acknowledge the received UL AMP frame(s)?”

[Reference contributions: 11-25/0398]

Nobody objects

### SP Set #7

SP1—Rojan Chitrakar decides to withdraw his straw poll.

C: We should discuss about specific parameters and details on the slot-based access.

SP2—Rojan Chitrakar conducts the following straw poll

“Do you agree to add to the 11bp SFD that:

802.11bp supports a time-slot based random access mechanism for Active Tx non-AP AMP STAs:

AMP AP transmits an AMP frame that indicates one or more time-slots.

Further details (e.g., frame formats, how a STA chooses a random access time-slot etc.) are TBD.”

[Reference contributions: 25/334r1, 25/0046r0, 11-24/1549r0, 11-24/1212r0]

Nobody objects

C: What is the difference to before?

A: This is using scheduled access. Slots are assigned by AP. The previous straw poll relates to a slot-based random access.

SP3—Rojan Chitrakar conducts the following straw poll

“Do you agree to add to the 11bp SFD that:

802.11bp supports a time-slot based scheduled access mechanism for Active Tx non-AP AMP STAs:

\* AMP AP transmits an AMP frame to assign one or more transmission time-slots.

\* Further details (e.g., frame formats, how the time-slots are assigned etc.) are TBD.”

[Reference contributions: 25/334r1, 25/0046r0, 11-24/1549r0, 11-24/1212r0]

Nobody objects

C: What do you intend to incorporate into IEEE 802.11bp? Are you proposing to copy aspects from copyright-protected standard into our standard.

A: We had many examples of normative references. We will not copy. We will use normative references

SP4—Rojan Chitrakar conducts the following straw poll

“Do you agree to add to the 11bp SFD that:

11bp supports a mode of operation in which a sub-set of the logical interface of the UHF RFID Standard is used for backscattering communication.

\* Applicable UHF commands are carried in 802.11bp frames.

\* Applicable to both mono-static & bi-static backscattering.

\* The sub-set of the logical interface to be reused is TBD.

NOTE – The logical interface of the UHF RFID Standard is defined by the EPC® Radio-Frequency Identity Generation-2 UHF RFID Standard”

[Reference contributions: 25/334r1, 25/0046r0, 11-24/1549r0, 11-24/1212r0]

Nobody objects

### SP Set #8

Ian Bajaj defers conducting his straw polls SP1, SP2.

C: By interval you mean repetition interval?

A: Yes, okay. I am adding the following “Note: Interval refers to a repetition of the WPT waveform”

C: With frequency you mean channel?

A: Yes

C: Please state “waveform \*may\* include” because there could be more parameters.

SP3—Ian Bajaj conducts the following straw poll

“Do you agree to add to the 11bp SFD that:

Control information that is sent from the AMP AP to the AMP Energizer relating to the WPT waveform may include at least one or more of the following: Start Time, Duration, Interval, Transmit Power, and frequency related parameters.

The frequency related parameters may include central frequency information, bandwidth information, etc.

Note: Interval refers to a repetition of the WPT waveform”

[Reference contributions: 11-24/1208r1, 11-24/1524r2, 11-24/1769r0, 11-25/0037r0, 11-25/0318r0, 11-25/0336r0]

Nobody objects

### SP Set #9

SP1—Yinan Qi conducts the following straw poll

“Do you agree to add to the 11bp SFD that:

WPT signals from two or more transmitters in S1GHz are allowed to occupy the same channel simultaneously.”

[Reference contributions: 11-25/0320r1, 11-25/0029r1]

Nobody objects

SP2—Yinan Qi conducts the following straw poll

“Do you agree to add to the 11bp SFD that:

Energizer should report its WPT and excitation related capability to the AMP AP. The parameters to be reported are TBD”

[Reference contributions: 11-25/0318r0]

Nobody objects

### SP Set #10

Nelson Costa defers conducting his straw poll SP1

### SP Set #11

C: Technically, we have not defined any TDM mechanism because the related motion was not conducted, so far.

SP1—Chuanfeng He conducts the following straw poll

“Do you agree to add the following content to TGbp SFD?

AMP trigger frame indicates parameters for a slot-based procedure of time slots to AMP non-AP STA(s).

The exact parameters are TBD.”

[Reference contributions: 11-25/0340r0, 11-24/1774r1]

Noboy objects

## Motions

At 15:23 IEEE 802.11 TGbp discusses the following motion

1. “Move to approve the proposed text in the following SPs in 11-25/0228r6 into 11bp SFD, and allow the chair to update 11-24/1322 to capture the motion result for each approved text:

* SP 1, 2 in SP SET 1;
* SP 1, 2, 3 in SP SET 2;
* SP 1, 2 in SP SET 3;
* SP 1 in SP SET 5;
* SP 5, 6, 7, 8, 9 in SP SET 6;
* SP 2, 3, 4 in SP SET 7;
* SP 3 in SP SET 8;
* SP 1, 2 in SP SET 9;
* SP 1 in SP SET 10”

Mover: Bian Tian  
Seconded: Sanket Kalamkar  
Approved by unanimous consent

1. “Move to add the following content to TGbp SFD: AMP trigger frame may indicate parameters for a slot-based procedure of time slots to AMP non-AP STAs

* The exact parameters are TBD

Mover: Weijie XU  
Seconded: Rui Cao  
Approved by unanimous consent

## Timeline Review

The chair explains that TGbp’s schedule for issuing version 0.1 for comment collection will be delayed from March 2025 to July 2025.

## Teleconference Plan

The chair foresees to request the IEEE 802.11 WG to authoritze IEEE 802.11 TGbp to schedule the following teleconferences:

1. From 2025-03-25T10:00-04:00 until 2025-03-25T12:00-04:00 on Webex
2. From 2025-04-08T10:00-04:00 until 2025-04-08T12:00-04:00 on Webex
3. From 2025-04-22T10:00-04:00 until 2025-04-22T12:00-04:00 on Webex
4. From 2025-05-06T10:00-04:00 until 2025-05-06T12:00-04:00 on Webex

The chair requests members to contact him before the IEEE 802.11 closing plenary begins, should members prefer different times for teleconferences.

## Adjourn

The chair announced the session adjourned at 15:32.

Next hybrid (face to face & online) session will be the IEEE 802 plenary meeting in March.