IEEE P802.11  
Wireless LANs

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| TGbn July August 2024 Teleconference Minutes | | | | |
| Date: 2024-08-26 | | | | |
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Abstract

This document contains the minutes for TGbn July and August 2024 teleconferences.

Revision history:

* Rev0: First version of the document.
* Rev1: Add the links of the minutes for MAC ad-hoc teleconferences and the attendee lists for the Joint teleconferences

Abbreviations:

* C: Comment.
* A: Answer.

# 1st Conf. Call: July 29th, Monday (19:00-21:00 ET) – MAC

* <https://mentor.ieee.org/802.11/dcn/24/11-24-1344-00-00bn-802-11bn-mac-ad-hoc-minutes-july-sept-2024.doc>

# 2nd Conf. Call: July 31st, Thursday (10:00-12:00 ET) - Joint

* Call the meeting to order
* 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 spoke/wrote 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.
  + **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document([11-24/1340r](https://mentor.ieee.org/802.11/dcn/24/11-24-1340-03-00bn-july-to-sept-tgbn-teleconference-agenda.docx)3).

**Copyright Policy was presented.**

* 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))
  + Please ensure that the following information is listed correctly when joining the call:
  + "[voter status] First Name Last Name (Affiliation)"
* Agenda
  + Chair reviews proposed agenda found in [11-24/1340r3](https://mentor.ieee.org/802.11/dcn/24/11-24-1340-03-00bn-july-to-sept-tgbn-teleconference-agenda.docx).
  + Discussion: None.
  + The agenda approved with unanimous consent.
* Technical Submissions – Miscellaneous-Part 1:
  + [11-24/0730r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0730-00-00bn-flow-control-over-the-air.pptx): Flow control over the air Peter Stephenson (Samsung)

C: How do you indicate multi-STA BlockACK?

A: My proposal puts a bit in the main header. It would apply to all STAs. The flow control applies to the originator of the BlockACK. Anything more specific than NACK would obviously require more intrusive updates to the header to supply that information.

C: I am a little bit confused about the motivation. Are you seeing the receiver requests more processing time?

A: In the current standard, a device knows that it is not going to be able to accept data because it knows that its buffer is full. There is no way of supplying that information to the other side. The only method is saying to the other as “I didn’t get that data.” The transmitter of the data will simply retransmit data, which the recipient of the data knows it cannot process. That is inefficient use of the wireless medium. That is my main motivation for this proposal.

C: In that case, if the receiver negotiates buffer size, and then you can adjust the issue.

A: The point is to my mind in real world devices. It is always going to be the case that there will be occasions where you simply don’t have enough resources. If you’re on a powerful AP, then you will have plenty of buffer size. But my argument is that typical mobile devices which may be blockages in the system getting the data out of the buffer. In the real situation, with mass markets and mobile devices, this is something happening quite a lot.

C: On the other hand, it is not just for the receiver and for the transmitter side. The transmitter also transmits by flow control based on that negotiated buffer size. In that case, I don’t really see why we have this issue.

C: In the slide 8, what you bring here is interesting and valuable. I think it might be used in the wider use cases that any internal issues not only the flow control issues. Besides the flow control issue, when coexistence event happens in the non-AP station, it can respond the bit. When the transmitter AP recognizes that the failure is due to the AP’s bad radio condition, the receiver STA expects to receiver later. So, it can also resolve the coexistence event issue.

A: Not just missing data, there are other things that can happen that have got a similar effect on the connection where you can provide information to the originator. I agree with your comment.

C: How can a receiver tell the transmitter to turn it on again? Do you have this design?

A: There are various ways on turning off and it is not mandatory because that has been historic behavior. So, it can resume by many ways it can learn and then resume later, or obvious way of doing it is then the any BlockACK transmitted subsequently is allowed. Even if the other STA of the link hasn’t changed, the flow control bit is allowed to change in a BlockACK. I am adding the possibility that gratuitous BlockACK, which is the bottom line how you can tell the other side “OK, I am ready to receive again.”

C: If you are not transmitting, how could I be so sure the receive can send the BlockACK if it is not like for the responding the upcoming transmission? Maybe you can be clearer about the mechanism how the receiver responds to the transmitter to restart the transmission again, and if you have more simulation to see what is the real benefits, it is more like a convincing synchronization.

A: OK.

* + [11-24/0848r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0848-00-00bn-adapted-trigger-based-uplink-transmission-follow-up.pptx): Adapted trigger-based uplink transmission follow up

Ming Gan (Huawei Technologies)

C: In the slide 4, the use case for this scheme is that an AP does not know the additional puncture pattern for the non-AP STAs and then we could allow the non-AP STAs to kind of additional puncture 80 MHz, is that correct?

A: The receiver can provide the uplink transmission in the U-SIG. And it lets the AP know which is not used and which is used for uplink transmission. But it has some limitation. So, as I mention on the second bullet in the slide 2, all of RUs of 996, 484, and 484 -tone are idle, we can allow this uplink transmission. Otherwise, the transmission is not allowed.

C: If U-SIG fields from multiple STAs which shared the same 80 MHz channel, they have the same ones. So, if only one STA is on the 80 MHz channel and they can allow the STA to signal, this transmission is now available.

A: Correct. If we allow multiple STA to transmit uplink transmissions within one 80 MHz, then we cannot guarantee they have the same puncturing information within the U-SIG.

C: I think maybe some frame exchanges before the real data transmission can also help for this additional punctured case for the responder.

* + [[11-24/0880r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0880-00-00bn-cbf-recap-and-way-forward.pptx)](https://mentor.ieee.org/802.11/dcn/24/11-24-0375-00-00bn-nav-protection-for-c-tdma.pptx): Co-BF Recap and Way Forward Okan Mutgan (Nokia)

(during presentation)

C: Are you aware that coordinated beamforming was already approved to be included in the SFD in the July meeting? Because it is seemed that the presentation is essentially saying, “let’s have coordinated beamforming to be included in the SFD.”

A: Yes. So, I want to give a general overview and provide the update with the additional details.

I want to present this submission because this contribution is talking about latency point of view of coordinated beamforming, which is not discussed so much.

