IEEE P802.11  
Wireless LANs

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| TGbn March 2024 Meeting Minutes | | | | |
| Date: 2024-03-15 | | | | |
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|  |  |  |  |  |

Abstract

This document contains the minutes for TGbn March 2024 sessions.

Revision history:

* Rev0: First version of the document.
* Rev1: Fixed some typos and incorrect sentences.

Abbreviations:

* C: Comment.
* A: Answer.

# March 11th, Monday (16:00-18:00 MDT) - Joint

* The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order.
* Yusuke Asai (NTT) is serving as the Secretary.
* Registration information
  + The chair announced that registration is needed to attend this meeting.
* Meeting protocol
  + The chair announced that everyone is required to log in WebEx to vote.
  + Please ensure that the following information is listed correctly when joining the call:
    - "[voter status] First Name Last Name (Affiliation)"
* Attendance reminder.
  + Participation slide: <https://mentor.ieee.org/802-ec/dcn/16/ec-16-0180-05-00EC-ieee-802-participation-slide.pptx>
  + Please record your attendance during the conference call by using the IMAT system:
    - 1) login to [imat](https://imat.ieee.org/attendance), 2) select “802 Wireless Interim/Plenary Session” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “TGbn conference call that you are attending.
  + If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to:  
    Yusuke Asai ([yusuke.asai@ntt.com](mailto:yusuke.asai@ntt.com)) & Alfred Asterjadhi ([aasterja@qti.qualcomm.com](mailto:aasterja@qti.qualcomm.com))
* IEEE 802 and 802.11 IPR policy and procedure
  + Patent Policy: Ways to inform IEEE:
    - Cause an LOA to be submitted to the IEEE-SA ([patcom@ieee.org](mailto:patcom@ieee.org)); or
    - Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or
    - Speak up now and respond to this Call for Potentially Essential Patents

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair.

Nobody speaks/writes up.

* + Copyright Policy: Participants are advised that
    - IEEE SA’s copyright policy is described in [Clause 7](https://standards.ieee.org/about/policies/bylaws/sect6-7.html#7) of the IEEE SA Standards Board Bylaws and [Clause 6.1](https://standards.ieee.org/about/policies/opman/sect6.html) of the IEEE SA Standards Board Operations Manual;
    - Any material submitted during standards development, whether verbal, recorded, or in written form, is a Contribution and shall comply with the IEEE SA Copyright Policy.

Copyright Policy was presented.

* + **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document ([11-24/0235r3](https://mentor.ieee.org/802.11/dcn/24/11-24-0235-03-00bn-tgbn-mar-2024-meeting-agenda.pptx)).
* Agenda
  + Chair reviewed proposed agenda found in [11-24/0235r3](https://mentor.ieee.org/802.11/dcn/24/11-24-0235-03-00bn-tgbn-mar-2024-meeting-agenda.pptx).
  + Discussion:
    - The presentation of [11-24/0093r2](https://mentor.ieee.org/802.11/dcn/24/11-24-0093-02-00bn-nav-setting-for-coordinated-tdma.pptx) on the Monday, PM2 joint session was cancelled due to absence of the presenter.
    - [11-23/2217r1](https://mentor.ieee.org/802.11/dcn/23/11-23-2217-01-00bn-some-thoughts-on-relay-improvement.pptx) was moved from MAC ad-hoc on Wednesday AM1 to joint session on Monday PM2.
  + The modified agenda was approved with unanimous consent.
* Summary from January 2024 meeting
  + Eight teleconferences were held.
  + The group discussed 35 technical submissions on the calls.
  + There were 150 pending submissions at the beginning of March 2024 session.
* Approve TG minutes
  + TG motions: Approve TG minutes from the January 2024 meeting

**Motion: Move to approve TGbn minutes listed below:**

* + - January Interim: <https://mentor.ieee.org/802.11/dcn/24/11-24-0303-00-00bn-tgbn-january-2024-meeting-minutes.docx>
    - Teleconferences Jan-Mar: <https://mentor.ieee.org/802.11/dcn/24/11-24-0331-01-00bn-tgbn-january-february-march-2024-teleconference-minutes.docx>

Move: Yusuke Asai Second: Akira Kishida

* + - Discussion: None.
    - Result: Approved with unanimous consent
* Technical Submissions – MAP/Coordination:
  + [11-23/2142r0](https://mentor.ieee.org/802.11/dcn/23/11-23-2142-00-00bn-txop-adjustment-for-inter-bss-r-twt-schedule-protection.pptx): TXOP Adjustment for inter-BSS R-TWT Schedule Protection

Dana Ciochina (Sony Group Corporation)

C: In general, I think in general, we like the direction of coordination between APs in a lightweight manner. In the slide 6, which option do you think more broadly applicable and which of those maybe can be used only for 11bn or both of 11bn or legacies?

A: Option 3 is the most flexible and versatile. It allows most things to do and can also be applied to EHT STAs.

