IEEE P802.11  
Wireless LANs

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| TGbn January 2024 Meeting Minutes | | | | |
| Date: 2024-01-18 | | | | |
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Abstract

This document contains the minutes for the January 2024 IEEE 802.11 TGbn sessions.

Revision history:

* Rev0: First version of the document.

Abbreviations:

* C: Comment.
* A: Answer.

# January 15th, Monday, PM1 (13:30-15:30 EST)

* 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.
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  + Participation slide: <https://mentor.ieee.org/802-ec/dcn/16/ec-16-0180-05-00EC-ieee-802-participation-slide.pptx>
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    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 Patent And Procedures
* Agenda
  + The chair reviewed the agenda in [11/23-2174r4](https://mentor.ieee.org/802.11/dcn/23/11-23-2174-04-00bn-tgbn-jan-2024-meeting-agenda.pptx).
    - Summary of the November 2023 meeting and the teleconferences from there
    - Approval of the minutes
    - TGbn ad-hoc chair election
    - Presentation of submissions
    - Goals for March 2024 session
    - Future teleconference plans
  + Discussions:
    - The SP from Jay was postponed.
    - Two TDMA contributions were added ([23/1895](https://mentor.ieee.org/802.11/documents?is_dcn=1895&is_group=00bn&is_year=2023) and [23/1912](https://mentor.ieee.org/802.11/documents?is_dcn=1912&is_group=00bn&is_year=2023)).
    - To add 23/2212 to the presentation list in this session was proposed.
    - Chair confirmed the topic change and Xiangxin agreed to changed it to C-TDMA and added [23/2212](https://mentor.ieee.org/802.11/documents?is_dcn=2212&is_group=00bn&is_year=2023).

Modified agenda approved with unanimous consent

* Summary from November 2023 meeting
  + TG motions: Approve TG minutes from the November 2023 meeting

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

November plenary: <https://mentor.ieee.org/802.11/dcn/23/11-23-2075-02-00bn-tgbn-november-2023-meeting-minutes.docx>

Teleconferences Nov-Dec: <https://mentor.ieee.org/802.11/dcn/23/11-23-2204-03-00bn-tgbn-november-december-2023-teleconference-minutes.docx>

Move: Yusuke Asai Second: Yanchun Li

* + - Discussion: None

Result: Approved with unanimous consent

* Call for ad-hoc chairs
  + Chair announced final call for TGbn ad-hoc chairs nominations.
    - PHY ad-hoc chairs candidates:

Dongguk Lim, Sigurd Schelstraete, Tianyu Wu

* + - MAC ad-hoc chairs candidates:

Xiaofei Wang, Srinivas Kandala, Jeongki Kim

* + There was no more nomination for ad-hoc chairs.
  + Chair closed the nomination.
  + The election was scheduled on Monday PM2 session.
* Technical submissions
  + [11-23/1887r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1887-01-00bn-coordinated-medium-access-for-multi-ap-deployments.pptx): Coordinated Medium Access for Multi-AP Deployments  
    Giovanni Chisci (Qualcomm)

C: In the slide 4, can the BSS2 utilize the C-rTWT SP set by the NAV?

A: The BSS2 will not respect there are no mechanism in place right now, in order for AP2 to acknowledge that RTWT to the AP1.The idea is that AP2 will rather receive these C-rTWT information from the AP1.

C: I understand that the BSS2 waits to transmit during C-rTWT. Is it right?

A: This goes in bucket of next steps. An idea is that we're not really preventing anyone from BSS to transmit during this service period. We're just trying to give some advantage to BSS1 on the service period. In the next steps, we can require that the AP2 avoid to some EDCA parameters that are coordinated by the one for the service period.

C: In the slide 6, you have two solutions for TSF. Is this only needed for Level 2, the TSF synchronization, or also required for Level 1?

A: The Level 1 will be a kind of internal correction. It needs to make sure that its connected stations have the right interpretation. The PHY to property colonization of TSF or inclusive of an offset as additional information.

C: In the slide 8, is that with Level 1 or 2?

A: I believe it has been simulated with Level 2.

C: About two Levels of coordination, the purpose is to stop other BSS STAs to conflict with the C-rTWT transmission. I think in number one, if we only know that AP2 it seems no much use. Which Level do you prefer?

A: Level 2 is clearly a little more aggressive. I think it depends on the deployment but Level 2 is good.

C: In simulation results, we compare the left and the right figure. The left figure is the cases of shorter and the higher priorities and the right one is CBR traffic which is a lower priority. Why the left figure shows quite a long delay in the baselines and the right one is only 20 microseconds in the baselines?

A: They have EDCA parameter as in the slide 7. One concept is that transmission for VR can be quite expensive.

C: In the slide 4, I am afraid if we are going to make all the APs kind of stopping their transmission for a r-TWT or kind of going against spatial reuse. Because the examples here showing that TXOP for STA 1 and AP 2 are actually possible to have at the same time. Why is not those restricted TWT to be used to a spatial user matches the channel at the same time?

A: I think there is no practical solution for the problems to solve UHR. Spatial reuse is one to these kinds of coordination for RTWT is another tool they should be used, not necessarily in a standalone fashion, they could be used together. We should have a good framework to decide what tool to use, and which to refuse to use.

C: I'm just concerned about using this might affect the medium efficiency because we stop the whole transmission from one r-TWT. Still, in the slides 6 and 7, it's just very hard for me to understand the reason for the super high latency for that figure on the left and the massive game that you get 300 millisecond was AC\_VO competing was full buffer AC\_BE.

A: Basically, the STAs all use AC\_BE parameters when I'm checking the effect.

C: In the slide 9, what do you mean by your coordinated EDCA? EDCA is just parameters of MAC services sessions used in BSS 1.

A: Basically, we mentioned that during the coordinated service period from AP1, how the coordinated AP2 is connected stations in Level two, they can still contend. But maybe they content according to a special set of parameters that have been coordinated by everyone. That provides further advantage to everyone by means of anyone proposing some EDCA parameters to the other stations willing to respect is coordination be met and provide some advantage by itself, etc.

C: I was wondering why AP1 will provide the parameters because I think maybe AP2 we know what can add a new AIFS and didn't deliver video access for each station and would add to a further session for BSS 2.

* + [11-23/1973r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1973-01-00bn-discussion-on-uhr-enhanced-channel-access.pptx): Discussion on UHR enhanced channel access Yanchun Li (Huawei)

C: We need to be careful in addressing some of these things. There are already a lot of legacy tools. Also, I think the fairness is something that people would care between the client and the AP. We need to see what's the right balance.

