IEEE P802.11
Wireless LANs

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| TGbn January February March 2024 Teleconference Minutes |
| Date: 2024-03-11 |
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Abstract

This document contains the minutes for TGbn January, February and March 2023 teleconferences.

Revision history:

* Rev0: First version of the document.
* Rev1: Add 5th, 6th and 7th minutes and correct typos.

Abbreviations:

* C: Comment.
* A: Answer.

# 1st Conf. Call: January 29th, Monday (19:00-21:00 ET) - PHY/MAC

* Split PHY and MAC ad-hoc teleconferences.
	+ PHY: <https://mentor.ieee.org/802.11/dcn/24/11-24-0223-00-00bn-minutes-tgbn-phy-ad-hoc-jan-to-march-cc.docx>
	+ MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0218-02-00bn-minutes-for-tgbn-mac-ad-hoc-teleconferences-in-january-to-march-2024.docx>

# 2nd Conf. Call: February 1st, 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); 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 speaked/writed up.

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

Copyright Policy was presented.

* + **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document([11-24-201r2](https://mentor.ieee.org/802.11/dcn/24/11-24-0201-02-00bn-jan-mar-tgbn-teleconference-agenda.docx)).
* 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) & Alfred Asterjadhi (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 [11-24-201r2](https://mentor.ieee.org/802.11/dcn/24/11-24-0201-02-00bn-jan-mar-tgbn-teleconference-agenda.docx).
	+ Discussion: None.
	+ Agenda approved with unanimous consent.
* Technical Submissions – MAP/Coordination:
	+ [11-23/1952r3](https://mentor.ieee.org/802.11/dcn/23/11-23-1952-03-00bn-coordinated-r-twt-for-multi-ap-scenarios-follow-up.pptx): Coordinated R-TWT for Multi-AP scenarios - Follow up

Liuming Lu (OPPO)

(The presentation of the submission had been done the Jaunary 2024 F2F meeting. The presenter explained the update of the submission since the last meeting.)

C: In the slide 5, in the R-TWT setup for Type 1, you newly introduced some R-TWT request and response between APs. But the R-TWT currently uses the broadcast TWT and it could have multiple members. Do you expect each STA negotiate with the AP, and is this kind of R-TWT request response between APs needed?

A: Whether the APs set up the coordinator R-TWT or not depends on the distribution of the stations. If the stations may be impacted by the OBSS interference, I think the coordinated R-TWT is needed.

C: Your proposal is slightly different from a lot of other contributions which propose like the second AP relays or broadcasts another AP’s R-TWT element.

C: In the slide 8, this overall summary says the Type 1 does not require a CSI, but some exchange of the information of transmission power between the APs should be needed, is it right?

A: Yes. The information of transmit power may be need especially for the PD based spatial reuse or the C-SR based spatial reuse which can be used based on the exchange of the transmit power. I think the coordinated spatial reuse triggerd by the multi-AP is different from the PD or C-SR based spatial reuse.

C: In the slide 4, when there are multiple R-TWT member stations in BSS1, the existing R-TWT cannot decide which station transmits in the R-TWT SP. In that case, how should the AP decide to optimize Tx power control? I think the AP2 cannot know which station can transmit first in R-TWT.

A: I think it depends on the decisions and scenarios. The AP1 and the AP2 can make decisions how to form membership between staions. In this proposal, I show an example that the AP2 does the information exchange to limit the transmit power with its own stations.

C: I think it's much better if the client sends its cost characteristics requirements, and then the AP has more understanding of the underlying degrees of freedom that the AP has to schedule, and then interact with other APs in order to find the sort of globally most useful schedule. I guess that that's just one thought. Leading with the R-TWT by the client, that doesn't really work for some clients. That doesn't really work for the beacon. It just doesn't leave the AP with the as much information as it could have. That initiating step is maybe not the best from my perspective.

A: I think it would be that the AP1 and the AP2 can also send the answer solicited and the setup the coordinated R-TWT. I think your comments are reasonable.

C: Regarding scalability aspects, in Type 2, when the AP1 and the AP2 operating the same chanel but their primary channels are different with each other, what happens? When you have more OBSSs, how will it scale?

A: Your concern is reasonable. In my contribution, two BSSs are considered. If we have more OBSSs, the APs can also negotiate with each other and depend on their decision and decide how to set up a where to set up and coordinated R-TWT.

C: Maybe it becomes a combination of Type 1 and Type 2 in more OBSSs cases. Because in some cases, the primary channels become the same, then it falls back to this half-coordinated scheme that you were talking about.

A: If we utilize the MLD in 11be, the number of OBSSs may be reduced.

* + [11-23/1920r2](https://mentor.ieee.org/802.11/dcn/23/11-23-1920-02-00bn-managed-networks-under-highly-congested-scenarios.pptx): Managed Networks under highly congested scenarios

Iñaki Val (MaxLinear)

C: Many thanks for bringing this topic forward. In the slide 10, when we talk about the capability of quantifying the traffic load metrics, each BSS ensures to support these reports. It is good and important, but it doesn't really give us the time dimension very clearly. I assume you're thinking of sort of that, it may be a general sense, like maybe sharing R-TWT agreements, or cost characteristics, requests or agreements, as well as sort of traffic load metrics.

A: I was thinking mainly on existing traffic methods that are already standardized in current 802.11 standard in terms of throughput. I think there could be these KPIs or metrics that will be needed in order to have a better coordination.