C: In the slide 7, what is happening is your extension of the TXOP to go all the way into the R-TWT scheduled time by scheduling or by requesting the STA to transmit more data than what was requested?

A: I haven’t thought of it as an extension. Ts can be the original duration of what was requested.

C: What is the D factor? What would like if the STA is requested time like this? For example, if the STA2 needs to transmit data, it’s interfering with RTWT schedule.

A: The AP2 simply stop the TXOP. The initial scenario is that the STA2 was requesting the TXOP larger than this D\_pre-rTWT so that would overlap with the R-TWT. So, the STA2 would theoretically have more to transmit than this T\_eff.

C: In the C-TDMA, do you assume that a TXOP initiated by the STA2 would be taken over the AP2 and given to the AP1?

A: Probably they should already have established some coordination beforehand. The AP2 has originally the TXOP. If C-TDMA is possible between two STAs and it also knows the traffic requirements for the R-TWT, then it can take the TXOP to the AP1 assuming that there exists a coordination between them.

C: In this example, the TXOP is initiated by the STA2 not the AP2. It is just unclear to me how the AP2 would use C-TDMA here.

A: I think there are thing that are not yet clear.

C: In the slide 4, is duration of D\_pre-rTWT scheduled individually as a normal R-TWT TXOP, or associated with R-TWT SP for AP1?

A: The D\_pre-rTWT is the duration between the end of the RTS and the start of the R-TWT. It is not only a time between these two it is not scheduled or anything. What I’m trying to say here is the AP2 has received this RTS and the remaining duration after the R-TWT this what the requested D\_pre-rTWT is strictly larger than this remaining duration. This is not scheduled intervals.

C: The STA2 shouldn’t know the start of R-TWT by the AP1, is it right?

A: No. I’m just describing the problem.

C: Your proposal helps non-AP STAs. In the slide 4, you mentioned the STA2 isn’t aware of the AP1’s schedule. Is it possible that RTS transmission started right before the boundary of the following R-TWT window?

A: Yes, it is possible in this case. This solution can basically do something as long as this what whatever next frame is.

C: I just want to point out that is a potential risk to R-TWT because you could override like 50 us. I will comment on offline.

* + [11-24/0102r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0102-01-00bn-multi-ap-coordinated-puncturing.pptx): Multi-AP Coordinated Puncturing Shawn (Sanghyun) Kim (WILUS Inc.)

C: Typically, this puncturing happens at 6 GHz to protect incumbent devices. So, is it reasonable to assume that two APs that are close together that multi-APs will see such difference as described in the slide 4? When those two APs see the same incumbent and they have to puncture in the same band, there is no opportunity for another BSS to use the band that has been punctured by one of the BSSs.

A: We can have more offline discussion.

C: I don’t think it is a good idea to let to neighbor APs to operate on same bandwidth but with not aligned the primary channel here. AP2 will not set the NAV because its primary channel is not used.

A: It depends on the CCA level and threshold.

C: But if they aligned the primary channel, they could use the virtual CCA to protect the channel. In this scenario, you only can rely on the packet for energy detection. That is not a robust enough.

A: We have no rule for aligning the primary channel and there might be the BSS for using different channels.

C: I can see the benefits on your proposal. In EHT, we only allow one hole for the nine OFMA transmission. When we have multiple APs and we want to apply this scheme, the bandwidth will be shrined a lot unless we define a new PPDU transmission with multiple holes. Is that your intention?

A: Actually not. I think they depend on the topology and primary channel distribution. If the two of working BSS, you use the channels two and three. As a primary channel, we can puncture 40 MHz. So, we can support multiple BSS cases.

C: In the slide 7, it is better for the second AP to adjust its primary channel. In the middle of the other AP on this figure will cause strong interference. Because there is no time alignment, they will cause adjacent channel interference.

C: It’s interesting but I have scalability concern, a lot of time on the networks when three or four APs might operate in the same channel. In this case, typically, 80 MHz channel would drop down to 20 MHz for each AP.

(SP was deferred because more discussion was needed.)

* + [11-24/0105r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0105-00-00bn-txop-for-relay-communication-in-11bn.pptx): TXOP for Relay communication in11bn Dongguk Lim (LG Electronics)

C: It overall looks good. Do you assume that AP to STA communication through the relay will only happen through TXOP sharing or do you think you’re using that as a way to optimize the kind of delay?

A: I think that to guarantee the transmission between the relay STA and the destination STA, we need to customize the TXOP sharing to prevent other STAs’ channel access.

C: There can still be a possibility that even if you do TXOP sharing, the relay is not able to successfully send the PPDU to the STA in the same TXOP? I think we need to contend again after the TXOP is over because of such retransmission.

C: As for the TXOP allocation in slide 5 through 8, if you do only TXOP allocation to the relay, I think you would need the multi-user allocation and also, when you say destination STA, I believe it's the source STA, which we'll be uplink trigger to transmit to the first layer that to the AP, right?