A: The legacy version, we have some tools to, to give AP more channel access opportunities, but always a station has some ways to not obey to those schemes. Actually, AP has more knowledge about the QoS requirement of all associated stations. What we need to do in current version is we need to not have AP, to give something to some kind of promise or something. A station can truly understand if I cooperate with you, I obey your instructions, then I can get more benefits. That is the concept.

C: Do you say UHR needs to provide some new mechanisms for the AP’s channel access?

A: Currently, it is a general thinking, we can have a long discussion on detail.

C: In general, we do have a lot of complex issues. We have many different reasons why not to follow, for instance, BTM requests, why to operate on the EDCA mode. I wouldn't be starting to limit those operational flexibilities. In addition, we also have a lot of legacy devices. We should enable those operational modes also inside of UHR and kind of give flexibility for spaces to operate as they wish. If we have our good design that clearly performs well, then we can take over to coordination working well. But in many cases, it's not so straightforward.

A: I agree with you that we also need to take care of fairness of legacy stations experience. What I think is a we need a win-win situation but we can have more discussion.

C: We want to attach latency and reliability to those things, right? If the logic is going to be we're going to make it work in scenarios where all the APs around are coordinating and all the STAs around, are following the rule we're defining. First of all, we need to account for all those cases and we want to see management in those as well. So, let's not consider only the cases of fully coordinated. Let's take a step back a little bit and then analyze and see how we can solve the problems here.

A: Here is not absolutely to lead AP to control all the details. In this group, we have a lot of people here to dig deep to tell developers some new gains before we put our efforts. If we don't have an opportunity to really use those games, then the game will vanish. It's just to try to push the balance a little bit to really make those new schemes to make real gain.

C: I see a lot of comments about compatibility with legacy devices for your proposal and others. Have you ever done a comparison of how spatial reuse will stand up compared to modifying the 11ax? Basically, especially with something like this patient can do independently and every BSS can do independently and can be compatible with the legacy existing mechanism without giving up the opportunities. Do you have any thoughts on that?

A: If you mean about this spatial reuse, we actually are in need of a head. We have defined some improvement to if the AP1’s interference to the AP2 is not so strong, then maybe the AP2 can have spatial reuse. But the problem is it can only support partial reuse. So, actually, we continue to make more concurrent the transmission opportunity.

C: Basically, any wave for transmitting, you have to check the media per station as to see if the medium is free or not. Even if we use like, lowered MU EDCA kind of parameters, but still, there was chances of collisions.

C: Are you proposing this for CSR, CTF and the joint transmission listed in the first slide, or is it more general for all the multi-AP solutions? If we look at the proposals on the table, at least for C-TDMA, in the proposals, our table will work for legacy devices as well. If we want some control to the devices, then they have to be UHR STAs, which really means that the if your proposal in the General for all of the multi-AP solutions, it will exclude the legacy devices. So that's why I want to clarify the scope.

A: I think it really depends on the situations. If I have a low latency, high level transmission needed to transmit buffer, there are some legacy stations keep interrupting me, that prevents me from accessing channel. I needed to do some analysis tools to stop such a legacy user. For example, I can transmit some CTS. But if you can follow some good rules, certain I can ask him to we can have a winning situation. If the legacy station just to have some best effort traffic, we can still remove some percentage of time for these best effort transmissions but it cannot be effective at least some voice or some low latency VR or gaming streaming traffic.

**Straw Poll:**

Do you agree that UHR needs to provide AP more channel access opportunities and management for multi-AP coordinated transmissions to meet reliability goal?

* + - Discussion:

C: If I vote yes, then does it mean that an AP gets more time and access opportunities compared to current state?

A: It’s just to see people’s preference.

C: I'm just wondering, do we need to run this right now right here because at least this is very unclear. I would at least like to have more discussion.

C: My view is like this straw poll itself is very broad, very high level.

**Result: 77/78/58 = Yes / No / Abstain**

* + - Chair announced if you cannot vote on motion or SP, please let me know BEFORE closing the voting.
  + [11-23/2186r1](https://mentor.ieee.org/802.11/dcn/23/11-23-2186-01-00bn-map-coordination-for-dfs-channel.pptx): MAP coordination for DFS operating channel Jay Yang (ZTE)

Q: My understanding is that only AP take a role of DFS function in some regulatory rules. How do you consider that point?

A: I’ll check the regulatory rules.

C: If you claim that you can operate in DFS channels, the test and that you have to do regulatory testing, the device that is submitted has to prove right that he can actually pass the test or DFS detection. What you're proposing here is another device that does not have DFS detection. So, that device will not pass regulatory certification to operate in DFS channels. What you're proposing here would require going to regulators and changing the regulatory, that will take time.

A: Thank you for your comment.

C: I understand that each image in Wi-Fi Alliance already have similar future as a coordinated association. So why do we need to define this function?

A: This one is not just for each dimension. This is our general solution. If you get the mesh or the IP belong to the same BSS the IP and data are belonged to the same ESS, or the APs that don't have the backhaul connection.

C: We have a massive lobbying effort with FCC regulators, which is going to be hard. And because the AP is what the AP being authorized and the AP sensing aren't treated replaces, with uncontrollable. Regulators will not be very sympathetic. The rules are the way they are today, for good reason.

A: Thank you.

C: What is the relation between the AP1 to AP2 here? Are the collocated or client?

A: Separated physical devices.

C: What is the incentive for the AP2 to provide the DFS information for the AP1?

A: The procedure is based on an agreement.

C: Can the AP2 scan DFS channel prior to the DFS channel scan request?

A: It depends on the AP2’s behavior.

* + [11-23/1895r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1895-02-00bn-c-tdma-frame-sequence.pptx): Coordinated TDMA (C-TDMA) Follow-up

Abhishek Patil (Qualcomm)

(The question queue was postponed to the PM2 session due to lack of time.)

* Recessed at 15:30.

# January 15th, Monday, PM2 (16:00-18:00 EST)

* The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order.
* Yusuke Asai (NTT) is serving as the Secretary.
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  + 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.