C: I think at least sharing information among themselves for helping coordination could be a vital part of the solution.

C: I suppose this concept of some managed network, because some AP centric controls may fulfill strict latency requirements such as industry automation. But in non-managed networks, such as stations or some public spaces where many relatively devices exist, it is quite challenging to centralize management, So, we should expand countermeasure above that.

A: Do you consider the coextence with legacy devices?

C: Yes.

A: We're proposing the centric idea. This proposal is also to do the coexistence with the legacy devices not only propose new ideas that will work with a next generation of Wi-Fi. So, we're also proposing to give more priority access to the AP taking into account the EDCA or DCF parameters than those used by current stations.

C: I agree with your direction.

C: In the slide 7, trigger frames could be a good means, but I think that your access is only able to deal at AC level not at TID or SSID. So, the triggered access cannot use all the tools here are not in line with each other. So, the trigger access cannot use an SSID, what is your thinking on this?

A: I just listed some of the tools that have more control over the the traffic access. We proabably identify some gaps of these current mechanisms.

C: OK. When there is a congestion, the AP has to figure out just what it is expected to trigger as a priority traffic. If the APs manage at an AC level, it cannot do a fine-grained scheduling. So, I think we have to annouce this event for MSCS or TID.

A: Thank you.

C: In your straw poll text, you want to manage the P2P, which includes online and offline P2P operations. I guess you want to include offline P2P. And you want to propose to steer other APs in sub-channel level. How do you control the other APs in the managed networks?

A: We can extend our proposal for the multi-AP environment.

C: In the slide 10, how can we do that the AP is silencing other users? Is it the realistic situation? You may have a lot of legacy users in the network that doesn't even have trigger-based channel access.

A: If we are talking about legacy devices, they don't have any mechanisms to silence in EDCA.We are also proposing to have reminded the channel access, times or backoffs, that are assigned to the AP will have more advantages, with respect to legacy devices. If we take the HCCA mechanisms, the APs takes advantages to wait less time for channel access than any other devices or any other AP devices. To set better parameters in terms of channel access advantages for the AP is the only way to deal with the legacy devices.

C: OK. For the AP scheduling peer to peer, there is no way as well to control other peer to peer tackling the channel and using it without the AP coordination, correct?

A: In this case, the stations also want to establish a peer-to-peer link and ask for resources. For example, during SCS request, the AP is aware of these resources and keeps the medium time for executing that link.

* + [11-23/1972r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1972-01-00bn-evaluation-of-coordinated-spatial-reuse-follow-up.pptx): Evaluation of Coordinated Spatial Reuse – Follow Up

Kosuke Aio (Sony)

C: How do you select MCS and NSS for each transmission? Is it “Genie” or based on certain computation?

A: In this simulation, MCS is fixed for each drop and optimization of MCS is calculated from CNR or SIR. So, it is “Genie.”

C: When we use the transmit power control, we vary the signal level as well as interference level, and it depends on the channel utilization as well. I think it is a little bit optimistic performance. My opinion is that it is better to evaluate it some certain level of assumptions further.

A: Thank you.

C: If we use full-power or similar to the CCA-ED, it looks like to gather up most of the gain. So, I think if we use a full power transmission and selectively use CSR for the good users, that is better than the CSR based on thransmit power control. Have you ever thought that kind of approach?

A: I agree with that. In this simulation slide, CCA-ED performs better capacity gain compared to TDMA. But, for example, when CSI is inaccurate, the throughput for CCA-ED will possibly degrade compared to TDMA case.

C: In the case of MCS Max with optimized MCSs, what is the difference between this scheme with the CSI-4APopt? I think you are alredy optimized the tarege MCSs.

A: There is the default point that is only constrained about sharing AP. CSR for AP means aiming to maximize capacity, but the AP will probably assume at one transmit data. We set the one constraint that sharing the AP must aim target MCS, and then optimize the target MCS optimization includes the condition no worse throughput than TDMA. So, CSMA/CA can achieve throughput to gain without worse in fairness.

C: OK. In the slide 9, for the CCA-ED, in this small cell case, why is the performance reduced in large SNR?

A: In this case, in CCA-ED, all the APs can transmit with maxim power and the AP can adjust MCS from the CSI estimated and returned from each STA. In this case, almost all Tx parameters are the same as those in the CSRMCSmax case.

C: In the range of the midpoint SNR is greater than 40 dB, throughput performance degrades.

A: After this point, neighboring APs can detect the packet above ED level. So, when the sharing AP starts data transmission, neighboring APs cannot transmit data.

C: In the slide 4, you assume two types of CSI, accurate CSI and inaccurate CSI. I’m wondering the meaning of “accurate” and “inaccurate”. Do you mean “accurate” is perfect CSI?

A: In the accurate CSI case, we can calculate TX power SNR or the calculated result based on the pathloss level from the distance. In the inaccurate CSI case, I added some random value to calculate from minus three to plus three dB, and thus the AP cannot know the right path loss level.

C: OK. As the previous commentor said, I also think the perfect MCS selection is somewhat optimistic.

A: I think inaccurate CSI may correspond to the imperfect MCS selection case because the AP cannot know the right SNR value.

C: In the slide 12, what is the difference between the “all links” and the “my link” in CSR-MCSmax? Do the “all links” include the RSSI between the sharing AP and its own BSS as well as those between the sharing AP and the OBSS STAs? And does my link mean just the RSSI between the AP and its own BSS?

A: Yes. The appendix (the slide 15) illustrates the “all links” and the “my link.”