A: In this document we only considering the RTS case but we also considering the TXOP sharing for uplink during the relay communication. I need more discussion further detailed cases.

C: Uplink would be somewhat different from downlink.

C: In the slide 10, before transmitting from the AP to the relay, the AP send a CTS but this relay communication requires CTS from the destination STA. Do you think it is required a CTS from destination STA?

C: I assume that we are using the same bandwidth is assigned by the AP. The AP sending transmit the TS trigger frame and the relay STA responds by the CTS frame using idle channel. And the bandwidth that we are using the data transmission between the AP and the STA. The AP exactly knows which channel is possible or not between the relay and destination STAs.

C: For checking the channel status, not checking for the availability of destination STA, right?

A: We can consider the checking of what the available the channel between the relay and the destination STAs before this operation. We need more discussion.

C: I prefer option one. The reason is that it can give some time for error correction. Another comment is that in the slide 4, the RTS/ CTS protection can also work. When the non-AP STAs send the data to the AP, maybe we could have another better way to think about this scenario.

A: I will follow-up your comments.

C: In the slide 6, you say that AP can always do a downlink and then share it if you want. However, since the transmission from the AP is required within the TXS, and that's the reason why the existing TXS framework doesn't work.

A: Currently, the defined these values have choose only the allow the transmission between the uplink transmission.

C: The AP can perform a downlink and then it can do TXS. We can have offline discussion.

A: Let me check about that.

C: There is one exiting TXOP sharing mechanism in the S1G relay operation. I just want to know if it is possible to reuse the S1G relay operation mechanisms.

A: I assume that two options for the TXOP sharing. Using the already defined mode is the mode two. But it does not allow the transmission from the AP, so we need to define the additional indication for that model using for the relay operation.

* + [11-23/2217r](https://mentor.ieee.org/802.11/dcn/23/11-23-2217-01-00bn-some-thoughts-on-relay-improvement.pptx)1: Some thoughts on relay improvement Jay Yang (ZTE)

C: Regarding relay architecture topology, some of the discussion we are also considering in mulit-AP coordination. is there a duplication of that?

A: I think in some cases this is a type of multi-AP coordination.

C: OK. So, given that there's overlap, it may make sense to study some of these after all the AP coordination techniques have been finalized.

C: In the slide 11, you mentioned FTTR products can solve some problems of joint transmission. But from slide 8 to 10, I see you are assuming that the root AP and some relay APs connect by wire. Do you assume that FTTR products connect wireless or wired?

A: It’s wired.

C: I understand that FTTR products have fiber cable connection, in some products. Why do you assume wireless connections between FTTR products?

A: We assume wired connection but not all of products support wired connection, and thus wireless connection is also assumed.

C: I basically agree to the direction like some link level relay and kind of seamless roaming. In the slide 9, it should be like the clients should be the UHR only, right? Because pre-UHR clients do not support the kind of seamless roaming.

A: Yes. This is only for UHR client.

C: And I think doing the transmission is kind of some different category of the technology. The content of the technology is different from the relay protocol.

C: If you consider the MLD operation, is the relay operation done on all of the same links or other links?

A: It’s not limited the operation on the same or different link.

C: What is the meaning of the UHR roaming function? Is it easily included in the relay?

A: We need to take more offline discussion.

C: In the slide 4, here you have the easy mesh architecture which has the wireless backhaul. I think this architecture is already defined. Why do you need a relay architecture? This architecture already works today.

A: Because in some contributions mentioned there will be some reorder issues. In the link level relay, there don’t need to reorder packets.

C: In FTTR architecture, how is the relay helping if it is a wired backhaul? My understanding is you're relaying over multiple wireless hops.

A: Yes. It depends on how we define the relay.

C: This is not a relay architecture I understand. We can have more offline discussion.

(SP text discussion)

C: I think there are multiple proposal to propose the relay function with the different details, so I am not sure if this SP to cover the high-level concept for all the contributions. So, I think we can for the discussion.

A: OK.

(SP deferred.)

* AoB: None.
* Recessed at 17:55 MDT.

# March 12th, Tuesday, AM2 (10:30-12:30 MDT)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0584-00-00bn-minutes-802-11-bn-phy-ad-hoc-march-plenary-meetings.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0590-00-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-march-2024-plenary.docx>

# March 12th, Tuesday, PM1 (13:30-15:30 MDT)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0584-00-00bn-minutes-802-11-bn-phy-ad-hoc-march-plenary-meetings.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0590-00-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-march-2024-plenary.docx>

# March 13th, Wednesday, AM1 (8:00-10:00 MDT)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0584-00-00bn-minutes-802-11-bn-phy-ad-hoc-march-plenary-meetings.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0590-00-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-march-2024-plenary.docx>

# March 13th, Wednesday, AM2 (10:30-12:30 MDT)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0584-00-00bn-minutes-802-11-bn-phy-ad-hoc-march-plenary-meetings.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0590-00-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-march-2024-plenary.docx>