(after presentation)

C: In the slide 8, are you talking about low latency traffic for downlink or both of downlink and uplink?

A: Uplink.

C: How do we set the null to the uplink frames?

A: The nulling works two ways. The APs have the channel state information. In the uplink case, the STA’s transmission frame to the APs. Because the APs know the channel state information, so they can do a receiver beamforming. If you want to check the details, you can check the previous contribution, which is the reference [5].

C: For the OFDMA transmission, how many nodes can you serve in a single PPDU? I saw that you have 16 STAs in the setup. I just want to understand the total.

A: In the setup, there are 24 STAs in total. They are 16 broadband stations and eight low-latency stations. We chose the transmitting STAs randomly. For example, five broadband stations and three low-latency stations connect to the Ap1 and the rest connect to the AP2. We randomize access here.

C: In the bandwidth setup, how many STAs can you serve in a single PPDU? Traffic load depends on the setup. For example, when you say the offered load is 100 Mbps, is this per STA load?

A: I have to check, but we didn’t focus too much on throughput but latency.

C: I am wondering if it is oversaturated because the OFDMA transmission will typically be able to 100 STAs.

A: You can also check the references [5], which has all the parameters here.

C: In the slide 8, how can the AP know which low-latency stations should be made nulling? Do you need a negotiation in advance?

A: What we look here is general latency and the low-latency stations have data in their buffer and want to transmit data and we just put nulling in the environment. Because of nulling, the low-latency stations can have an access to the channel more. That is why they reach low latency.

C: Regarding ACK frames, there are two types of traffic patterns, FTP and XR. One AP needs to send an ACK frame to a station in the middle of transmission from other station. In this case, how do you make nulling the ACK frame from the AP?

A: We look at uplink traffic only here, not downlink traffic.

C: But how about an ACK frame? It needs to protect an ACK frame from other APs.

A: It naturally happens but no data frames.

C: In terms of PHY level processing, it sounds like you are just relying on the preambles to obtain all the sounding information in order to perform nulling. So, that sounds an implicit sounding, or are we doing explicit sounding?

A: We assume perfect sounding here.

C: If you have got two APs each with 16 antennas, sounding takes a lot of time. And on the downlink, you would be looking for the clients to better support sounding across 16 spatial streams, which is large overhead. How sensitive are these results if the AP support only eight spatial streams of sounding?

A: The limited number of antennas at the AP is one thing we have to think about it. It is not possible to schedule all these stations at once. An AP with eight antenna supports eight stations with single antenna.

C: The simulation setup is still a little bit unclear. You simulated purely uplink traffic and you just use receiving information at the AP sides. In that case, what about the coordination aspect between the different APs? What is done exactly in order to coordinate between different APs?

A: The reference [5] shows the coordination process between APs.

C: Why do you need to do that sounding? If you are doing the nulling at the receivers, they can use the preamble in order to get the CSI. How is the sounding taking place exactly?

A: The two APs get the channel state information from the stations, then those APs can do receiver beamforming. That is how it is kind of a null. If it is downlink, of course, the APs can do transmit beamforming as well.

C: It is very clear why we need CSI at the transmitter side. But for the case of receive beamforming, it is not very clear how the sound is going to.

* + [[11-24/0892r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0892-00-00bn-integrating-wur-into-11bn.pptx)](https://mentor.ieee.org/802.11/dcn/24/11-24-0375-00-00bn-nav-protection-for-c-tdma.pptx): Integrating WUR into 11bn Ying Wang

C: Why do we need FDMA for the wake-up radio?

A: Do you mean FDMA as a frequency division multiple access? It is just a signal into different part of 20 MHz channels.

C: What is the use case?

A: You can transmit to multiple WUR signals to the multiple STAs at the same time. This will improve the spectrum efficiency.

C: I mean to reduce the packet length. Is this sent to the same STA?

A: No. It is sent to multiple STAs. If you have 80 MHz spectrum bandwidth available, then you can send four wake-up signals simultaneously to four STAs.

C: You can do that using just one wake-up frame that lists multiple STAs recipient.

A: Right. You can also send to even more WUR STA radios.

C: Each radio is actually wake-up radio, the center frequency can be different from the primary channel. When they are awakened by the wake-up radio reception, then their 802.11 main radio should exchange the packet through the primary channel.

A: Right. WUR is simply to receive a kind of a wake-up message and it will wake-up the memory and the main radio will operate. They can be on different to center frequencies.

C: WUR can be used to identified and applied to 11ax and beyond.

A: Yes.

C: So, basically even without further optimization or improvement, we can already use WUR for the UHR generation, right?

A: Right. That is what we are referring to as the method one. The current WUR standard only supports FDMA PPDUs up to 80 MHz of bandwidth. So, I guess you may want to extend to a wider bandwidth.

C: I think that is an important baseline which people need to be aware. Regarding this wider bandwidth support, I think at 11ax group already has agreed to have 80 MHz of bandwidth during TGba discussion. I think it is useful for the mandatory bandwidth support. And in my common sense, as for the 320 MHz, we want to have WUR in the 6 GHz bands, which I think it is not necessary to do this research.

A: Thank you for sharing the history.

C: I can see the necessary to involve the WUR in the UHR. Because currently power saving of existing 11be only has something like TWT. So, you can only negotiate the time to recover. But if you have really high priority transmission that need to wake the device up, you need this new kind of design. In the future, can it be cooperated directly or involving some other like power saving mechanisms such as TWT?

A: I think probably it is mainly as an independent feature. This is basically for a radio with WUR and you can turn off the main radio most of the time and basically use the WUR to monitor whether there is any data traffic coming in for you. I think the concept you mentioned is from the main radio side.

* + [[11-24/1038r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0837-00-00bn-indication-of-use-case-in-11bn.pptx)](https://mentor.ieee.org/802.11/dcn/24/11-24-0375-00-00bn-nav-protection-for-c-tdma.pptx): Channel Sounding for UHR Relay Pei Zhou (TCL)

C: What is the different between the sounding PPDU and the NDP?

A: It can be the same. There may be some difference because in 11bf the sounding PPDU can be HE or VHT NDP. I am not provided the detailed in this contribution. The detailed format of the sounding PPDU is left for the next step.