* + [11-23/2084r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1895-02-00bn-c-tdma-frame-sequence.pptx): Discussion on Enhanced R-TWT for UHR Jeongki Kim (Offino, LLC.)

(There was no question.)

* Adourned at 20:58.

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

* Split PHY and MAC ad-hoc teleconferences.
	+ (PHY: cancelled)
	+ MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0218-02-00bn-minutes-for-tgbn-mac-ad-hoc-teleconferences-in-january-to-march-2024.docx>

# 4th Conf. Call: February 22nd, Thursday (10:00-12:00 ET) – PHY/MAC

* Split PHY and MAC ad-hoc teleconferences.
	+ (PHY: cancelled)
	+ MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0320-00-00bn-11bn-mac-ad-hoc-teleconference-minutes-feb-22-march-2024.doc>

# 5th Conf. Call: February 26th, Tuesday (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); 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 speaked/writed up.

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

Copyright Policy was presented.

* + **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document([11-24/0201r7](https://mentor.ieee.org/802.11/dcn/24/11-24-0201-07-00bn-jan-mar-tgbn-teleconference-agenda.docx)).
* 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) & Alfred Asterjadhi (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 [11-24/0201r7](https://mentor.ieee.org/802.11/dcn/24/11-24-0201-07-00bn-jan-mar-tgbn-teleconference-agenda.docx).
		- Two presentor requested to be deferred or postponed their submissions.
		- One submission related to coordinated spatial reuse was added.
	+ Discussion: None.
	+ Agenda approved with unanimous consent.
* Technical Submissions – Miscellaneous (including C-SR MAP):
	+ [11-23/1967r1](https://mentor.ieee.org/802.11/dcn/23/11-23-1967-01-00bn-trigger-based-uplink-adapted-transmission.pptx): Trigger based uplink adapted transmission

Ming Gan (Huawei Technology)

C: If the STA shirnks the bandwidth, then AP need to detect, which 20 MHz channel is transmitted or not?

A: Yes. There are two ways for detection. One is implicit and the other is explicit. I recommend explicit way to inform some indication in the U-SIG field and then AP can know it.

C: In this case each STA should contain the same U-SIG. I think it has some problems.

C: I have the same concern with the previous commentor. I agree that the implicit is unreliable and thus explicit is preferred. I see the problem with using explicit.

A: We can think about one way to make sure how explicit indication in U-SIG should be.

C: The specific concern is if you’ve got two or more cliens transmitting the U-SIGs at the same time, we don’t really have a good way to process that if they are transmitting different information.

A: OK. We can discuss offline, thank you. From outside, maybe there's one simple way to address this issue.

* + [11-24/0088r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0088-01-00bn-maximizing-channel-bandwidth-in-dense-ap-deployments.pptx): Maximizing channel bandwidth in dense AP deployments

Malcolm Smith (Cisco Systems)

C: There's also the proposal on dynamic power saving that allows an AP to reduce its operating channel. The first question is: Is your proposal equivalent to that just that using multi-AP framework as the initiation for that expansion? The second question related to bandwidth expansion. If an AP just arbitrarily starts using the bandwidth expansion that was not a part of the initlal signaling, then could there be medium synchronization issues? I think at least one of the two APs must be observing the full bandwidth before this expansion process.

A: Regarding the first question, I meand definitely the advantage of this tecunique is power saving using narrower bandwidth. But this technique does solve the problem of the density deployment, in particular, where it's necessary to coordinate with your neighboring APs. When the channel usage is changed as time goes by (e.g., office environment), the available channel bandwidth should also be controlled dynamically. For the second question, the first point is that all APs do off-channel scanning through determine if the channel can be used. The second point is that the offered load shifs in a network load.

C: In the slide 6, the bandwidth is very responsive. I think this kind of opereation may be done in the existing standard. At least, the AP can control the bandwidth in each PPDU. So maybe this kind fo scheme is needed for the non trigger-based uplink transmission.

A: The key is that both the APs are aware of the maximum bandwidth PPDU that can be shared or used. My suspicion is we are highly unreliable to simply change the operating bandwidth of the AP and expect all the stations. The practical method to be selective of which STAs will be expanded into even to the extent of bandwidth, which depends on the appilicaiton and traffic load. But we don't really see that the changing the bandwidth of operating channels will not cause a huge amount of destruction in legacy devices out there.

C: Could you tell me about your assumption of controlled circumstances in detail?

A: First, all the the APs in the network (e.g., conference hall, stadium, office) are capable of supporting the channel. The second is that if the AP chooses to expand the bandwidth, the extension will not cause interfereoce on the neighboring APs. The third is that there has to support within the BSS of the chnnel. I think those three things would be the required to trigger this operation. Regarding power savings, the bandwidth can adjust according to the traffic load.

C: In the slide 3, what does the “10+” refer to?

A: This is maybe right to the previous slide. I need to have minimum 8 channels but 10 have enough separation from a co-channel interference point of view. Compared with cellular, Wi-Fi should have a bit more conservative.

C: O.K. Do you have any area?

A: I can share the simulation data with you. The cell size is a big factor when we consider the required number of channels. That depends on use cases and transmit power.

C: How does the APs track its medium when it tries to expand?

A: It is assumed that off-channel scanning is always going on at each AP. The operationg channel plus also channels beside them we have to scan.

C: I understand. But I assume that of channel scanning that your taking is a little bit long term, right?

A: Yes.That’t the long term oeration in the seconds.