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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 Patent And Procedures
* Agenda
  + The chair reviewed the agenda in [11/23-2174r5](https://mentor.ieee.org/802.11/dcn/23/11-23-2174-05-00bn-tgbn-jan-2024-meeting-agenda.pptx).
  + Discussions: No

Modified agenda approved with unanimous consent

* Ad-hoc Chair election

Motion:

**Move to confirm**

**PHY ad-hoc chairs: Dongguk Lim, Sigurd Schelstraete, Tianyu Wu**

**MAC ad-hoc chairs: Xiaofei Wang, Srinivas Kandala, Jeongki Kim**

Move: Sean Coffey Second: Abhishek Patri

* + Discussion: None

Result: Approved by acclamation

* Presentation of submissions
  + [11-23/1895r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1895-02-00bn-c-tdma-frame-sequence.pptx): Coordinated TDMA (C-TDMA) Follow-up Abhishek Patil (Qualcomm)

(The question queue was resumed from the PM1 session.)

A: The first commentor’s question was “Why CTS can’t be a wide broadcast frame?” The answer basically goes for efficiency purposes. In MU-RTS scheme, we can transmit with a single frame. It’s more efficient to consolidate multiple operations into one frame. Legacy stations can respond to CTS and informing other APs.

C: Very interesting idea. In CTS transmission, currently, every STA will respond to CTS and be responsible as the primary 20 MHz channel. In this case, there is no way to distinguish who is responding with CTS. Do you expect to change this rule?

A: The first station responds with CTS.

C: In your proposal, it is important that the AP1 and the AP2 are ready. Do you think there will be some change for this mechanism as transmission?

A: Basically, what you're saying is possible that during this period, the AP2 did not respond with a CTS and everyone has no way to know. So, what will happen is at this point, the AP1 sends a notation frame, it will not get a response from the AP2 knows that the TXOP scheduling is not ready or not available to take the TXOP. The AP1 then has the option to either continue serving its BSS, or truncate this period by the CF-end frame. I haven't shown all the corner cases here, but that's the likely possibility. And so, with this AP1 will just simply either continue serving in cases or truncate the TXOP. Since you brought up the question, I just want to highlight that again, there is a benefit to going with a single AP because when you go with multiple AP sharing, you could run into that issue here, you have that TXOP allocation frame, and more than one AP response with the CTS. And the AP1 doesn't know really to respond or not, because it will see a response for maybe three and anywhere else. That is another benefit.

C: I regard the protection as asking about the station. For example, a station also that are associated with the AP1 and it is hidden from the AP2. In this case, while the station is transmitting something, and the AP2 know it is OK to transmit a frame and the AP1 cannot receive most of them.

A: At TXOP allocation frame, the TA is set to be the one to the RA of the AP2. So, what that sets the intra BSS NAV for the AP1 and the AP 2 stations. So those stations are waiting the AP1 stations, they will not be accessing the medium, they think that some AP1 is serving some other BSS stations. So, they are holding off and they will not be accessing the medium at that time. Legacy stations from the AP1 will also be waiting because they see that if you want to serve in some station, and then now the set up to certain point, it's just like baseline behavior. You have the CTS RTS frame that says the now and nobody access the medium, so that the scenario you mentioned will not happen after the CF-end frame. Everyone can now go service HT stations and beyond. Because they are in trouble the NAV set.

C: Do you now consider only for UHR stations?

A: Not just for UHR.

C: I think that it's possible that in this picture that frame exchange between the AP2 and that STAs can be occupied narrow bandwidth from the location of the AP1. So, what happens if this happened?

A: Even if it's using narrow bandwidth, the primary 20 s still occupied right or in use. We are not proposing multi-primary and all of that we are keeping it simple.

C: If the frame exchanges between the AP2 and its STAs you eligible to arrange OFDMA. Some STAs did not respond to the trigger frame from the AP2, so, to upper transmission frames.

A: What you said is like a baseline behavior. When I send a trigger frame soliciting from five stations and only two of them responded, I use up to two stations. There is no difference from baseline. So, I don’t see any issue.

C: I agree to the general direction. I think there is going to prevent a hidden states or interference. The duration field of the schedule announcement is set to the time until the MU-RTS frame

A: I didn’t go into all the corner cases but that’s possible. That is baseline.

C: This is a good mechanism. But I think STAs that belong to the AP2 are affected by the AP1.

A: Are you refereeing the schedule announcement frame or the allocation frame?

C: I am referring the CTS frame.

A: In both cases, you are sending a CTS frame.

(Chair terminated the QA session due to lack of time and asked 11 members in the queue to continue offline discussion.)

* + [11-23/1912r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1912-01-00bn-coordinated-tdma-procedure.pptx): Coordinated TDMA Procedure Geonhwan Kim (LG Electronics)

C: In the slide 9, the multi-AP selection is trying to decide which AP should be shared. Is it within the TXOP or a long-term thing?

A: Basically, the multi-AP selection is done within the TXOP.

C: Are you saying there will be additional frame exchanges within the TXOP to decide which one to go with?

A: There will be some negotiation procedures and the multi-AP selection procedure. Some information can be obtained during the negotiation procedure. The sharing AP sends the selected request to the shared APs.

C: Do you mean APs can hear each other or not?

A: A piece of APs can hear each other. Someone cannot hear each other, where we can consider.

C: If two APs cannot hear each other, how do you set it into the multi-AP coordination?

A: We can talk to you offline.

C: The lifecycle of the sharing AP is one specific TXOP, right?

A: Right.

C: In the slide 8, what is your thought on when determine the sharing and the shared APs?

A: Is your question when the selection procedure occurs on the sharing AP?

C: I understand the sharing AP allocate duration on the TXOP according to the condition of the shared AP.

(Chair asked whether the SP is run or not. The presenter deferred it because there needed some more discussion.)

* [11-23/2212r1](https://mentor.ieee.org/802.11/dcn/23/11-23-2212-01-00bn-r-twt-protection-in-11bn.pptx): R-TWT protection in 11bn Xiangxin Gu (Spreadtrum)

C: I think it’s going to be important. In the slide 4, the first two bullets, it looked like STA and an APs from OBSS cannot transmit at all during the OBSS RTWT. So, I was wondering if that’s the intention.

A: I think I just explained that my figure showed here the only RTWT TXOP for the AP2 can exchange frames with its associated STA1. I also propose to add RCPI of beacon frames by the OBSS APs in the muliti-AP coordination signaling during the RCPI may be benefit for the spatial reuse.

C: That makes sense. Multi-AP transmission from the AP1 to the STA1 may going to damage the RTWT. The rules which you want can transmit or not transmit during the RTWT is needed to be further discussed and investigated. There is another question. It sounds like the AP1 is getting information on the activity of the AP2 from a station (for example, STA11). Is that the correct understanding?