C: OK. For the related topic, some members propose the TXOP sharing from an AP to a relay station. In this case, the AP1 can share TXOP to the relay station for sounding, which should be considered.

A: I agree with you. The sounding can be happened in a TXOP shared by the AP.

C: In the slide 6, the STA3 is supposed to compute the CSI between the Relay1 and the Relay2 both, right?

A: Yes.

C: Based on the report request, it needs to feedback this CSI but I think it requires a lot of processing time. Have you thought about that?

A: Yes, maybe we can. We can add more gap between the measurement and the report.

C: In the slide 9, two NDPs are transmitted in both direction, one from the STA side and the other one from the relay side. This measurement report is done by the Relay1 to the Relay2 based on the first NDP transmitted by the STA3. And the second NDPs are transmitted by the Relay1 and the Relay2. This downlink channel is also estimated and measured. The CSI is measured and fed back again to the relay or the AP. Is my understanding correct?

A: I think it is necessary because the sounding is initiated by the STA3 after the relay transmitted the second NDP, then the STA3 get the CSI. It is done how to report to anyone.

C: But the second NDP is for the downlink channel. So, the beamforming precoder is supposed to be computed by the AP. Assuming a relay does not have a capability to compute the beamforming precoder. So, the AP is supposed to compute the for the downlink channel.

A: It is possible but my intention is that the STA3 computes the matrix itself.

C: If the STA3 computes the precoder rather than CSI, then the STA3 needs to feedback that precoder to the Relay1 and the Relay2. This second NDP is for the downlink channel and not only for uplink channel.

A: I understand and agree with you.

C: It highlighted the benefit of relaying. Many contributions are focused on one relay. But this is a system view that the benefit of relay comes from having lots of these small, cheap devices spread around the system. You have multiple relays and addressed how we can efficiently and quickly select identify the correct relay to do the communication. So, the sounding can be initiated by an AP or an STA. In the slide 7, I think the AP was triggering relays to send NDPs. I suppose you could also have the AP triggered the STA3 to send the NDP and receive the feedback report, that can reduce the time.

A: In that case, the same as the uplink signing for the relay is applied.

* + Call for additional presentations
    - Chair called for the proposal for the presentation in the remaining time.
    - The presentation of the submission [11-23/2015r2](https://mentor.ieee.org/802.11/dcn/23/11-23-2015-02-00bn-ht-control-field-expansion.pptx) was proposed to add the agenda.
    - The modified agenda was approved without objection.
  + [[11-23/2015r2](https://mentor.ieee.org/802.11/dcn/23/11-23-2015-02-00bn-ht-control-field-expansion.pptx)](https://mentor.ieee.org/802.11/dcn/24/11-24-0375-00-00bn-nav-protection-for-c-tdma.pptx): HT Control field expansion Xiangxin Gu (Spreadrum)

C: I commented on this proposal before. 11ax already extend the HT control type. Why do you propose a new method?

A: I remember your comment. It is just another way to expand A-control because of overhead and complexity.

C: I don’t think this has complexity. It is a mechanism that all the devices before UHR can understand the assumption. In the future there may be the control fields that an older generation station cannot understand and the new generation station can understand. So, it could be mixed together. By using your extension, HE or EHT stations could not understand the extension overriding the HTC. You may have some problems in that.

A: I think there is no backward compatibility issues.

C: Maybe individually addressed frame does not have that problem. I think we can first see if we consume the reserved field. After that, we can further decide either to use the existing method or new one.

A: That is OK. Thank you.

C: The original purpose of the retry bit is to indicate that a data or management frame is retransmitted form the early one. If we repurpose the field, how do we indicate the retransmission?

A: We have BlockACK agreements. So, there is no need because in the spec the retry field is reserved.

C: But A-control field is only transmitted in a management or a data frame.

A: I mean those frames are based on block ACK agreement and thus the field is reserved.

C: We already have once in the control ID, that is only for the future, no extension. So, if we repurpose the retry bit, the we are wasting this old one. It is only defined for the future extension. So, why don’t use these old ones and just repurpose this additional retry bit?

A: That is my purpose.

* Any other business: None.
* Adjourned at 21:00.

# 3rd Conf. Call: August 5th, Monday (19:00-21:00 ET) – MAC/PHY

* MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-1344-01-00bn-802-11bn-mac-ad-hoc-minutes-july-sept-2024.doc>
* PHY: cancelled

# 4th Conf. Call: August 8th, Thursday (10:00-12:00 ET) – MAC

* <https://mentor.ieee.org/802.11/dcn/24/11-24-1344-02-00bn-802-11bn-mac-ad-hoc-minutes-july-sept-2024.doc>

# 5th Conf. Call: August 12th, Monday (19:00-21:00 ET) - Joint

* Call the meeting to order
* 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 spoke/wrote 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.
  + **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document([11-24/1340r](https://mentor.ieee.org/802.11/dcn/24/11-24-1340-07-00bn-july-to-sept-tgbn-teleconference-agenda.docx)7).

**Copyright Policy was presented.**

* 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))
  + Please ensure that the following information is listed correctly when joining the call:
  + "[voter status] First Name Last Name (Affiliation)"
* Announcements
  + Please submit contributions at least 24 hours in advance and if there are deferral request to be sent at least 24 hours in advance. Contributions that don’t follow these will be removed from the queues.
* Agenda
  + Chair reviews proposed agenda found in [11-24/1340r7](https://mentor.ieee.org/802.11/dcn/24/11-24-1340-07-00bn-july-to-sept-tgbn-teleconference-agenda.docx).
  + Chair struck out several submissions from the original agenda because they had not been uploaded 24 hours before.
  + Chair asked presenters to keep tracking their contributions in the queue.
  + Chair announced MAC submission will be presented after the joint submissions because most of joint queue is cleaned up.
  + Discussion: None.
  + The agenda approved with unanimous consent.
* Technical Submissions – Miscellaneous Part 2 + MAP Part 2:
  + [11-24/1122r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1122-00-00bn-vendor-specific-phy-options-follow-up.pptx): Vendor Specific PHY Options With Minimal PHY Changes – Follow-Up

Brian Hart (Cisco Systems)

C: Once you have a mechanism to signal a dynamic operation, do you still need the static operation?