C: Basically, on a TXOP level, if you want to expand the channl bandwidth, you need to know some NAV is already set in some other bandwidth, and all of that you are off-channel scanning wouldn’t give you that information.

A: Channel scanning we are doing here is more responding to any sort of imminen or dynamic load conditions in real time manner.

C: You first started with a problem statement that the APs will be using their bandwidth to have more conservative approach to minimize the interference between the neighboring APs. In the case on the slide 6, if the configuration was done in that way, is the neighboring APs that occupies the rest of 240 MHz, and it becomes lightly loaded?

A: Correct. If the traffic load of the AP1 operating 80 MHz drops, then you can operate 20 MHz and then that 60 MHz can be given to the other APs for that burst of traffic.

C: If the neighboring AP, which are in the 240 MHz next to 80 MHz and if their load is high enough, you cannot expand your badwidth, right?

A: I mean every AP has the same load, then you wouldn’t naturally expand a bandwidth as described here; however, it depends on what load consist of.

C: In the slide 6, is this BSS bandwidth or PPDU bandwitdth?

A: I think it is easier to implement as PPDU bandwidth.

C: In the case, wny do you mention a seleted stations? Some may not support and then do the association because in some slides you mentioned that selected or eligible.

A: STAs see the fields if you change the operation bandwidth of the AP.

* + [11-24/0093r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0093-01-00bn-nav-setting-for-coordinated-tdma.pptx): NAV setting for Coordinated TDMA Debakar Das (Intel)

(Deferred by the presenter)

* + [11-24/0050r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0050-00-00bn-coordinated-spatial-reuse-types.pptx): Coordinated Spatial Reuse Types Hassan Omar (Huawei Technologies)

(Postponed due to absence of he presentor.)

(The agenda was revised to add Wook Bong’s presentation)

* + [11-24/0114r0](https://mentor.ieee.org/802.11/dcn/24/11-24-0050-00-00bn-coordinated-spatial-reuse-types.pptx): Touhghts on Power Control for CSR Wook Bong Lee (Apple)

C: In the slide 9, what is the difference between the local CSI and the full CSI?

A: The full CSI is V-matrix and delta. Basically it corresponds to the full H matrix. The AP can decide what is the reciver or filter.

C: Is it related to the partial knowledge?

A: Yes.

C: In the slide 22, you mean there is no need to know the interference if don’t use power control. But if we adapt the MCS level or something like that, we need to adjust the MCS to the link quality. How about that?

A: Because the AP’s transmit power level is steady. I assume the best feedback in the simulation.

C: My major concern of this is when you compare the CSR with and without power control, you show that the performance of the CSR with power control. It’s not as good as the CSR without power control. But I don’t think this should be the case. Because if you do the power control appropriately, then no power control is always a subset of power control, right?

A: I evaluated very similar scheme as other proposals, which is based on the fairness scheme. So, optimization could be done but it is not easy. I tried but it was not easy. In the reference [3], the authors actually said the full power transmission is the optimal. The optimal solution is depending on the deployment scenarios, and thus it will be very complex.

C: If we do that, some kind of optimization is needed. I think if the APs know the path loss between the STA and the shared AP or the sharing AP, I think it could be done in a not so complicated way.

A: We also need to consider hidden node problem, which makes the optimization complex.

C: I agree that there are some rooms of study about coordinated SR abtou feedback and link adaptation. You assume RSSI variation +- 3dB but you also assume ideal ransmit beamforming. My concern is about CSI accuracy and variation speed of channel.

A: I also tested the actual simulation including the V-matrix defined in 11ac. There is almost no difference, and it is also reflectiong some level of the error as well.

C: Regarding coordinated SR without power control as described in the slide 9, how did you do station selection when the AP transmits a packet?

A: In this simulation, we assume center STAs within 0.375 distance. Because it is only between the associated STAs.

C: If the AP doesn’t know this information, is there any performance loss about the scheme?

A: I assume the AP doesn’t need to know the loation, just needs to know the measure the RSSI at the STAs. It is not related to the location of the STAs but just the RSSIs.

C: How about the case when another AP transmits packets?

A: The AP already knows the RSSIs from the STAs and the RSSIs of the sharing AP or the shared AP will be very high. The sharing AP should exclude those APs that transmit too high interference and should avoid coordination.

C: Is there any additional procedure?

A: No. The interference is in the range from -82 dBm to -62 dBm. If it is more than -62dBm, we should avoid such situation.

* AoB: None.
* Adourned at 20:45.

# 6th Conf. Call: February 29th, Thursday (10:00-12:00 ET) – PHY/MAC

* Split PHY and MAC ad-hoc teleconferences.
	+ (PHY: cancelled)
	+ MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0320-02-00bn-11bn-mac-ad-hoc-teleconference-minutes-feb-22-march-2024.doc>

# 7th Conf. Call: March 4th, Monday (19:00-21:00 ET) – PHY/MAC

* Split PHY and MAC ad-hoc teleconferences.
	+ (PHY: cancelled)
	+ MAC: <https://mentor.ieee.org/802.11/dcn/24/11-24-0320-03-00bn-11bn-mac-ad-hoc-teleconference-minutes-feb-22-march-2024.doc>

# 8th Conf. Call: March 7th, Thursday (10:00-12:00 ET) – Joint

* Call the meeting to order
* Ross Jian Yu took the role of the temporal secretary due to absence of the TGbn secretary (Yusuke Asai).
* 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); 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 speaked/writed up.