# March 14th, Thursday, AM2 (10:30-12:30 MDT)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0584-00-00bn-minutes-802-11-bn-phy-ad-hoc-march-plenary-meetings.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0590-00-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-march-2024-plenary.docx>

# March 14th, Thursday (16:00-18:00 MDT) - Joint

* The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order.
* Yusuke Asai (NTT) is serving as the Secretary.
* Registration information
  + The chair announced that registration is needed to attend this meeting.
* Meeting protocol
  + The chair announced that everyone is required to log in WebEx to vote.
  + Please ensure that the following information is listed correctly when joining the call:
    - "[voter status] First Name Last Name (Affiliation)"
* Attendance reminder.
  + Participation slide: <https://mentor.ieee.org/802-ec/dcn/16/ec-16-0180-05-00EC-ieee-802-participation-slide.pptx>
  + Please record your attendance during the conference call by using the IMAT system:
    - 1) login to [imat](https://imat.ieee.org/attendance), 2) select “802 Wireless Interim/Plenary Session” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “TGbn conference call that you are attending.
  + If you are unable to record the attendance via [IMAT](https://imat.ieee.org/attendance) then please send an e-mail to:  
    Yusuke Asai ([yusuke.asai@ntt.com](mailto:yusuke.asai@ntt.com)) & Alfred Asterjadhi ([aasterja@qti.qualcomm.com](mailto:aasterja@qti.qualcomm.com))
* IEEE 802 and 802.11 IPR policy and procedure
  + Patent Policy: Ways to inform IEEE:
    - Cause an LOA to be submitted to the IEEE-SA ([patcom@ieee.org](mailto:patcom@ieee.org)); or
    - Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or
    - Speak up now and respond to this Call for Potentially Essential Patents

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair.

Nobody speaks/writes up.

* + Copyright Policy: Participants are advised that
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    - Any material submitted during standards development, whether verbal, recorded, or in written form, is a Contribution and shall comply with the IEEE SA Copyright Policy.

Copyright Policy was presented.

* + **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document ([11-24/0235r13](https://mentor.ieee.org/802.11/dcn/24/11-24-0235-13-00bn-tgbn-mar-2024-meeting-agenda.pptx)).
* Agenda
  + Chair reviews proposed agenda found in [11-24/0235r13](https://mentor.ieee.org/802.11/dcn/24/11-24-0235-13-00bn-tgbn-mar-2024-meeting-agenda.pptx).
  + Discussion:
    - C: I request to confirm the C-TDMA presentation (deferred on Monday) whether the submission is on the que or not.
    - A: Chair confirmed the presentation was on the queue.
    - C: A request for SP on DSL which were deferred on the MAC ad hoc was raised.
    - A: Chair approved it if time allowed.
  + Agenda approved with unanimous consent.
* Technical Submissions
  + **Straw Poll** on C-TDMA (Slide 60, [11-24/0235r13](https://mentor.ieee.org/802.11/dcn/24/11-24-0235-13-00bn-tgbn-mar-2024-meeting-agenda.pptx)):

Do you agree that TGbn shall define a Coordinated TDMA (C-TDMA) procedure for an AP to share its time resources of an obtained TXOP with a set of APs.

–    Set of APs is TBD.

–    The set can consist of one AP.

Note: Discussed in several sessions and several submissions discuss similar concept, ref: [11-23/0041](https://mentor.ieee.org/802.11/dcn/23/11-23-0041-00-0uhr-considerations-on-coordinated-tdma.pptx), [11-23/249](https://mentor.ieee.org/802.11/dcn/23/11-23-0249-01-0uhr-extended-txop-sharing.pptx), [11-23/0261](https://mentor.ieee.org/802.11/dcn/23/11-23-0261-00-0uhr-tdma-for-wifi-8.pptx), [11-23/739](https://mentor.ieee.org/802.11/dcn/23/11-23-0739-01-0uhr-follow-up-on-coordinated-tdma-c-tdma.pptx), [11-23/1085](https://mentor.ieee.org/802.11/dcn/23/11-23-1085-00-0uhr-thoughts-on-coordinated-tdma.pptx), [11-23/1962](https://mentor.ieee.org/802.11/dcn/23/11-23-1962-01-00bn-gain-analysis-for-coordinated-ap-transmissions.pptx), [11-23/1895](https://mentor.ieee.org/802.11/dcn/23/11-23-1895-02-00bn-c-tdma-frame-sequence.pptx), [11-23/1910](https://mentor.ieee.org/802.11/dcn/23/11-23-1910-01-00bn-coordinated-tdma-follow-up.pptx), [11-23/1912](https://mentor.ieee.org/802.11/dcn/23/11-23-1912-01-00bn-coordinated-tdma-procedure.pptx).

* + - Discussion

C: The 2nd bullet says the set can consist of one AP. Would you be able to comment that like decided C-TDMA for multi-AP?