A: Yes. If we think about like a canonical problem, one is transmitting with non-vendor specific behavior and the other is transmitting with vendor specific behavior with a dynamic instance. Sometimes the vendor specific behavior is present, maybe sometimes it is absent. So, it is vendor specific mode A or mode B. In that case, you definitely need to have a static indication and dynamic indication to indicate between the mode A and the mode B. If the dynamic behavior is dynamically on and then completely off, and it looks exactly like a standardized protocol, then I agree you are right at that point.

C: I mean the static could just uses that dynamic bit set as high all the time, so that makes it de facto static. And of course, you can disable it all the time, which also make it de facto static.

A: That is good clarification.

C: You mentioned the BSS color is useless for an AP. Could you please clarify that?

A: If an AP has multiple BSSIDs, the AP practically has to use the same BSS color. And if one wants to use vendor specific signal and the other doesn’t, it just can’t do the spatial reuse.

C: Regarding this general AID List Veto mechanism, do you know currently we have any requirements on the AID assignment?

A: Basically, no. The early AIDs are assigned to the broadcast and not transmitted BSSID broadcast indications. There is some sort of optional use of AIDs. In general, there is a goal for an AP to use close tightly allocated AIDs because that reduces the beacon size and given the existence of broadcast traffic, then it is really just low AIDs. And 11bi talks about hiding in the crowd and switching AIDs and having a group of clients, possibly multiple groups of clients, and then switching AIDs between them. Typically, those groups are isolated. But I don’t believe there is any particular requirement for contiguousness of anything else.

C: I think this could be one mechanism, but they need the MAC folks to have some requirements of AIDs. Another thing may be to consider like the color collision mechanisms. If the AP or the STA finds some collision issues, then it tries to prevent the BSS color collision or to report saying that it is not safe usage.

A: In an enterprise deployment, the AP allocations are sort of three or five feet away. In such cases, you are just not going to get spatial reuse. It is better to have no color or just putting them to the same color. If these two different networks use the same BSS color, then using BSS color for the purpose of distinguish BSSs for this kind of purpose is dangerous.

C: Could you elaborate a little bit more about a few examples on what kind of vendor specific behavior that might be different or like a vendor specific PHY?

A: One example for the dynamic is to adjust appropriate MCS setting where you would not be using a super-high MCS all the time and the AP or client can decline it. For example, you are transmitting with especially low EVM or especially low phase noise, and if the recipient knows that, it could use a tighter tracking loop on carrier recovery, phase tracking or perhaps different algorithms for range estimation. My earlier documents on the references show more examples.

C: In the slide 5, in the cases B and D, you mentioned about this AID identification. The way I see it is probably like either happen between the AP and the station, typically. So, in an MU-PPDU, you see the signaling in the U-SIG field, where you have trigger frames in the user field. So, for example of the cases B and D, how would an AID assignment help in this particular case? You have one of them seem to be clearly a peer-to-peer communication.

A: Most of peer-to-peer in these days is using so-called infrastructure BSS, where one of these entities is an AP. And, in the corner case, which we need to be worry about, if this AP happens to assign the AID 10 to this client, and the other AP also assigns the AID 10 to this case, whenever it receives an PPDU with AID 10, it is not clear if it is coming from the AP or another AP. If it needs to do different receiver processing based on the vendor specific information, the communication to the STA which is aware of the information is achieved but the reception by other STA which is not aware of the information would be screwed up.

C: So, basically you are still assuming the EMLSR AP, which makes a little bit more sense to me. In this case, the AP is avoiding exactly the same AID assignment.

* + [11-24/1179r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1179-00-00bn-trigger-frame-expansion.pptx): Trigger frame expansion Vishnu V. Ratnam (Samsung Electronics)

C: In the slide 3, your proposal is to extend the current trigger frame compatible with the legacy device. I am thinking in which case the new trigger frame to make both 11bn and legacy devices respond. Because the list in the second bullet defined in 11bn. Which case do you need to make the response both from 11bn and legacy devices?

A: For example, in DSO you want to use the same trigger to both trigger legacy devices and UHR devices at the same time. And including all these proposals, they prefer to use the same trigger frames supposed to defining a new trigger frame. Even in the coexistence indication you would want, you could want to trigger a coupling OFDMA.

C: I understand the coexistence only for 11bn devices, right?

A: No. For example, if you are sending a BSRP trigger, legacy STAs might send a BSR. In some of the proposals and, the UHR STAs will just send multi-STA block ACK. The point is that it enables to get information from both of legacy and UHR STAs at the same time. Not all of it will be coexistence. Legacy STAs will provide normal BSR, and UHR STAs can provide the coexistence indication.

C: We do have some reserved bits in the common field for the trigger frames. Those bits can still be used like in slide the 4. We still have some room for the new signaling. And we can always use the new special user field for the future intention. I agree on that part. For the complexity regarding future generation indication, since we have this PHY version ID, those can be simply changed to UHR.

A: They are also reserved because legacy devices will copy these bits into the HE-SIG AID field for sending the trigger response. That is why an EHT AP always sets these bits to one to ensure backward compatibility. These large chunk bits are just individual bits. I am not fully sure if we could provide some other indications in UHR. Because if you are also triggering some of HE devices, it will impact what they want to transmit in their HE SIG-A.

C: I agree those points. They are copied to follow by the legacy devices. However, the legacy devices will copy no matter the value is zero or one, those bits are set to one because of the PAPR optimization by PHY. In 11be, we are using those reserved bits that will be copied by 11ax, so that we can always use that.

A: Thanks for that information. PHY version is used for indication for the PHY version of the trigger-based response. What we are trying to indicate is the version of the common info field itself. Because that would determine how many additional indications are present including some indications that you carry for UHR or beyond stations. So, the PHY version wouldn’t provide the exactly the same information.

C: The PHY version will be copied to the U-SIG. So, it takes the response. I think if the AP wants to select the UHR response, then the later user field shall be the same PHY version.

A: OK. We need more offline discussion.