* + Copyright Policy: Participants are advised that
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Copyright Policy was presented.

* + Yusuke Asai joined the teleconference and took over the secretary work from Ross Jian Yu.
	+ **Patent, Participation, Copyright and policy related subclause:** Please refer to the agenda document([11-24/0201r](https://mentor.ieee.org/802.11/dcn/24/11-24-0201-10-00bn-jan-mar-tgbn-teleconference-agenda.docx)10).
* 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) & Alfred Asterjadhi (aasterja@qti.qualcomm.com)
	+ Please ensure that the following information is listed correctly when joining the call:
	+ "[voter status] First Name Last Name (Affiliation)"
* Announcement
	+ Chair announced the deadline for the presentation queue input during March meeting. The cut-off timing is the Sunday, March 10th, EOB (5:00pm) at Denver local time.
* Agenda
	+ Chair reviews proposed agenda found in [11-24/0201r10](https://mentor.ieee.org/802.11/dcn/24/11-24-0201-10-00bn-jan-mar-tgbn-teleconference-agenda.docx).
	+ Discussion: None.
	+ Agenda approved with unanimous consent.
* Technical Submissions – (C-)SR and MAP:
	+ [11-24/0410r](https://mentor.ieee.org/802.11/dcn/23/11-23-1967-01-00bn-trigger-based-uplink-adapted-transmission.pptx)2: QoS based Spatial Reuse Gaurav Patwardhan (HPE)

C: In the slide 14, the modification for SR to allow AC-specific threshold dramatically improves channel access. Mabe it is good idea to achieve some peformance improvement. But is it needed to change standard modification? Because we already have OBSS\_PD and ED level adjustmemt.

A: Today, in the standard, we actually have an index for ACs but very specific. If we specify it to the spec, we will see more and more precise. I get a point that today’s OBSS\_PD can be algorithmically changed. It’s just not chaged in physical layer. Both of transmitter and receiver sides use the OBSS\_PD. It needs to be put into the spec to have a fairness across 11bn and legacy clients.

C: I didn’t fully get it but the standard 802.11 today tells you if you want to use that OBSS\_PD level, you just use that transmit power regardless of which AC you are using to contend the channel. I mean, there is nothing in the standard that prevents you of doing this. And there is no modification required to do it. That's in my opinion.

A: Thank you.

C: Regarding simulation conditions, do you assume the transmit power control as OBSS\_PD-based or maximum transmit power?

A: The power of an AP is fixed, and client power is not modelled here.

C: Regarding SINR measumenet, all APs need to measure SINR values at STAs and all interference links. I have concern about the measurement time.

A: I see your point. If this scheme is implemented, then the processing time would be much longer. We still need a kind of link level simumation. We had to abstract it out to a link here simulation and run that. I agree but we can take a look at that.

C: When you are doing spatial reuse and you have two concurrent transmit power control, the interference condition could be changed. If you select the MCSs and then SINR is changed, how do you deal with that?

A: This is link simulation. We are abstracted out there was like we tried, but there was no way to kind of finish your identity BSS simulation just wasn't converging fast enough. So, this is kind of abstracted out to kind of have a link level performance.

* + [11-24/0050r](https://mentor.ieee.org/802.11/dcn/24/11-24-0050-00-00bn-coordinated-spatial-reuse-types.pptx)0: Coordinated Spatial Reuse Types Hassan Omar (Huawe Technologies)

C: There may be another type where there are three APs, and the left AP is out of the range of the the right AP. In this case, it doesn't really matter if they do an uplink or downlink. Is that part of your thinking as well? Do you think that belongs under the coordinated special reuse term?

A: The Co-SR we are considering is pairwise. So, it is pairwise among one of these four types.

C: I think it is not quite the same. When two shared APs are transmitting at the same time, that is not captured by any of these types.

A: Do you mean the sharing AP is not transmitting at all and it just got the medium and then a trigger to shared APs, is it right?

C: Bascally, yes. The sharing AP that grips the medium may transmit some packets to its own BSS. After that, it may simultaneously grant to shared APs and if they may be far enough apart, they don’t care whether its downlink or uplink.

A: If the sharing AP is not transmitting data, I agree with you, it is not included in any types here. Here, I assume that there is transmission performed by the sharing AP and shared AP. You mean it grants the remaing of the TXOP and transmit pakets simultaneously, is it correct?

C: Basically yes. It granted the two different shared APs.

A: I think we need some offline discussions.

C: In the type 3, the trigger frame is sent from the sharing AP, is that tgigger also being used for the triggering the transmission for downlink PPDU from the shared AP?

A: There is that coordination trigger that specifies what is the shared AP that is going to transmit and maybe when exactly the transmission should start.

C: I echo the previous comementor, when we consider three or more APs, it is confusing.

A: If we have multiple shared APs, that is pairwise. That coordinated SR is between every sharihg AP and each shared AP.

C: Regarding the type 2, there is a trigger frame. It is a kind of a DL PPDU. I think the trigger frame also needs to spatial reuse. How about that?

A: I agree with you. There are the same requirements of measurements and report for type 1.

C: Do you assume the STAs could be legacy STAs or only UHR STAs?

A: It may be a legacy (pre-UHR) STA. In type 1, there is no requiremetnt at all. But if you want to control tht transmit power of those STAs, the legacy STA cannot be supported.

C: I agree with the type 1 is the main use case for Co-SR. You mentioned that type 1 requires transmit power control only for the shared APs but I think the sharing AP can control its transmit power as well. We should not limit the condition.