A: Yes. In this figure, the OBSS RTWT is operated by the AP2. The STA11 informs to the AP1. Actually, the AP1 cannot get the information by its own because it’s out of coverage of the AP2.

C: In the slide 3, assuming enterprise deployments, the AP’s reception ranges generally much farther than the clients associated with the AP. And typically, if clients locate at a little bit far away, there are other AP’s channels. So, the scenario here seems a little bit artificial. Do we agree that with the APs can hear other APs that we don't need the straight relay function?

A: I think usually the AP acts as startup. The AP selects channel that trying to avoid collision with the other edges along the way, too. So. So I think this is commonly viewed as the scenarios and the mechanism is needed.

C: The other issue is that many (50 or 100 or 200) clients associated with an AP, the AP must stop reporting them. That doesn’t seem very scalable.

A: Thank you. Let’s have offline discussion.

C: In the slide 3, why overlap the TXOP shouldn’t be, it should be avoided. You mentioned about EDCA restrictions. I think we discussed all of this within the BSS for some set of rules. Multi-AP coordination is majorly a way to end it itself before the service period. You let the probabilities happen.

A: I think around 11be we discussed more about the alignment of RTWT SP that in the AP affiliated with MLD. In this slide, because RTWT SP is used for low latency traffic in this BSS, as well to avoid the time with the OBSS RTWT SP. That's my will.

C: I echo the previous commenter. If the AP has a lot of stations and I'm in an area where an apartment complex or something and here is a lot of OBSSs around me, things might go out of hand. Blocking or restricting will be assessed where the APs can see each other.

A: The AP1 just listens to the STA12 during the RTWT TXOP of the AP2.

* [11-23/1898r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1898-01-00bn-signaling-details-for-non-colocated-ap-mld.pptx): Signaling Details for Non-collocated AP MLD

Guogang Huang (Huawei)

C: Just to clarify, for the roaming operations, you only get the AP information before you start roaming. Is that the case?

A: I think that because for the non-collocated AM MLD, the current AP MLD and the target AP MLD affiliated with the non-AP STA, to forward the signal to the non-AP MLD. In that case, we are going to allow the UHR AP MLD can probe target AP MLD directly through the current AP MLD.

C: I see. That's natural, though we also need to cooperate some coordinated APs and multi-AP operations. In that case, it may be beneficial to share that information. Technically we have a set of AP MLDs affiliated with the non-collocated AP MLD. That is a kind of ID setup for the multi-AP coordination cases and as well. I think it may be beneficial to share the APs affiliate with other non-collocated AP MLD.

A: OK. Thank you.

C: In the slide 3, I think that architecture leads to quite a bit of complexity on the backhaul. Because this new entity splits the data path on this non-collocated AP MLD. And then lower MAC on the individual AP MLD and anytime we're splitting the data path, there is a lot of coordination which needs to happen. That is a concern from an architecture point of view.

The other comment is that AID assignment should be a part of the basic ML element but I am not clear on that.

A: For the non-collocated AP MLD, there are many UHR AP MLD and non-collocated AP MLD. In that case, the ID space is limited. So, for the UHR AP MLD and the target AP MLD, new AID should not be assigned.

C: There are a lot of contributions on this topic. Every contribution is using a different name for this logical entity that's sitting above the AP MLD. That's awkward. In the slide 4, obviously, option 1 makes sense. And it would work on option 2, this is the APMLD ID. And it would work on option two, this is the APMLD ID, as you say that is assigned by the APMLD. This would mean that you're not using the same ID for the same AP MLD universally is only going to be using that ID if you're specifically communicating with another AP. Is that correct?

A: Year, you just should not be passed from the corresponding AP MLD that is customer ID because it's assigned by the AP MLD.

C: Could there be an option on this ID is assigned by the logical entity above?

A: No. Currently the AP MLD ID is assigned by the AP’s MAC.

C: What s you preferred option?

A: Option 1.

C: How could you get the non-coordinated AP MAC address in the first place when you're discovering?

A: In the slide 4, I explained how to get the non-collocated AP MLD to get MAC address. We need to add new field for the non-collocated AP MLD’s MAC address.

C: You prefer option 1 but I have a concern whether it would cause too much overhead.

A: I have extended the APM ID MAC address is always present in a basic upon any time. If you defined a new ID, the field also included an AP MLD MAC address. That will increase overhead.

C: For the multi-link element flexible enough to define a new variant, why do you want to extend basic modeling? My suggestion is to define a new variant of Milit-Link element. That variant you can incorporate or include any others roaming information as well. Otherwise, you're just utilizing this running out of presence indicators.

A: Currently, we added common info field to address the compatibility issue. I think we can follow the current baseline.

C: There will be scenarios where you want to advertise something information without confusing legacy, this approach will run into that issue. So, suggestion is just consider using a separate field.

A: OK.

C: In the slide 3, is the non-collocated AP MLD more of a logical entity?

A: Yes.

C: From a data flow standpoint, basically I assumed that the data comes directly to what you call as the MLD common MAC. Is it right?

A: I think so.

C: Are the two associations and the roaming different?

A: They are different.

C: Generally, I agree that it is the direction roaming in that perspective and we use whatever configuration. You are expecting to the carry the different payload of the different MAC addresses. In the slide 4, for the option 1, the AP MLD remember the MAC address of the non-AP MLD. Are you expecting to carry the MAC address? How can station know it?

A: It is based on another mechanism. This should include the AP MLD monitoring the corresponding AP MLD MAC address.

* + [11-23/1930r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1930-01-00bn-a-non-collocated-ap-mld-framework-further-discussion.pptx): Non-collocated AP MLD framework further discussion Jay Yang (ZTE)

(The question queue was postponed to the Thursday AM2 session due to lack of time.)

* Recessed at 18:00.