A: That means only one sharing AP and one shared AP.

C: I do want to make sure the C-TDMA propose. We also see use cases for more than one AP. So, the set of APs as TBD is desirable. It is good text I support.

C: Here, you could defer that it’s better for me because I just saw this today. I also think it is not necessary to share to multiple APs. I think we only need to put define share for one AP, so let me keep it simple. Another point is that time resource should be clarified as a part of TXOP.

A I’m OK with the last suggestion. The straw poll is saying the set can consist of one. So, your concern is already captured there to say the feature allows an AP sharing to share with only one AP.

C: I think that is not my understating in this text. It looks like you define a mechanism for multiple APs, for example, a trigger frame is for multiple STAs, but allowed to transmit to one STA. I think that is not your intention. I think the procedure for the only one OBSS AP, not for multiple APs. I think that is still different.

A: This is a very, very high-level SP. It says that the feature allows an AP to share the TXOPs of another AP and whether it shares with more than one AP is TBD. So, at this point, I don’t want to get into those details.

* + - **Result: Y-N-A = 132-60-24**
  + **Straw Poll** on CSR (Slide 60, [11-24/0235r13](https://mentor.ieee.org/802.11/dcn/24/11-24-0235-13-00bn-tgbn-mar-2024-meeting-agenda.pptx)):

Do you agree to add the following text to the TGbn SFD:

TGbn shall define Coordinated Spatial Reuse (CSR), which allows concurrent transmissions of at least two PPDUs from at least two BSSs on the same channel with the coordination between APs

Note: Discussed in several sessions and several submissions discuss similar concept, ref: [11-23/1868r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1868-02-00bn-coordinated-spatial-reuse-design.pptx), [11-23/1917r0](https://mentor.ieee.org/802.11/dcn/23/11-23-1917-00-00bn-coordinated-spatial-reuse.pptx), [11-24/529r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0529-00-00bn-coordinated-spatial-reuse-discussion.pptx), [11-23/1972r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1972-01-00bn-evaluation-of-coordinated-spatial-reuse-follow-up.pptx), [11-24/577r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0577-00-00bn-thoughts-on-coordinated-spatial-reuse-c-sr.pptx)

* + - Discussion

C: We need more some time to get to more details, I request you to defer the straw poll.

C: I also want to make suggestion for defer the straw poll. I also have the contribution presented before and it raised several concerns. So, we want to have more study.

C: I think there are some PHY issues need to resolve, and thus the SP should be deferred to give more time for discussion.

A: Thanks for the feedback from the members, but I’d like to try this straw poll.

* + - **Result: Y-N-A = 111-88-43**
  + [11-24/0108r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0108-00-00bn-triggered-beamforming-in-tgbn-follow-up.pptx): Triggered Beamforming in TGbn - Follow Up Shimi Shilo (Huawei)

C: I would like to express my support. This is a very good feature and quite generic. I mean what it does is it brings precoding to trigger based-PPDUs.

C: You said that no processing required on the client. Does it mean we are sort of thinking of transmitting raw IQ being from and coefficients? Is that a part of the plan?

A: No. I mean no additional real time requirements. Because an STA today would support precoding. They do need to store compressed precoding matrices to decompress them and multiply the columns by these precoders. We would expect it to be exactly the same. In that sense, we don’t see any difference.

C: They may well be reasonable.

C: Referring the sounding sequence, I think about the working STA side. A STA need to process a trigger, which is already pretty tight. And now we have a BFR which will compress and still you need to decompress it.

A: I see where you're going. I understand acknowledge and this is why I mentioned before while I presented this. This is simply the protocol that we presented in be like two three years ago. We definitely don't have to use this one. It's just an example we can use a different one.

C: I understood.

* + - **Straw Poll**: 11-24/108r0, slide 9

Do you agree to add the following text to the TGbn SFD?

TGbn will define a protocol for supporting triggered UL beamformed data transmission.

* + - * Discussion on the straw poll: None.
      * **Result: Y-N-A = 106-71-57**
  + [11-24/0142r](https://mentor.ieee.org/802.11/dcn/24/11-24-0142-01-00bn-residual-interference-in-cbf.pptx)1: Residual Interference in Coordinated Beamforming

Dana Ciochina (Sony Group Corporation)

C: In the slide 5, what is the definition with the header error rate? I think it may contain synchronization errors for OFDM symbol window and decoding error for legacy signal.

A: One of the errors is in the preamble and the second is in the payload. We consider them separately. For the header error rate, this is basically if there are errors in decoding the SIG field, then there is an error in a packet.

C: In the slide 8, the first bullet says the beamforming over the legacy preamble means you propose to apply the same beamforming for both preamble and data portion?

A: It was shown like this or at least having it having the ruling beamforming over the legacy preamble for simplicity.

C: What if the data portion is more than two spatial streams? How do you apply the same beamforming over the preamble and data portions?