* + [11-24/1244r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1244-00-00bn-sst-or-dso-support-for-wider-bandwidth-ofdma-and-a-ppdu.pptx): SST or DSO Support for Wider Bandwidth OFDMA and A-PPDU

Ross Jian Yu (Huawei)

C: In the enterprise with lots of APs, maybe stadium or the high-density environments, use of wider bandwidths is pretty uncommon, said in the 6 GHz bands, 80 MHz is typically the max and in the 5 GHz bands, 40 MHz is pretty much the maximum. The A-PPDU is a feature that only adds value until you are operating at 160 MHz or higher bandwidth. And I have a specific use case when we first introduce UHR, we have a UHR AP, a couple of UHR clients, and the whole bunch of VHT and HE and legacy clients. It makes sense from a PHY perspective, given the nature of how EHT and UHR SIG field have been defined here before, but I want to point out that it is not really what the market is looking for the enterprise market. I think it would add a lot of value if we try to use A-PPDU to deal with variable and mixed clients.

A: That sounds correct. I see similar case the enterprise scenarios currently want to use narrow bandwidth to prevent interference to achieve a larger capacity. Basically, we assume we need to have 160 MHz BSS operating channel with as a minimum and I think some of those features are mainly for the home scenarios. For enterprise, we can further see how to improve that part. Regarding the second comment, did you mentioned the flexibility related with the channel selection?

C: Let’s say we are operating 80 MHz and right now I want to give 20% of the bandwidth to UHR because I still have 80% for legacy. And then the next moment, the traffic is such that I want to use 40%, and then the next moment, a couple of TXOP later, maybe it is more like 10%.

I guess we can do it on a per TXOP basis and give more time to legacy depending on splitting legacy and UHR to give the TXOP shorter and longer. But ideally it would just be a single PPDU on the figures in the slide 5, creating a boundary between the different modes, those lines could move much more smoothly up and down. It might be 20 plus 60 or 10 plus 70 or something.

A: Do you mean that the AP controls the TXOP for the different generations?

C: Within a PPDU, the AP can have some flexibility. I just mentioned 10 MHz resolution, but that looks too extreme. At least if it had 20 MHz resolution, thing would be helpful for the enterprise market.

A: OK.

C: In general, I think it is a good direction to utilize the SST by defining secondary 160 MHz. In terms of use cases, do you think some high-level difference or some relationship with the DSO?

A: For the DSO, without considering the implementation details and complexity, they achieve the functions to move the stations to non-primary channels. So, the AP can send the different PPDUs in different channels, and the stations can receive the UHR PPDU portion in the center channel. That is why I have mentioned both SST and DSO.

C: So, this feature is not kind of the contradiction. The contradiction is a kind of supplementary to enhance the two features can be combined together.

A: I think SST is easier to achieve. At least for now, it does need some pre-negotiation compared with DSO. So, I prefer this direction for DSO. Its advantage is to do this operation directly at the beginning of a TXOP. You do not need some pre-negotiation, but on the other hand, it needs some hardware requirements for the non-AP stations to reduce the switching time. That is the difficult part.

* + [11-24/0874r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0874-00-00bn-discussion-on-terminology-sharing-and-shared-ap.pptx): Discussion on terminology: Sharing and Shared AP

Xiaofei WANG (InterDigital)

C: It is an interesting and important topic, but I would like to voice my opinion. It may be a little bit earlier. We could take some time to think about defining those particular coordination schemes more specifically. And then, it may be easier to define these qualifiers for each of the scheme. But I think that it would be clearer to have different terms depending on the type of coordination that is happening. On the slide 8, I think the initiating AP or the participating AP, these terms themselves are very general as well just saying coordinating AP. So, I align with the other line of thought that we should have separate terms depending on the type of coordination happening.

A: We can definitely keep discussing. Your opinion says that we want to have different terminology for different multi-AP operations, right?

C: Right.

A: It feels a little easier if we have similar things.

C: I have a similar concern with you for the sharing AP and the shared AP. There are several types of TXOP level coordination, for example, C-SR, C-BF and other things like C-TDMA. This term can be used in those schemes. but like C-TWT, there is alternate TXOP level coordination, and thus the sharing AP and the shared AP are not applied to the C-TWT scheme. My point is when you have some TXOP level coordination, you can use the terminologies of the sharing AP and the shared AP. Actually, it is better to say the TXOP sharing AP and the TXOP shared AP, which will be clearer because you mentioned the current terms are problematic. For other term, you mentioned the participating AP and the initiating AP, it looks like a long-term coordination. So, there will be some orthogonal with the sharing AP and the shared AP concept. But they are not in the same status.

A: Even if you have transmit opportunity to sharing based things, I think we still have to look at different forms sharing AP. In addition, it is a little bit confusing and I’m not 100% sure adding TXOP in front of it is going to solve that problem. So, we may have to look deeper into this.

C: I agree with several aspects in your contribution. For case 2 in the slide 8, you are saying that you for example of coordinated beamforming, we do not necessarily depend on one single AP obtaining a TXOP first. Is your intention to say that an AP can become the coordinating AP or the initiating AP?

A: The question here is really about whether it is necessary of a sharing concept. They also have to have a transmit opportunity. But for example, at least it's not immediately clear coordinating beamforming has to depend on TXOP sharing. That could be based on other ways and another possibility also coordinated TWT. You already have a negotiated TWT, why would you have to necessarily obtaining a TXOP first and then share with another BSS?

C: I certainly agree that C-RTWT is longer-term thing, that lead to different terms. But I do find the sharing/shared nomenclature unnecessarily over similar. I would be happy if we had very different names for the two roles, initiator and then something different one.

A: Thank you for your comment. We can keep talking about the different possibilities.

C: I spent my time thinking about this terminology. I ended up like in an early presentation this year having like the coordinating and coordinated AP type of wording. But that was not very happy myself with that, since the “C” is basically leading to the same acronym. But in general, using the same terminology across all the coordinated access point scheme would be easier to refer to the two sides of the agreements, or any way the parties involved in the coordination in general if we adopt this approach.

A: Thank you. We can keep discussing on this topic.

C: This is actually a very interesting because the shared AP never quite made sense to me. I like the idea of terms that makes clear what the device is doing. I think that was the attempt with your case one for sharing and shared. I would be more in favor of something that would continue that rather than trying to make uniform terms, that would end up being very general. For the first case where the behavior is pretty clear, it could be beneficial. And adding “TXOP” as in the previous comment, that is longer but it makes very clear what behavior is expected from the AP when you are talking about it.