# January 16th, Tuesday, AM1 (08:00-10:00 EST)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0156-00-00bn-minutes-for-tgbn-phy-ad-hoc-in-jan-2024-interim.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0136-02-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-january-2024-interim.docx>

# January 16th, Tuesday, PM1 (13:30-15:30 EST)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0156-00-00bn-minutes-for-tgbn-phy-ad-hoc-in-jan-2024-interim.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0136-02-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-january-2024-interim.docx>

# January 17th, Wednesday, AM1 (08:00-10:00 EST)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0156-00-00bn-minutes-for-tgbn-phy-ad-hoc-in-jan-2024-interim.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0136-02-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-january-2024-interim.docx>

# January 17th, Wednesday, AM2 (10:30-12:30 EST)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0156-00-00bn-minutes-for-tgbn-phy-ad-hoc-in-jan-2024-interim.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0136-02-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-january-2024-interim.docx>

# January 18th, Thursday, AM1 (08:00-10:00 EST)

* Split PHY and MAC sessions.
  + PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0156-00-00bn-minutes-for-tgbn-phy-ad-hoc-in-jan-2024-interim.docx>
  + MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0136-02-00bn-minutes-for-tgbn-mac-ad-hoc-sessions-in-january-2024-interim.docx>

# January 18th, Thursday, AM2 (10:30-12:30 EST)

* 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 Patent And Procedures
* Agenda
  + The chair reviewed the agenda in [11/23-2174r9](https://mentor.ieee.org/802.11/dcn/23/11-23-2174-09-00bn-tgbn-jan-2024-meeting-agenda.pptx)
    - Discussion: No.

Modified agenda approved with unanimous consent

* Presentation of submissions
  + [11-23/1930r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1930-01-00bn-a-non-collocated-ap-mld-framework-further-discussion.pptx): Non-collocated AP MLD framework further discussion Jay Yang (ZTE)

(The Q+A session was resumed from the Monday PM2 session.)

(There was no Q+A)

**Straw Poll:**

Do you agree 11bn group should define a non-collocated AP MLD framework?

* + - Discussion

C: What does it mean by a “non-collocated AP MLD framework?”

A: This is general concept. An AP MLD may be not in the same place but belong to an UHR AP MLD.

C: I would like to see some clarification.

C: Usually you define something for purpose, but what is missing is that? I am not sure. There is a problem about clarification. What is the purpose of this SP?

A: This is just a general SP.

C: When you say non-collocated AP MLD framework, is there architectural implications here? What does this mean that there is a particular architecture?

A: In my mind, this is a high-level SP It has no further details to the architecture framework. I just want to a kind of reaching some consensus with the SP.

C: I understand but if it is so high level that it can actually cover basically communicates architecture independent. We should define a framework for mobility.

**(The presenter deferred the SP.)**

* + [11-23/2029r](https://mentor.ieee.org/802.11/dcn/23/11-23-1914-00-00bn-enhanced-security-considerations-in-uhr.pptx)2: Overview of Enterprise Policy and Goals Brian Hart (Cisco Systems)

(The submission was presented in the last November meeting. The SP text has changed.)

**Straw Poll:**

Do you support a mode of operation where wireless medium resources are efficiently used to meet the QoS requirements of certain entities (defined as a function of user, application, flow, device type, STA's capabilities, etc.)

* + - Discussion:

C: I understand it is a high-level message. If we vote yes, what does that really mean?

A: This is not a change to the SFD, but this gives a direction for the topologies available.

C: One concern that I have is, even in the discussion, the seamless roaming, there were agencies towards making certain things mandatory for all for everyone. Let's take care of certain entities that are critical. And other comments needs are kind of getting every time struggling to create a case. That is also an important market segment that needs to be addressed.

A: IoT devices often convey critical information. If a device is critical to the enterprise, they will make sure it gets the resources that needs to fulfill its function. What we're trying to see is here is that we can protect that one number one packet, and still make all the other resources efficiently.

C: The QoS management is a very important topic. And we have a very good tools at the moment for the QoS management for instance, some signaling are the key features for the QoS managing. So, to me, it would make more sense to kind of vote on more concrete protocols to apply the existing framework as much as possible.

A: We do have controls that are strong enough to be triggered access, RTWT by which the AP has a much greater chance of achieving that level of quality of service. But at the same time, of course, RTWT is optional feature and it's optional because it doesn't really meet your needs. We need to revisit that and find something that does meet your needs.

C: I think the best thing seems that we have a lot of customers.

C: I'm not sure whether I supplied device coordination that I need to provide to allow this information to enable this differentiated freedom assess between different type of device. I see what you are trying to achieve, but I cannot see good guidance.

C: At the last sentence there is “wireless medium resources are efficiently used”? What are your thoughts?

A: What are we trying to say here is, as long as we can offer the rest of that 6 GHz devices to everybody help everyone's quality of service, as long as we can guarantee protect that critical service.

C: The second part of this sentence sort of stuffs pointing towards something on which we probably need more discussion. I propose to removes all the parentheses at the end of the sentence, which would be still capturing a high-level goal.

C: For my clarification, could you please explain the meaning of multiple mode of operation? I could read this in a way that it seemed to me that let's say an ESS or a BSS to the use of reserved a lot of resources and many devices of other ESS are operating on the same medium with whatever is left for example.

C: “Mode of operation” is a term we use quite often just when we're trying to think of it as a feature or protocol.

A: All right, thank you.

C: What do you think we're here to define anything that's not interested in?

A: When we go to the real world, there's real applications with real requirements, that reserve probably over reserve resources. The purpose of the straw poll is to try to create some realism in our decision making. If there's a lot of resources out there, we should try to make sure everyone gets access to those resources, which then in turn requires certain behaviors and the protocols.

C: I don't know what the straw poll would really accomplish if we don't know what certain entities.

A: The entity is a user application.

**Result: 84/78/59 = Yes / No / Abstain**

* + [11-23/1916r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1929-00-00bn-peer-to-peer-p2p-resource-management.pptx): R-TWT Coordination in Multi-BSS SunHee Baek (LG Electronics)

C: In your proposal, if multiple APs more than three want to participate in coordinated RTWT, that AP1 executes a handshake, the coordination request and response individual, I understand.

A: In this contribution, I have assumed two APs but more than two APs are possible. The negotiation can be operated between two APs.

C: How many APs do you assume?

A: I assume negotiation is operated between two APs.

C: I understand in some schemes you need the APs to negotiate each other. The AP is a UHR AP. Do you require that non-AP STA is to be a UHR STA or backward support for EHT or before?

A: If the two APs support the AP coordination scheme, then you can user overlapping RTWT.

C: It’s kind of debatable matter we need STAs to have UHR compatibility to support each RTWT coordinated transmission.

A: The station of the UHR AP during the RTWT coordination would be support a particular AP coordination scheme.

C: OK.

C: I'm a little bit confused about the overlap and coordinated RTWT. Do you mean that RTWT is used for APs to transmit traffic to each other like backhaul or they still can trigger their own stations for uplink traffic? What is the motivation of multi-APs colliding with each other on restricted duty?