A: For the moment, this has not yet been defined. The important part here is basically that you are having some nulling beamforming over the preamble. It can theoretically also be different.

C: On the 2nd bullet in the slide 8, what do you mean by the extending the LTF? Is this extending the P matrix?

A: This means that it allows orthogonal LTFs form the two APs. It can lead to extending the matrix. I think that having more LTF than the number of streams is actually easy method to apply it to the current configurations.

C: In the slide 4, the antenna configuration, I think you need eight spatial streams sounding at the client.

A: Yes.

C: I am certainly used to and sort of most comfortable with the idea. We essentially sound all the antennas for the AP1 and the AP2, which leads to sounding eight antennas. And I asked that for spatial stream sounding is really hard to show a gain when clients have to receive eight antennas in practical cases.

A: Thank you.

(No SP was run.)

* Motions (from the slide 7 to 14 in [11-24/0171r4](https://mentor.ieee.org/802.11/dcn/24/11-24-0171-04-00bn-tgbn-motions-list-part-1.pptx))
  + **Motion 3 (PHY)**

**Move to add the following text to the TGbn SFD**

* + - **11bn will define distributed tone RU (“DRU”) transmission**

Note: Discussed in one of the PHY ad-hoc sessions of the January Interim, (ref: [11-23/1988r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1988-02-00bn-considerations-on-dru-design-and-application.pptx)) during which a similar SP was run. The SP did not receive any objections.

Move: Bin Tian, Second: Lin Yang

* + - Discussion:

C: I don’t have any objection. Do we need this motion? Because I don’t see any technical difference from the motion 1.

A: This motion is from the passed straw poll in last January. We think it’s good to have it to kick off the DRU development for UHR.

C: I understand the intention. What is the different from Motion 1, technically?

A: Motion 1 says TB-PPDU. Motion 3 is more general.

C: Is there any potential development through transmission or a new transmission?

A: With this motion, we actually kick off the DRU feature. That’s why we need it.

C: My concern is that since motion one has already passed then Motion 3 is meaningless. What is the additional information provided in the motion?

A: Motion 3 is just saying this one is a feature introducing.

C: My concern is since actually I saw that this motion 3 is more general, so frankly speaking, I have a concern on the more general use of DRU for downlink transmission, which may cause more interference to the OBSS. Without a detailed investigation, it may cause such consequences. We should be more cautious on this. (Chair asked the secretary to note that concern.)

* + - **Result: Y-N-A = 133-36-43 (The motion passed.)**
  + **Motion 4 (PHY)**

**Move to include the following into the 11bn SFD**

* + - **DRU is allowed in a punctured UHR TB transmission.**

Note: Discussed in one of the PHY ad-hoc sessions of the March plenary, (ref: [11-23/2200r3](https://mentor.ieee.org/802.11/dcn/23/11-23-2200-03-00bn-distribution-bandwidth-of-dru.pptx)) during which a similar SP was run. The SP did not receive any objections.

Move: Ross J. Yu Second: Eunsung Park

* + - Discussion: None.
    - **Result: The motion was approved with unanimous consent.**
  + **Motion 5 (PHY)**

**Move to add the following text to the TGbn SFD:**

* + - **11bn supports hierarchical pilot structure for DRU**
      * Pilot locations of a larger DRU is a subset of pilot locations of smaller component DRUs within the same PPDU BW

Note: Discussed in one of the PHY ad-hoc sessions of the March plenary, (ref: [11-24/0501r2](https://mentor.ieee.org/802.11/dcn/24/11-24-0501-02-00bn-pilot-design-considerations-for-dru.pptx)) during which a similar SP was run. The SP did not receive any objections.

Move: Lin Yang Second: Eunsung Park

* + - Discussion: None.
    - **Result: The motion was approved with unanimous consent.**
  + **Motion 6 (PHY)**

**Move to add the following text to the TGbn SFD**

* + - **The number of pilot tones for the same size DRU and RRU (regular RU) is the same**
      * The RRU means the existing RU defined in 11ax and 11be

Note: Discussed in one of the PHY ad-hoc sessions of the March plenary, (ref: [11-24/0402r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0402-01-00bn-20-mhz-tone-plan-and-pilot-design-for-dru.pptx)) during which a similar SP was run. The SP did not receive any objection.

Move: Eunsung Park Second: Stephen Palm

* + - Discussion:

C: The general idea is that DRUs require more pilot tones than regular RUs. Because for regular RU, adjacent subcarriers are used due to the inter-subcarrier correlation, and thus the channel estimation will be fine for tracking the channel status. But for DRU, it has a much wider frequency span. It shows the need of more pilot tones than regular RU.

A: We already checked the performance with the same tone numbers. We presented that the contribution already and there’s no problem with the same power. We also made the same size of pilot tones. We can reuse the existing implementation.

A: I second instance opinion. In fact, wider bandwidth spreading have much better performance due to diversity.