A: I can see the benefit for “sharing” but we try to avoid confusions. When you have little more general term for like initiating or anything like the ideas, it doesn’t lose more specific things. But I wonder whether it makes sense to have if we end up to have four different multi-AP operations, that is going to be have a specific term for all four different ones.

C: Maybe it would be initiating with some other word. “Initiating” is the same across all of them that start the process, but there is a difference of what they are initiating.

A: That could be one way to go.

(Chair recommended to initiate the discussion on the TGbn reflector.)

* Any other business: None.
* Adjourned at 20:45.

# 6th Conf. Call: August 19th, Monday (19:00-21:00 ET) – MAC

* <https://mentor.ieee.org/802.11/dcn/24/11-24-1344-03-00bn-802-11bn-mac-ad-hoc-minutes-july-sept-2024.doc>

# 7th Conf. Call: August 22nd, Thursday (10:00-12:00 ET) – MAC

* <https://mentor.ieee.org/802.11/dcn/24/11-24-1344-04-00bn-802-11bn-mac-ad-hoc-minutes-july-sept-2024.doc>

**Appendix**

* Attendee List for the 2nd Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbn | 8/1 | Aio, Kosuke | Sony Corporation |
| TGbn | 8/1 | Ajami, Abdel Karim | Apple Inc. |
| TGbn | 8/1 | Asai, Yusuke | Nippon Telegraph and Telephone Corporation (NTT) |
| TGbn | 8/1 | Baek, SunHee | LG ELECTRONICS |
| TGbn | 8/1 | Baykas, Tuncer | Ofinno |
| TGbn | 8/1 | Byeon, Seongho | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Cha, Dongju | LG ELECTRONICS |
| TGbn | 8/1 | Chaturvedi, Abhishek | Samsung Electronics |
| TGbn | 8/1 | Chen, Junbin | TP-Link Corporation Limited |
| TGbn | 8/1 | CHENG, yajun | Xiaomi Communications Co., Ltd. |
| TGbn | 8/1 | Choi, JinHo | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Choi, Jinsoo | LG ELECTRONICS |
| TGbn | 8/1 | Dong, Xiandong | Xiaomi Communications Co., Ltd. |
| TGbn | 8/1 | Doppler, Klaus | Nokia |
| TGbn | 8/1 | Ekkundi, Manasi | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| TGbn | 8/1 | Fang, Yonggang | MediaTek Inc. |
| TGbn | 8/1 | Fujimori, Yuki | Canon Research Centre France |
| TGbn | 8/1 | Ghosh, Chittabrata | Apple Inc. |
| TGbn | 8/1 | Gu, Jaheon | Samsung Electronics Co., Ltd. |
| TGbn | 8/1 | Gu, Junrong | Clourney Semiconductor |
| TGbn | 8/1 | Gu, Xiangxin | Spreadtrum Communications (Shanghai) Co., Ltd. |
| TGbn | 8/1 | Ha, Taeyoung | Samsung Electronics Co., Ltd. |
| TGbn | 8/1 | Hamilton, Mark | CommScope |
| TGbn | 8/1 | Handte, Thomas | Sony Group Corporation |
| TGbn | 8/1 | Hasabelnaby, Mahmoud | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Hedayat, Ahmadreza | Apple Inc. |
| TGbn | 8/1 | Ho, Duncan | Qualcomm Technologies, Inc |
| TGbn | 8/1 | Hsu, Ostrovsky | Xiaomi Communications Co., Ltd. |
| TGbn | 8/1 | Hsu, Yung Lin | National Taiwan University |
| TGbn | 8/1 | HUANG, CHIHAN | MediaTek Inc. |
| TGbn | 8/1 | huang, kaikai | Nokia |
| TGbn | 8/1 | Huang, Po-Kai | Intel Corporation |
| TGbn | 8/1 | Inohiza, Hirohiko | Canon |
| TGbn | 8/1 | Jang, Insun | LG ELECTRONICS |
| TGbn | 8/1 | Jee, Anand | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Kakani, Naveen | Qualcomm Incorporated; Qualcomm Technologies, Inc |
| TGbn | 8/1 | Kandala, Srinivas | Samsung |
| TGbn | 8/1 | Kim, Geon Hwan | LG ELECTRONICS |
| TGbn | 8/1 | Kim, Jeongki | Ofinno |
| TGbn | 8/1 | Kim, Jungjun | Samsung Electronics |
| TGbn | 8/1 | Kim, Sang Gook | LG ELECTRONICS |
| TGbn | 8/1 | Kim, Sanghyun | WILUS Inc. |
| TGbn | 8/1 | Kim, Suhwook | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Kim, Youhan | Qualcomm Technologies, Inc. |
| TGbn | 8/1 | Kishida, Akira | NTT |
| TGbn | 8/1 | Koo, Jonghoe | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Lee, Hong Won | LG ELECTRONICS |
| TGbn | 8/1 | LEE, JOONSOO | Newracom Inc. |