A: The motivation is that the non-overlapping RTWT becomes one but non-overlapping one can be reduced with the protection.

C: In assumption that they can grab the channel right after each other is not that valid because we only protect on the beginning of the restricted TWT. So, the restricted TWT only protection at the beginning of the TXOP so one of the APs with cracked TWT, after that, there is no protection at all for a second AP. So, still I wouldn't see a valuable of overlap RTWT.

A: As I mentioned that non-overlapping one station and AP could not to access during RTWT scheduled by the neighboring AP.

C: Do you see any fundamental difference between overlap coordinated RTWT and non-overlapping ones from a protocol standpoint?

A: I figured out the coordinate RTWT as the non-overlap coordinated RTWT. The announcements can be found and the EDCA parameters that are coordinated ones. The coordinated EDCA parameters can be used during the overlapped coordinated RTWT.

C: I think that from a station side perspective, we should also think about defining the changes compared with the 11be the operation that we defined the RTWT and I think a lot of this from the station side can be kind of similar and most of the like coordination operation and how to coordinate we can access within the SP will be at the AP side. So, this will also make it much more scalable. For example, commenting on one of the points raised about stations may check for SPs in the in the other one scheduled in the other BSS.

A: In overlapping coordinated RTWT case, the station does not know that the RTWT scheduling is cognitive or overlap one and depending on the non-overlap coordinated RTWT case, depending on how the AP casts the information. I think the base operation is almost the same.

C: If you have multiple OBSS RTWT shared the information and then in that case, the most station will defer the channel access and then the access contention will happen at the same time.

C: In the slide 8, if multiple RTWT schedules exist, how do we determine which RTWT schedule should be initiated first? I understand that these kinds of things can be done at the negotiation phase, but could you please explain that?

A: As you know, the RTWTs are scheduled by the different APs. If the first RTWT is scheduled by the AP1, then the AP1 and stations can access the first RTWT. But they could not access the second one.

* + [11-23/1932r](https://mentor.ieee.org/802.11/dcn/23/11-23-1929-00-00bn-peer-to-peer-p2p-resource-management.pptx)0: P2P Resource Management

Rubayet Shafin (Samsung Research America)

C: In the slide 9, you're suggesting that in this case, the RTWT essentially adds a signaling to convey a sense of information and not necessarily follow the operation.

A: I did not say that there is no function. I say the function can be based on that agreement. If it is an RTWT coordination, then this is definitely distinct function that is agreed between the APs. I agree that there is a distinct function, but whatever my point is, this function can also be different based on what other forms of TWT coordination. For example, if you're using TWT as timing guidelines, so how do we now define the RTWT rules on top of that? So, the function will depend on how the TWT is periodic.

C: I understand that this coordinated TWT many AP can request to other APs “How about to coordinated TWT.” In this case, they are maybe a lot of sharing APs and same AP groups. According to the TGbe decision, sharing AP is already one AP is dimension sharing AP is already one AP, obtaining TXOP. I agree that multi-AP coordination function commonly used for P2P is important. But I think it doesn’t need to harmonize across TXOP coordination.

C: In the slide 4, you're talking about four types of coordinated RTWT. The difference is to care for the AP before the start off the RTWT more likely than action based. In other contributors, some people also consider some calculation for special reuse coordinated OFDMA. So, are we also open to certain kind of level of contribution?

A: Correct, of course. It can be a tool to pair with other forms of mechanism, like a CSR or CTWT.

C: I see lots of really good information. Regarding the straw poll, I see what's good stuff and then you said call it the sort of network coordination TWT. APs are waking up, that one fit particular name just doesn't seem like the best thing. I think we need a different name.

C: Are those levels defined in 11be?

A: No. Just type one is defined. Just for completeness, the type one is not this kind of behavior is not there, because it's also putting this transmission in this process.

* + [11-23/1952r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1942-00-00bn-inter-ppdu-low-power-listening-scheme.pptx): Coordinated R-TWT for Multi-AP scenarios - Follow up

Liuming Lu (OPPO)

(The question queue was postponed to the Thursday AM2 session due to lack of time.)

* Recessed at 12:30.

# Thursday, PM2 (16:00-18:00 EST)

* 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.

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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 Patent And Procedures
* Agenda
  + The chair reviewed the agenda in [11/23-2174r9](https://mentor.ieee.org/802.11/dcn/23/11-23-2174-09-00bn-tgbn-jan-2024-meeting-agenda.pptx).
    - Chair announced the Q&A session for Liuming ([11-23/1952r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1952-02-00bn-coordinated-r-twt-for-multi-ap-scenarios-follow-up.pptx)) was deferred because it was late in the presenter’s time zone. The Q&A session continued the conference calls after this meeting.
    - Discussions: None

Modified agenda approved with unanimous consent

* Technical submissions
  + [11-23/1962r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1962-01-00bn-gain-analysis-for-coordinated-ap-transmissions.pptx): Gain analysis for coordinated AP transmissions

Abhishek Patil (Qualcomm)

C: In the slide 4, the 1st bullet says there are four APs and there are basically two STAs going through an AP, one DL and one UL. What are the access categories in both of those? Because short packets I am assuming, like video or voice.

A: That’s true. But in here, access categories are best efforts because access category information is vanished out when packets travel backhaul, typically.

C: What did you set the TXOP duration.

A: The TXOP duration is 4 ms, maximum.

C: In the slide 5, regarding the AP TX gains. is that to gain that you see both through and then you have average, across those four? Is this an additive value?

A: As for the low latency traffic, compared to baseline. We think of it as a CDF across all six BSSs. And we have the statistics and this has been identified.

C: Have you compared the simulation results with those of uplink case?

A: We have some statistics and results for uplink case. I do not have the slides but I can share it with you offline.

C: I'm not sure how the uplink is considered to be these simulations.

A: Uplink is full-buffer. Maybe they have given two specific examples in the C-TDMA. One example is that it determines that the AP3 has traffic after the AP1 has done with its downlink, it will pass some TXOP to the AP3 and the AP3 gets downlink, and the TXOP ends, for any other stations the medium is open for contention. It would be one of this case one the medium it shared the TXOP. There is only one device that had low latency traffic, it will give it and also the TXOP is passed only to the nearest node.

The other example is that the C-RTWT case. When the AP owns the TXOP, it does its downlink if it has any downlink traffic and then the medium is free, others can contend and get the medium. So, the uplink is in that sense not restricted to the uplink devices to get a chance to contend and transmit.