C: I think the evaluation shouldn't be done for the channel with much larger delays. So, I think your evaluation may have a different observation.

* + - **Result: Y-N-A = 129-23-47 (The motion passed.)**
  + **Motion 7 (PHY)**

**Move to add the following text to the TGbn SFD:**

* + - **11bn supports the hybrid mode with DRUs (Distributed tone RU) and RRUs (Regular RU as existing RU defined in 11ax/be) in UHR UL TB OFDMA transmissions**
      * Minimum PPDU BW for hybrid mode is TBD

Note: Discussed in one of the PHY ad-hoc sessions of the March plenary, (ref: [11-24/477r2](https://mentor.ieee.org/802.11/dcn/24/11-24-0477-02-00bn-high-level-perspective-on-dru-follow-up.pptx)) during which a similar SP was run. The SP did not receive any objection.

Move: Shengquan Hu Second: Ross J. Yu

* + - Discussion:

(One editorial comment was raised. The above motion text was the corrected version.)

C: When we are talking about hybrid mode, we are sort of some portion of the bandwidth that is allocated to DRU and another proportion is allocated to regular RU, right? Since 80+80 or something beyond that, we haven't committed that yet. Is it a correct understanding of the structure?

A: Yes. That have not finalized yet.

* + - **Result: The motion was approved with unanimous consent.**
  + **Motion 8 (MAC)**

**Move to add the following text to the TGbn SFD**

* + - **11bn defines a mechanism that when a non-AP MLD roams from one AP MLD to another AP MLD, the context related to the non-AP MLD is transferred from the one AP MLD to the other AP MLD such that it preserves the data exchange context for the non-AP MLD.**
      * Details of the context (e.g., security association context) that can be transferred are TBD
      * Framework to transfer the context is TBD.

Note: Discussed in one of the MAC ad-hoc sessions (several submissions were discussing similar concept, ref: [23/0322r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0322-00-0uhr-improve-roaming-between-mlds.pptx), [23/1884r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1884-02-00bn-seamless-roaming.pptx), [23/1897r0](https://mentor.ieee.org/802.11/dcn/23/11-23-1897-00-00bn-thoughts-on-improving-roaming-under-existing-architecture.pptx), [23/1908r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1908-02-00bn-seamless-roaming-procedure.pptx), [23/1937r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1937-01-00bn-smooth-roaming-follow-up-1.pptx), [23/1971r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1971-02-00bn-further-thoughts-on-seamless-roaming.pptx), [23/1996r0](https://mentor.ieee.org/802.11/dcn/23/11-23-1996-00-00bn-improve-roaming-between-mlds.pptx), [23/2157r2](https://mentor.ieee.org/802.11/dcn/23/11-23-2157-02-00bn-seamless-roaming-within-a-mobility-domain.pptx)) during which a similar SP was run.

SP result was 100Y, 28N, 18A.

Move: Po-Kai Huang Second: Gaurav Patwardhan

* + - Discussion:

C: It seems the kind of transfer must be needed to this framework. But in some cases, for example, the non-collocated AP MLD application, there is no concurrent transfer in my understanding because of the security concern. I requested to defer this motion.

A: I and other contributors have the contribution to explain very details how this mechanism works based on the kinds of contribution. The only request is a transfer from one AP MLD to another AP MLD. I don’t think defining new mechanisms for making everything complex.

C: I am against this motion because I think I remember there was debate in the MAC session, I missed that discussion. In this motion, context transfer is TBD. But the question is do we need to have this transfer? In some scenarios, we do not need the context transfer especially for some non-collocated non-AP MLD.

A: This motion is essentially saying it defines a mechanism. This is saying that we define a mechanism where we basically achieve romancing by context. We are not saying anything about any other mechanism.

A: I want to speak in favor of this motion. There have been a lot of discussions offline to come to this point and as previous commentor mentioned, there may be different implementation flavors. And this particular text is not precluding any of that there could be a case where context is natively available for multiple AP MLDs, some case where they've explicitly transferred. That's a reason why there is TBD.

C: I am in favor of the motion. I think context transfer is really how we achieve for 802.11 roaming.

* + - **Result: Y-N-A = 121-71-34 (The motion failed.)**
  + **Motion 9 (MAC)**

**Move to add the following text to the TGbn SFD**

* + - **TGbn defines a power save mode for a STA that is a UHR Mobile AP or a UHR non-AP STA wherein the STA may transition from a lower capability mode to a higher capability mode upon reception of an initial control frame**
      * Lower capability mode (e.g., 20 MHz BW, one SS, limited data rates, PPDU format)
      * Higher capability mode (e.g., operating BW, NSS and MCSs, with at least one higher capability than that in the lower power capability mode)
      * Initial Control frame is TBD
      * Whether that applies for a non-mobile AP is TBD