A: I agree with you. In all these types the sharing AP may reduce the transmit power. In all types, the sharing AP may reduce the transmit power based on the algorithm for the shared APs.

* + [11-24/0095r](https://mentor.ieee.org/802.11/dcn/24/11-24-0095-00-00bn-efficient-coordinated-spatial-reuse-follow-up.pptx)0: Efficient Coordinated Spatial Reuse Follow Up

Lenardo Lanante (Ofinno)

C: In the slide 5, In this scheme the interference measuremet isreferred to CQI info but not CSI, right?

A: Yes.

C: How do you transmit this NDPA frame, like OFDMA kind of transmission or totally overallping in frequency?

A: Both of them can be possible. But I mean that the simplest one is using OFDMA with separate transmitted in separate frequency channels.

C: So, the NDPA frame contains different information in this case, right?

A: Yes.

C: In the slide 5, what do you measure the X1 and X2?

A: This is to measure the estimated pathloss between the target STA and the AP. We don’t need a lot of information compared to CSI. But we can definitely use the CSI if you want to define the new thing.

C: It is difficult to know the transmit power, so it is RSSI metric measured by the packet detection. If multiple STAs transmit NDPs together, then it will be difficult to measure the RSSIs.

A: OK.

* + [11-24/0084r](https://mentor.ieee.org/802.11/dcn/24/11-24-0084-01-00bn-considerations-on-multi-ap-operation-follow-up.pptx)1: Considerations on Multi-AP Operation - Follow Up Jiayi Zhang (Ofinno)

C: I see you are using the terms of sharing AP and shared AP quite liberally. What are the definitions of these terms in yoru contribution?

A: In my contribution, we align the definitions of a sharing AP and a shared AP to the discussion of the TGbn. In the selection phase of themulti-AP transmission, the sharing AP is a kind of the master AP, and the shared AP is the slave AP. There is different definition but basically, it is based on TXOP.

C: You have mentioned actlually two definition. One is the based on the TXOP and the other is like the master and slave APs that kind of framework. Both are two different definitions.

A: In our case, that is for TXOP.

C: The TGbn is considering TWT-based coordination. How does this definition fit in there?

A: If we consider TWT, then you would like to have AP which is always the like group leader, that could be kind of master, but we haven't defined that yet.

C: I have a silimar comment of previous commentor. I think we really a lot of termilologies. If you want to run a straw poll, you should make sure that the the members of that group agree on those terminologies.

A: Thank you.

C: In your frame exchange, there's multi- AP selection for unicast or multicast.What if three of APs are trying to share for an AP group?

A: If there are more than one shared AP, then the multiple shared APs send feedback about either transmission scheme or the scheduling. Then, the sharing AP consider how to handle the coordinated transmission.

C: But may they have different schemes?

A: I think it depds on the sharing scheme. If the preferred scheme reported from the shared AP is different from the that of sharing AP, the sharing AP should consider what is the best for the overall performance.

C: This confirm frame would be confused.

A: The confirmation frame is more than just acknowledgment. It will notice the shared AP of the selected and the confirmation.

C: So, the AP2 may not be aware of the AP3, for example.

A: The AP 2 is only aware of the frame from tne AP1. Transmission pair depends on cases.

* + [11-24/0086r](https://mentor.ieee.org/802.11/dcn/24/11-24-0086-00-00bn-multi-ap-coordination-for-sta-re-association.pptx)1: Multi-AP Coordination for STA (Re)Association Jiayi Zhang (Ofinno)

(There was no C/A queue.)

* AOB: None.
* Adjouned at 11:48

**Appendix**

* Attendee List for the 2nd Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbn (Joint) | 2/1 | Abouelseoud, Mohamed | Apple Inc. |
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| TGbn (Joint) | 2/1 | Choi, Jinsoo | LG ELECTRONICS |
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| TGbn (Joint) | 2/1 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn (Joint) | 2/1 | LU, Yuxin | TCL |
| TGbn (Joint) | 2/1 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
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| TGbn (Joint) | 2/1 | Minotani, Jun | Panasonic Corporation |
| TGbn (Joint) | 2/1 | Montemurro, Michael | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/1 | Morioka, Hitoshi | SRC Software |
| TGbn (Joint) | 2/1 | Motozuka, Hiroyuki | Panasonic Holdings Corporation |
| TGbn (Joint) | 2/1 | Mutgan, Okan | Nokia |
| TGbn (Joint) | 2/1 | Nayak, Peshal | Samsung Research America |
| TGbn (Joint) | 2/1 | Noh, Si-Chan | Newracom Inc. |
| TGbn (Joint) | 2/1 | Norouzi, Sara | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
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| TGbn (Joint) | 2/1 | Patil, Abhishek | Qualcomm Incorporated |
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| TGbn (Joint) | 2/1 | Quan, Yingqiao | Spreadtrum Communications (Shanghai) Co., Ltd.; Unisoc (Shanghai) Technologies Co., Ltd. |
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| TGbn (Joint) | 2/1 | Serizawa, Kazunobu | Advanced Telecommunications Research Institute International (ATR) |
| TGbn (Joint) | 2/1 | Sevin, Julien | Canon Research Centre France |
| TGbn (Joint) | 2/1 | Shafin, Rubayet | Samsung Research America |
| TGbn (Joint) | 2/1 | Shirakawa, Atsushi | SHARP CORPORATION |
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| TGbn (Joint) | 2/1 | Talarico, Salvatore | Sony Corporation |
| TGbn (Joint) | 2/1 | Tanaka, Yusuke | Sony Corporation |
| TGbn (Joint) | 2/1 | Taori, Rakesh | Infineon Technologies |
| TGbn (Joint) | 2/1 | Tsodik, Genadiy | Huawei Technologies Co., Ltd |
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| TGbn (Joint) | 2/1 | Xia, Qing | Sony Corporation |
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| TGbn (Joint) | 2/1 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/1 | Zhang, Jiayi | Ofinno |
| TGbn (Joint) | 2/1 | Zhang, John | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn (Joint) | 2/1 | Zhang, Maolin | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/1 | Zhao, Yue | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/1 | Zhong, Ke | Ruijie Networks Co., Ltd. |
| TGbn (Joint) | 2/1 | Zhou, Lei | H3C Technologies Co., Limited |
| TGbn (Joint) | 2/1 | Zhou, Pei | TCL |