C: OK. So, the impact of this full buffer uplink is that all the non-AP STAs are always contending for the video. That is the intention by using AC\_BE.

C: If we change the generation pattern from the Poisson arrival, for example, to on off and investigate also other arrival rate, I believe the results may be different. So, it will be useful if you can investigate this issue like to this same comparison for other regeneration rate and the traffic generation.

A: We've tried to emulate a periodic traffic because if you have a periodic traffic, you have means like to do something because we have a very nice periodicity. What we wanted to show was a low latency high priority traffic.

C: In your simulation, you only show the latency. That is important, but we need see the throughput performance.

A: Yes, we have that and I can share it with you offline.

C: In this scheme, you assume the service period allocation like C-RTWT or RTWT plus C-TDMA. How are the stations with the uplink traffic aware of the service period? How is this distributed or allocated?

A: In the RTWT, the owner or the service period, owner AP has prioritized to access medium, how we do it is not the details power disseminators not important. But essentially, the AP that owns the service period at the beginning of the service period, if it has traffic with the prioritized access, it jumps into the medium and transmits whatever it has after that the medium is shared with anyone with access. So, to answer your questions to stations will get access to him after the he has completed transmission.

C: OK. In the slide 3, there is a green guy which is the upper left corner and yellow one in the right lower quadrant. How does the station S1 in the green BSS3 know about the schedule of the BSS4. At the beginning of SP, the AP keeps the priority over the stations in that particular BSS. But the stations in the other BSSs are not aware about that, so to speak. So, the AP has to compete with the stations as well. Is my understanding correct?

A: On this topology, all the stations can hear each other such that “6” and “1” in the slide 3 are just about the PD level of RSSI. So, corner nodes are able to hear each other. But then there are scenarios in baseline and pure C-TDMA, where they do get out of sync, once there is a collision, then they start getting out of sync. And then all those now issues and all that happened like basically in transmitting and going on, which causes two and five to suffer. In baseline and C-TDMA, the tail latencies are mostly impacted by the latencies of “2” and “5“, because they are kind of suffering when “1”, “6”, or “3”, four keep going, because they are out of sync. With the C-RTWT, what happens is there is a natural synchronization of a medium every so often, in this case, every 2ms. There's a natural synchronization on the medium.

(Chair asked the presenter to respond to the comments on the chat window.)

* + [11-23/2022r1](https://mentor.ieee.org/802.11/dcn/23/11-23-2022-01-00bn-r-twt-for-multi-ap-follow-up.pptx): R-TWT for Multi-AP Laurent Cariou (Intel)

C: Is there some assumption that stations would be supporting RTWT multi-AP coordination schemes?

A: Yes. for this to work, you need stations to support the multi-AP RTWT.

C: There is no restrictive TWT so for a lot of stations currently. That is not going to be restricted TWT for some time. I'm not sure if this is very relevant starting points.

A: I don't totally dispute your point here. We definitely need some all sorts of features in addition to that.

C: For the comparison between the schemes with only protection versus those with protection plus coordination. I'm just thinking from the complexity of two APs. What I'm afraid of is big SPs of multiple APs are serving a number of users and watching the channel for a period of time and then the legacy devices does not support restricted TWT are kind of locked.

A: If the opportunity was defined in a way that makes the APs more aggressive than RTWT STAs, your point of view is throughput. I think legacy STAs don’t distinguish the RTWT announce, so we’ll just go for it.

C: We're still going to have legacy we're going to still have 11be traffic and 11be devices does not support restricted TWT. So, we'll never going to get to have this like what are we have coordinated restricted TWT with coordinated AP or without coordinated AP, we're always going to have the problem of no full protection. If I added more APs in one SP, they're going to make this be longer, and this is going to make it much harder other devices to access the channel. If I make it smaller SPs, I'm comparing between five SP, each one is 2 ms versus one SP that is 10 milliseconds because I wanted to share them. I think we can schedule it in a smart way and kind of not have this complication of multiple AP sharing.

A: Yes, that can be analyzed.

C: Comparing option one versus option two, I think option two is a complication.

A: If we do define this group as some multi-AP coordination, you can combine them if you want to. When you design them properly, and looking at efficacy devices, when people look at all those aspects of a building and taking realistic scenarios. Currently, the RTWT relies on having a basis of station supporting it, otherwise, it's not working. If at some point you do reach a certain level of support that's going to happen is that's right.

C: You bring up an important issue. We've noticed this in our simulations as well if you use something like spatial reuse, two APs, two BSSs can go out of sync. For all of these coordination mechanisms, if you don't get the preamble, especially if you're outside the energy detection threshold, or if the primary channels are indifferent, the coordination doesn't work. Here is looking specifically at solving it using RTWT as long as two AP is implicitly coordinate to have like to end their transmissions at specific times without broadcasting something in their beacons for their states. That should potentially resolve the part of the issue but without having the overhead of broadcasting something in the beacon. Maybe they took quite elements to protect specific types. Is there something what would be able to do APs? Without broadcasting R-TWT element in the beacon, then they understand that they need to end their own transmissions at these specific intervals. That gives some level of confidence that both APs will do preamble detection and those specific times so that when one of them initiates the other is likely to detect the preamble and then to the sharing.

A: I think that's what we say that is our duty to could have some timing which it would end it takes off and then a contention period. And all of them would be in sync and able to detect each other.

C: The only difference is whether you include it in the beacons or not.

A: OK.

C: For different BSSs, each BSS starts at a different time point. So, I think it’s hard to expand the coordinating RTWT SP across OBSSs. I’m not sure it works.

A: If the coordinations are too complicated, or if there's too many stations, it's going to be very difficult to get harmonized to require too many resources. I used some of these can only work in very small type of setup for APs and a group of stations.

C: You mentioned that you won't use the RTWT also to enable the coordinated spatial reuse. I'm just wondering if that will force the transmission from given the BSS transmitted at same time.

A: We could potentially do it, if we do this. If we do that more on the service period, and you would do especially in that case, so they wouldn't be. So, we had an alignment of the transmission.

C: It mentions that it needs to be sure that we have the AP extends the protection of the RTWT schedule. I'm wondering whether it's going to have some extension in time, spatially, or bandwidth.

A: If an AP extend the protection of another AP, it doesn't simply mean that it's going to advertise RTWT, after the schedule is on beacon for its own stations. And the opportunity rules that apply to those stations within the service period. We've extended to the neighboring APs doing the same thing.