| TGbn | 8/1 | Levy, Joseph | InterDigital, Inc. |
| TGbn | 8/1 | Li, Haozheng | TP-Link Corporation Limited |
| TGbn | 8/1 | Li, Weiyi | Spreadtrum Communication USA, Inc |
| TGbn | 8/1 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn | 8/1 | Li, Yunbo | Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Lim, Yeon Geun | Newracom Inc. |
| TGbn | 8/1 | LIU, QINGLAI | Panasonic Holdings Corporation |
| TGbn | 8/1 | Lorgeoux, Mikael | Canon Research Centre France |
| TGbn | 8/1 | Lou, Hanqing | InterDigital, Inc. |
| TGbn | 8/1 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd. |
| TGbn | 8/1 | LU, Yuxin | TCL Industries |
| TGbn | 8/1 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| TGbn | 8/1 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Minotani, Jun | Panasonic Holdings Corporation |
| TGbn | 8/1 | Motozuka, Hiroyuki | Panasonic Holdings Corporation |
| TGbn | 8/1 | Mutgan, Okan | Nokia |
| TGbn | 8/1 | Nayak, Peshal | Samsung Research America |
| TGbn | 8/1 | Neishaboori, Azin | General Motors Company |
| TGbn | 8/1 | Noh, Si-Chan | Newracom Inc. |
| TGbn | 8/1 | Norouzi, Sara | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Park, Sungjin | Senscomm |
| TGbn | 8/1 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| TGbn | 8/1 | Petrick, Albert | InterDigital, Inc. |
| TGbn | 8/1 | Qi, Yue | Samsung Research America |
| TGbn | 8/1 | Quan, Yingqiao | Spreadtrum Communications (Shanghai) Co., Ltd.; Unisoc (Shanghai) Technologies Co., Ltd. |
| TGbn | 8/1 | Ratnam, Vishnu | Samsung Research America |
| TGbn | 8/1 | RISON, Mark | Samsung Cambridge Solution Centre |
| TGbn | 8/1 | Roy, Rishabh | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Ryu, Kiseon | NXP Semiconductors |
| TGbn | 8/1 | Sadiq, Bilal | Samsung Research America |
| TGbn | 8/1 | Schelstraete, Sigurd | MaxLinear |
| TGbn | 8/1 | Serizawa, Kazunobu | Advanced Telecommunications Research Institute International(ATR) |
| TGbn | 8/1 | Shafin, Rubayet | Samsung Research America |
| TGbn | 8/1 | Shi, Zhenpeng | Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Singh, Aditi | Charter Communications |
| TGbn | 8/1 | Smith, Luther | Cable Television Laboratories Inc. (CableLabs) |
| TGbn | 8/1 | SUH, JUNG HOON | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Sung, Hyeonjun | WILUS Inc. |
| TGbn | 8/1 | Tanaka, Yusuke | Sony Corporation |
| TGbn | 8/1 | Taori, Rakesh | Infineon Technologies |
| TGbn | 8/1 | Urabe, Yoshio | Panasonic Holdings Corporation |
| TGbn | 8/1 | Val, Inaki | MaxLinear, Inc. |
| TGbn | 8/1 | Verenzuela, Daniel | Sony Group Corporation |
| TGbn | 8/1 | Wang, Lei | Futurewei Technologies/Huawei Technologies |
| TGbn | 8/1 | Wang, Qi | Apple Inc. |
| TGbn | 8/1 | Wang, Ying | InterDigital, Inc. |
| TGbn | 8/1 | Wee, Gaius | Panasonic Holdings Corporation |
| TGbn | 8/1 | Wei, Dong | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn | 8/1 | Wilhelmsson, Leif | Ericsson AB |
| TGbn | 8/1 | Wullert, John | Peraton Labs |
| TGbn | 8/1 | Xiao, Tong | Xiaomi Communications Co., Ltd. |
| TGbn | 8/1 | Xu, Yanchao | Amlogic |
| TGbn | 8/1 | Yamada, Ryota | SHARP CORPORATION |
| TGbn | 8/1 | Yan, Aiguo | SAMSUNG ELECTRONICS |
| TGbn | 8/1 | Yan, Zhongjiang | Northwestern Polytechnical University |
| TGbn | 8/1 | Yang, Jay | ZTE Corporation |
| TGbn | 8/1 | Yang, Jimmy | Moxa Inc. |
| TGbn | 8/1 | YANG, RUI | InterDigital, Inc. |
| TGbn | 8/1 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| TGbn | 8/1 | Yee, James | MediaTek Inc. |
| TGbn | 8/1 | Yoon, Yelin | LG ELECTRONICS |
| TGbn | 8/1 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Zhang, Maolin | Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Zhao, Yue | Huawei Technologies Co., Ltd |
| TGbn | 8/1 | Zhong, Ke | Ruijie Networks Co.,Ltd. |
| TGbn | 8/1 | Zhou, Pei | TCL |