* Attendee List for the 5th Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbn (Joint) | 2/26 | Adachi, Tomoko | TOSHIBA Corporation |
| TGbn (Joint) | 2/26 | Aio, Kosuke | Sony Corporation |
| TGbn (Joint) | 2/26 | Ajami, Abdel Karim | Apple Inc. |
| TGbn (Joint) | 2/26 | Anwyl, Gary | Mediatek Inc |
| TGbn (Joint) | 2/26 | Asai, Yusuke | Nippon Telegraph and Telephone Corporation (NTT) |
| TGbn (Joint) | 2/26 | Au, Kwok Shum | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Baek, SunHee | LG ELECTRONICS |
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| TGbn (Joint) | 2/26 | Bian, Tong | Panasonic |
| TGbn (Joint) | 2/26 | Byeon, Seongho | Samsung Electronics Co., Ltd. |
| TGbn (Joint) | 2/26 | Carney, William | Sony Group Corporation |
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| TGbn (Joint) | 2/26 | Chen, Junbin | TP-Link Corporation Limited |
| TGbn (Joint) | 2/26 | Chen, You-Wei | MediaTek Inc. |
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| TGbn (Joint) | 2/26 | CHERIAN, GEORGE | Qualcomm Technologies, Inc |
| TGbn (Joint) | 2/26 | Cho, Hangyu | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | Choi, Jinsoo | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | Chu, Liwen | NXP Semiconductors |
| TGbn (Joint) | 2/26 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | Coffey, John | Realtek Semiconductor Corp. |
| TGbn (Joint) | 2/26 | Cui, Yaoshen | TP-Link Corporation Limited |
| TGbn (Joint) | 2/26 | Das, Subir | Peraton Labs |
| TGbn (Joint) | 2/26 | Derham, Thomas | Broadcom Corporation |
| TGbn (Joint) | 2/26 | Dong, Xiandong | Xiaomi Communications Co., Ltd. |
| TGbn (Joint) | 2/26 | Eiger, Martin | Peraton Labs |
| TGbn (Joint) | 2/26 | Erkucuk, Serhat | Ofinno |
| TGbn (Joint) | 2/26 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| TGbn (Joint) | 2/26 | Fang, Yonggang | MediaTek Inc. |
| TGbn (Joint) | 2/26 | Fischer, Matthew | Broadcom Corporation |
| TGbn (Joint) | 2/26 | Fujimori, Yuki | Canon Research Centre France |
| TGbn (Joint) | 2/26 | Gao, Ning | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn (Joint) | 2/26 | Ghosh, Chittabrata | Apple Inc. |
| TGbn (Joint) | 2/26 | Gu, Jaheon | SAMSUNG ELECTRONICS |
| TGbn (Joint) | 2/26 | Gu, Xiangxin | Spreadtrum Communications (Shanghai) Co., Ltd. |
| TGbn (Joint) | 2/26 | Gupta, Binita | Cisco Systems, Inc. |
| TGbn (Joint) | 2/26 | Ha, Taeyoung | Samsung Electronics Co., Ltd. |
| TGbn (Joint) | 2/26 | Hamilton, Mark | CommScope |
| TGbn (Joint) | 2/26 | Hansen, Christopher | Covariant Corporation |
| TGbn (Joint) | 2/26 | Hart, Brian | Cisco Systems, Inc. |
| TGbn (Joint) | 2/26 | Hedayat, Ahmadreza | Apple Inc. |
| TGbn (Joint) | 2/26 | Hervieu, Lili | CableLabs |
| TGbn (Joint) | 2/26 | Ho, Duncan | Qualcomm Technologies, Inc |
| TGbn (Joint) | 2/26 | Hu, Chunyu | Spreadtrum Communications US |
| TGbn (Joint) | 2/26 | HUANG, CHIHAN | MediaTek Inc. |
| TGbn (Joint) | 2/26 | Huang, Po-Kai | Intel Corporation |
| TGbn (Joint) | 2/26 | Inohiza, Hirohiko | Canon |
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| TGbn (Joint) | 2/26 | Kabbinale, Aniruddh | SAMSUNG |
| TGbn (Joint) | 2/26 | Kamel, Mahmoud | Interdigital Inc. |
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| TGbn (Joint) | 2/26 | Kim, Jeongki | Ofinno |
| TGbn (Joint) | 2/26 | Kim, Sang Gook | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | Kim, Sanghyun | WILUS Inc. |
| TGbn (Joint) | 2/26 | Kim, Youhan | Qualcomm Technologies, Inc. |
| TGbn (Joint) | 2/26 | Kishida, Akira | NTT |
| TGbn (Joint) | 2/26 | Klein, Arik | Huawei Technologies Co., Ltd |
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| TGbn (Joint) | 2/26 | Lanante, Leonardo | Ofinno |