C: Is it spatial?

A: Yes.

* Straw Polls
  + [11-23/](https://mentor.ieee.org/802.11/dcn/23/11-23-1931-01-00bn-tgbn-proposed-timeline.pptx)1917r0: Coordinated Spatial Reuse Jinyoung Chun (LG Electronics)

**Straw Poll:**

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

* + - An UHR AP which obtains TXOP and initiates the Multi-AP coordination is the Sharing AP[NOTE].
    - An UHR AP which is coordinated for the Multi-AP transmission by the Sharing AP is the Shared AP[NOTE].

[NOTE] The names can be modified.

\* It’s from 11be SFD.

* + - Discussion

C: Do you have a clear definition of multi-AP transmission?

A: We don’t have definition the multi-AP yet. Actually, I think multi-AP transmission includes all the multi-AP schemes like CSR, coordinated beamforming. We have not decided yet. I think the concept of the sharing and shared APs are used for common multi-AP transmission.

A: OK. So, then do you mind also to put specific schemes which have been already, solely discussed in 11be or 11ax? I think 11be has multi-AP transmission including Co-SR, Co-BF and JT.

A(Chair): It is a kind of procedurally. The SFD of TGbe is the SFD of TGbe. Anything that we're building on top of our baseline plus accepted standards, the drafts including TGbe draft. We cannot recite the SFD of the TGbe on this conversed motion. Because the TGbe SFD is not a spec text.

C: OK. You mean if without a definition of RTWT transmission, we could not run the straw poll?

A(Chair): Independent to the definition. We cannot have a motion for the TGbn SFD citing the TGbe SFD. We cannot rely on the SFDs for our ongoing task.

A: “The definition of sharing AP or shared AP is first defined before making the working transmission” is a chicken and egg problem, I think.

C: Regarding he TXOP sharing in multi-AP coordination, I remember in some contributions that the sharing AP is in TXOP level. But the AP coordination may be some long term or coordination. Multi-AP coordination have a lot of baselines.

A: I defer the straw poll.

**(The straw poll was deferred.)**

* + [11-23/](https://mentor.ieee.org/802.11/dcn/23/11-23-1931-01-00bn-tgbn-proposed-timeline.pptx)1868r2: Coordinated Spatial Reuse Design

Jason Yuchen Gou (Huawei Technologies)

**Straw Poll:**

Do you agree to define Coordinated Spatial Reuse in TGbn:

An AP can transmit a Trigger frame to initiate simultaneous transmissions of two or more APs on the same frequency resource within its obtained TXOP, where the transmission duration and the transmit power of the APs are specified by the Trigger frame.

* + - Discussion

C: I have a contribution number 11-24/114 discusses on C-SR and power control and have some shared our concerns. Maybe you can defer the straw poll after the presentation.

A: OK. I will take a look at your proposal.

C: We should continue the discussion in the in general, I don’t really like to have this like a trigger operation because the trigger-based operation is designed for the orthogonal transmissions. I disagree with this.

A: This is not a positive comment. I can reach to your comments.

C: I also like to defer this straw poll. Because we were interested in CBF. But we're still also looking at CSR. And there was a straw poll on CBF this week in the fight, actually, that people are so different.

A: OK. Generally, I think CBF is CBF, and CSR is CSR. I think it is better to consider together.

C: Basically, one of the main things is we need to compare the complexity for the CSR.I think we are going into the next level the CSR in terms of trigger frame and things like that. So, I have a similar request as previous commenters to defer the straw poll. I also have a contribution.

A: OK. I just started contribution here. I see some benefits of it solely based on CSR is more stable, and more reliable.

C: I think about the simultaneous transmission, about the concepts of we need to talk to discuss more about that.

**(The straw poll was deferred.)**

* Motions
  + The TGbn motions are listed on [11-24/](https://mentor.ieee.org/802.11/dcn/23/11-23-1931-01-00bn-tgbn-proposed-timeline.pptx)171r1.

**Motion 1 (PHY):**

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

* + - **11bn supports a distributed-tone RU (DRU) for a TB PPDU transmission**
    - **The DRU means an RU which consists of subcarriers spreading across a certain bandwidth**

Move: Eunsung Park Second: Jianhan Liu

Note: Discussed in one of the PHY ad-hoc sessions (ref: [11-23/](https://mentor.ieee.org/802.11/dcn/23/11-23-1931-01-00bn-tgbn-proposed-timeline.pptx)1919r1) during which a similar SP was run. The SP did not receive any objections.

* + - Discussion

C: I think it should be spread across not spreading.

C: It has already got the consensus in the PHY group.

C: I am concerned the legacy devices are victims of the RDU.

C: If the interference is from OBSS, it is not the same all the time because of the nature of fading. High level agreement was made.

**Result: 113 Yes, 6 No, 47 Abstain (Motion Passed)**

**Motion 2 (MAC):**

Move to add the following text to the TGbn SFD:

* + - 11bn defines a mechanism that enables a non-AP MLD to roam from one AP MLD to another AP MLD and the non-AP MLD remains in state 4 (see 11.3) during and after roaming to the other AP MLD

Move: Po-Kai Huang Second: Binita Gupta

Note: Discussed in one of the MAC ad-hoc sessions (several submissions were discussing similar concept, ref: 23/1884r2, 23/1898r1, 23/1908r2, 23/1937r1, 23/1971r2, 23/1996r0, 23/2157r2) during which a similar SP was run. The SP result was 83Y, 22N, 22A.

* + - Discussion: None.

Result: Approved with unanimous consent.

* Teleconference plan
  + Jan 29 (Monday) – MAC/PHY 19:00-21:00 ET
  + Feb 01 (Thursday) – Joint 10:00-12:00 ET
  + Feb 05 (Monday) – MAC/PHY 19:00-21:00 ET
  + Feb 22 (Thursday) – MAC/PHY 10:00-12:00 ET
  + Feb 26 (Monday) – Joint 19:00-21:00 ET
  + Feb 29 (Thursday) – MAC/PHY 10:00-12:00 ET
  + Mar 04 (Monday) – MAC/PHY 19:00-21:00 ET
  + Mar 07 (Thursday)– Joint 10:00-12:00 ET
    - Discussion

C: Usually, we use joint session for motions. The time zone is not so fair for everyone.

A: Motion will be run F2F.

* AoB: None.
* Adjourned at 17:26.