* Attendee List for the 5th Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbn | 8/12 | Aio, Kosuke | Sony Corporation |
| TGbn | 8/12 | Ajami, Abdel Karim | Apple Inc. |
| TGbn | 8/12 | Asai, Yusuke | Nippon Telegraph and Telephone Corporation (NTT) |
| TGbn | 8/12 | Bai, Jiyang | TCL |
| TGbn | 8/12 | Baykas, Tuncer | Ofinno |
| TGbn | 8/12 | Byeon, Seongho | SAMSUNG ELECTRONICS |
| TGbn | 8/12 | Cha, Dongju | LG ELECTRONICS |
| TGbn | 8/12 | Chen, Wei-Han | Mediatek Inc |
| TGbn | 8/12 | Chen, You-Wei | MediaTek Inc. |
| TGbn | 8/12 | CHENG, yajun | Xiaomi Communications Co., Ltd. |
| TGbn | 8/12 | Chisci, Giovanni | Qualcomm Technologies, Inc |
| TGbn | 8/12 | Cho, Hangyu | LG ELECTRONICS |
| TGbn | 8/12 | Choi, JinHo | SAMSUNG ELECTRONICS |
| TGbn | 8/12 | Choi, Jinsoo | LG ELECTRONICS |
| TGbn | 8/12 | Dezfouli, Behnam | Nokia |
| TGbn | 8/12 | Doppler, Klaus | Nokia |
| TGbn | 8/12 | Dunna, Manideep | Qualcomm |
| TGbn | 8/12 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| TGbn | 8/12 | Fang, Juan | Intel Corporation |
| TGbn | 8/12 | Fang, Yonggang | MediaTek Inc. |
| TGbn | 8/12 | feng, Shuling | MediaTek Inc. |
| TGbn | 8/12 | Fischer, Matthew | Broadcom Corporation |
| TGbn | 8/12 | Gao, Ning | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn | 8/12 | Gu, Jaheon | Samsung Electronics Co., Ltd. |
| TGbn | 8/12 | Gu, Junrong | Clourney Semiconductor |
| TGbn | 8/12 | Gu, Xiangxin | Spreadtrum Communications (Shanghai) Co., Ltd. |
| TGbn | 8/12 | Gupta, Binita | Cisco Systems, Inc. |
| TGbn | 8/12 | Ha, Taeyoung | Samsung Electronics Co., Ltd. |
| TGbn | 8/12 | Hamilton, Mark | CommScope |
| TGbn | 8/12 | Hart, Brian | Cisco Systems, Inc. |
| TGbn | 8/12 | Hasabelnaby, Mahmoud | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Hedayat, Ahmadreza | Apple Inc. |
| TGbn | 8/12 | Ho, Duncan | Qualcomm Technologies, Inc |
| TGbn | 8/12 | Hsu, Chien-Fang | MediaTek Inc. |
| TGbn | 8/12 | Hsu, Yung Lin | National Taiwan University |
| TGbn | 8/12 | Hu, Chunyu | Spreadtrum Communications US |
| TGbn | 8/12 | HUANG, CHIHAN | MediaTek Inc. |
| TGbn | 8/12 | huang, kaikai | Nokia |
| TGbn | 8/12 | Huang, Po-Kai | Intel Corporation |
| TGbn | 8/12 | Jang, Insun | LG ELECTRONICS |
| TGbn | 8/12 | Kalamkar, Sanket | Qualcomm Incorporated; Qualcomm Technologies, Inc |
| TGbn | 8/12 | Kamel, Mahmoud | Interdigital Inc. |
| TGbn | 8/12 | Kim, Geon Hwan | LG ELECTRONICS |
| TGbn | 8/12 | Kim, Jungjun | Samsung Electronics |
| TGbn | 8/12 | Kim, Sang Gook | LG ELECTRONICS |
| TGbn | 8/12 | Kim, Sanghyun | WILUS Inc. |
| TGbn | 8/12 | Kim, Youhan | Qualcomm Technologies, Inc. |
| TGbn | 8/12 | Kishida, Akira | NTT |
| TGbn | 8/12 | Koo, Jonghoe | SAMSUNG ELECTRONICS |
| TGbn | 8/12 | Lanante, Leonardo | Ofinno |
| TGbn | 8/12 | Lee, Hong Won | LG ELECTRONICS |
| TGbn | 8/12 | LEE, JOONSOO | Newracom Inc. |
| TGbn | 8/12 | Lee, Wookbong | Apple Inc. |
| TGbn | 8/12 | Li, Weiyi | Spreadtrum Communication USA, Inc |
| TGbn | 8/12 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn | 8/12 | Li, Yunbo | Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Lim, Dong Guk | LG ELECTRONICS |
| TGbn | 8/12 | Lim, Yeon Geun | Newracom Inc. |
| TGbn | 8/12 | Liu, Yong | Apple Inc. |
| TGbn | 8/12 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd. |
| TGbn | 8/12 | LU, Yuxin | TCL Industries |
| TGbn | 8/12 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| TGbn | 8/12 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| TGbn | 8/12 | Mehrnoush, Morteza | Apple Inc. |
| TGbn | 8/12 | Naik, Gaurang | Qualcomm Technologies, Inc |
| TGbn | 8/12 | Namvar, Nima | Charter Communications |
| TGbn | 8/12 | Nayak, Peshal | Samsung Research America |
| TGbn | 8/12 | Nogami, Toshizo | SHARP CORPORATION |
| TGbn | 8/12 | Noh, Si-Chan | Newracom Inc. |
| TGbn | 8/12 | Norouzi, Sara | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Palayur, Saju | Maxlinear Inc |
| TGbn | 8/12 | Park, Minyoung | Intel Corporation |
| TGbn | 8/12 | Park, Sungjin | Senscomm |
| TGbn | 8/12 | Patil, Abhishek | Qualcomm Incorporated |
| TGbn | 8/12 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| TGbn | 8/12 | Petrick, Albert | InterDigital, Inc. |
| TGbn | 8/12 | Qi, Yue | Samsung Research America |
| TGbn | 8/12 | Quan, Yingqiao | Spreadtrum Communications (Shanghai) Co., Ltd.; Unisoc (Shanghai) Technologies Co., Ltd. |
| TGbn | 8/12 | Ratnam, Vishnu | Samsung Research America |
| TGbn | 8/12 | Ryu, Kiseon | NXP Semiconductors |
| TGbn | 8/12 | Sadiq, Bilal | Samsung Research America |
| TGbn | 8/12 | Schelstraete, Sigurd | MaxLinear |
| TGbn | 8/12 | Sevin, Julien | Canon Research Centre France |
| TGbn | 8/12 | Shafin, Rubayet | Samsung Electronics |
| TGbn | 8/12 | Shi, Zhenpeng | Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Shilo, Shimi | Huawei Technologies Co., Ltd |
| TGbn | 8/12 | SUH, JUNG HOON | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Sung, Hyeonjun | WILUS Inc. |
| TGbn | 8/12 | Taori, Rakesh | Infineon Technologies |
| TGbn | 8/12 | Wang, Lei | Futurewei Technologies/Huawei Technologies |
| TGbn | 8/12 | Wang, Qi | Apple Inc. |
| TGbn | 8/12 | Wang, Xiaofei | InterDigital, Inc. |
| TGbn | 8/12 | Ward, Lisa | Rohde & Schwarz |
| TGbn | 8/12 | Wee, Gaius | Panasonic Holdings Corporation |
| TGbn | 8/12 | Wei, Dong | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn | 8/12 | Wullert, John | Peraton Labs |
| TGbn | 8/12 | Xia, Qing | Sony Corporation |
| TGbn | 8/12 | Xiao, Tong | Xiaomi Communications Co., Ltd. |
| TGbn | 8/12 | Xu, Yanchao | Amlogic |
| TGbn | 8/12 | Xu, Yue | Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Yang, Jay | ZTE Corporation |
| TGbn | 8/12 | Yoon, Yelin | LG ELECTRONICS |
| TGbn | 8/12 | Zhang, Jiayi | Ofinno |
| TGbn | 8/12 | Zhang, John | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn | 8/12 | Zhang, Maolin | Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Zhao, Yue | Huawei Technologies Co., Ltd |
| TGbn | 8/12 | Zhong, Ke | Ruijie Networks Co.,Ltd. |
| TGbn | 8/12 | Zhou, Huixuan | OPPO |
| TGbn | 8/12 | Zhou, Lei | H3C Technologies Co., Limited |
| TGbn | 8/12 | Zhou, Pei | TCL |