Note: Discussed in one of the MAC ad-hoc sessions (several submissions were discussing similar concept, ref: [23/10](https://mentor.ieee.org/802.11/dcn/23/11-23-0010-00-0uhr-considerations-for-enabling-ap-power-save.pptx), [23/1875](https://mentor.ieee.org/802.11/dcn/23/11-23-1875-01-00bn-power-save-proposal-for-non-ap-mobile-ap.pptx), [23/1936](https://mentor.ieee.org/802.11/dcn/23/11-23-1936-00-00bn-ap-mld-power-save-follow-up.pptx), [23/1965](https://mentor.ieee.org/802.11/dcn/23/11-23-1965-02-00bn-dynamic-power-save-follow-up.pptx), [23/2003](https://mentor.ieee.org/802.11/dcn/23/11-23-2003-01-00bn-client-power-save.pptx)). SP result was: 101Y/11N/23A.

Move: Laurent Cariou Second: Ming Gan

* + - Discussion: None.
    - **Result: The motion was approved with unanimous consent.**
  + **Motion 10 (MAC)**

**Move to add the following text to the TGbn SFD**

* + - **TGbn defines cross link power save signaling mechanism**
      * Allowing a non-AP MLD to indicate to its associated AP MLD that supports the mechanism, in a frame sent on one enabled link, the power management mode for one or more of its affiliated non-AP STAs
      * Whether support for the mechanism is mandatory or optional is TBD

Note: Discussed in one of the MAC ad-hoc sessions (several submissions were discussing similar concept, ref:[11-23/2003](https://mentor.ieee.org/802.11/dcn/23/11-23-2003-01-00bn-client-power-save.pptx), [11-24/0602](https://mentor.ieee.org/802.11/dcn/24/11-24-0602-00-00bn-multi-link-power-management-for-mlo.pptx)). SP result was: 122Y/23N/32A

Move: Laurent Cariou Second: Rakesh Taori

* + - Discussion: None.
    - **Result: The motion was approved with unanimous consent.**
* Teleconference Plan
  + Discussion:
    - Some people shared the holiday information in each country.
  + The modified schedule was approved:
    - Mar 28 (Thursday) – MAC/PHY 10:00-12:00 ET
    - Apr 08 (Monday) – MAC/PHY 19:00-12:00 ET
    - Apr 11 (Thursday) – MAC/PHY 10:00-12:00 ET
    - Apr 15 (Monday) – Joint 19:00-21:00 ET
    - Apr 18 (Thursday) – Joint 10:00-12:00 ET
    - Apr 22 (Monday) – MAC/PHY 19:00-21:00 ET
    - Apr 25 (Thursday) – MAC/PHY 10:00-12:00 ET
    - Apr 29 (Monday) – Joint 19:00-12:00 ET
    - May 06 (Monday) – MAC/PHY 19:00-21:00 ET
* Any Other Business
  + Procedural of running the SP on the MAC session.

**Motion:(procedural, need simple majority)**

**Move to amend the agenda to add a straw poll on a DSO (Dynamic Subband Operation).**

* + - Discussion: None.
    - **Result: Y-N-A = 100-62-35 (The motion was approved.)**
  + **Straw Poll** on DSO:

Do you agree that TGbn will define a mechanism where a non-AP STA can be allocated resources dynamically (i.e., on a per-TXOP basis) outside of its current operating bandwidth and within the associated AP’s BSS bandwidth?

Note: Discussed in several sessions and several submissions discuss similar concept, ref: [11-22/2204](https://mentor.ieee.org/802.11/dcn/22/11-22-2204-00-0uhr-dynamic-subband-operation.pptx), [11-23/2141](https://mentor.ieee.org/802.11/dcn/23/11-23-2141-00-00bn-further-discussion-on-dynamic-subband-operation.pptx), [11-23/843](https://mentor.ieee.org/802.11/dcn/23/11-23-0843-01-0uhr-considerations-on-dynamic-subchannel-operation.pptx), [11-23/1496](https://mentor.ieee.org/802.11/dcn/23/11-23-1496-00-0uhr-emlsr-dynamic-subband-operation.pptx), [11-23/1892](https://mentor.ieee.org/802.11/dcn/23/11-23-1892-00-00bn-thoughts-on-dynamic-subchannel-operation.pptx), [11-23/2027](https://mentor.ieee.org/802.11/dcn/23/11-23-2027-02-00bn-considerations-for-dso-sub-band-switch-delay.pptx), [11-24/591](https://mentor.ieee.org/802.11/dcn/24/11-24-0591-00-00bn-emlsr-secondary-channel-operation.pptx)

* + - Discussion

C: I am in favor of the straw poll. This is very generic for DSO. I think we need this feature for the UHR to be more spectrum efficient.

C: Currently, there are several ways to improve the usage of secondary channels. One is non-primary channel access here. This is dynamic subbband operation and also another way is both of APs and STAs switch out of the operation channel. I want more time to think about compare with each other.

* + - **SP result: Y-N-A = 139-67-44**
* Adjourned at 17:42 MDT.