| TGbn (Joint) | 2/26 | Lee, Hong Won | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | LEE, JOONSOO | Newracom Inc. |
| TGbn (Joint) | 2/26 | Lee, Wookbong | Apple Inc. |
| TGbn (Joint) | 2/26 | Li, Haozheng | TP-Link Corporation Limited |
| TGbn (Joint) | 2/26 | Li, Jialing | Qualcomm Technologies Inc. |
| TGbn (Joint) | 2/26 | Li, Weiyi | Spreadtrum Communication USA, Inc |
| TGbn (Joint) | 2/26 | Li, Yanchun | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbn (Joint) | 2/26 | Lim, Dong Guk | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | Lim, Yeon Geun | Newracom Inc. |
| TGbn (Joint) | 2/26 | LIU, QINGLAI | Panasonic |
| TGbn (Joint) | 2/26 | Lou, Hanqing | InterDigital, Inc. |
| TGbn (Joint) | 2/26 | Lu, kaiying | MediaTek Inc. |
| TGbn (Joint) | 2/26 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd. |
| TGbn (Joint) | 2/26 | LU, Yuxin | TCL |
| TGbn (Joint) | 2/26 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| TGbn (Joint) | 2/26 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| TGbn (Joint) | 2/26 | Mehrnoush, Morteza | Apple Inc. |
| TGbn (Joint) | 2/26 | Minotani, Jun | Panasonic Corporation |
| TGbn (Joint) | 2/26 | Morioka, Hitoshi | SRC Software |
| TGbn (Joint) | 2/26 | Motozuka, Hiroyuki | Panasonic Holdings Corporation |
| TGbn (Joint) | 2/26 | Mutgan, Okan | Nokia |
| TGbn (Joint) | 2/26 | Naik, Gaurang | Qualcomm Technologies, Inc |
| TGbn (Joint) | 2/26 | Namboodiri, Vamadevan | SAMSUNG ELECTRONICS |
| TGbn (Joint) | 2/26 | Nayak, Peshal | Samsung Research America |
| TGbn (Joint) | 2/26 | Neishaboori, Azin | General Motors Company |
| TGbn (Joint) | 2/26 | Noh, Si-Chan | Newracom Inc. |
| TGbn (Joint) | 2/26 | Norouzi, Sara | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Ouchi, Masatomo | Canon |
| TGbn (Joint) | 2/26 | Palayur, Saju | Maxlinear Inc |
| TGbn (Joint) | 2/26 | Pandey, Sheetal | Synaptics Inc. |
| TGbn (Joint) | 2/26 | Park, Minyoung | Intel Corporation |
| TGbn (Joint) | 2/26 | Patil, Abhishek | Qualcomm Incorporated |
| TGbn (Joint) | 2/26 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| TGbn (Joint) | 2/26 | Petrick, Albert | InterDigital, Inc. |
| TGbn (Joint) | 2/26 | Qi, Yue | Samsung Research America |
| TGbn (Joint) | 2/26 | Quan, Yingqiao | Spreadtrum Communications (Shanghai) Co., Ltd.; Unisoc (Shanghai) Technologies Co., Ltd. |
| TGbn (Joint) | 2/26 | Ratnam, Vishnu | Samsung Research America |
| TGbn (Joint) | 2/26 | Ryu, Kiseon | NXP Semiconductors |
| TGbn (Joint) | 2/26 | Sato, Takuhiro | SHARP CORPORATION |
| TGbn (Joint) | 2/26 | Schelstraete, Sigurd | MaxLinear |
| TGbn (Joint) | 2/26 | Serizawa, Kazunobu | Advanced Telecommunications Research Institute International(ATR) |
| TGbn (Joint) | 2/26 | Shafin, Rubayet | Samsung Research America |
| TGbn (Joint) | 2/26 | Shirakawa, Atsushi | SHARP CORPORATION |
| TGbn (Joint) | 2/26 | Smith, Malcolm | Cisco Systems, Inc. |
| TGbn (Joint) | 2/26 | Song, Hao | Intel Corporation |
| TGbn (Joint) | 2/26 | SUH, JUNG HOON | Huawei Technologies Canada; Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Talarico, Salvatore | Sony Corporation |
| TGbn (Joint) | 2/26 | Tanaka, Yusuke | Sony Corporation |
| TGbn (Joint) | 2/26 | Taori, Rakesh | Infineon Technologies |
| TGbn (Joint) | 2/26 | Tsujimaru, Yuki | Canon |
| TGbn (Joint) | 2/26 | Urabe, Yoshio | Panasonic Holdings Corporation |
| TGbn (Joint) | 2/26 | Wang, Lei | Futurewei Technologies/Huawei Technologies |
| TGbn (Joint) | 2/26 | Wang, Qi | Apple Inc. |
| TGbn (Joint) | 2/26 | Wang, Ying | InterDigital, Inc. |
| TGbn (Joint) | 2/26 | Wei, Dong | NXP Semiconductors |
| TGbn (Joint) | 2/26 | Wu, Chao-Yi | Samsung Electronics Co., Ltd. |
| TGbn (Joint) | 2/26 | Wu, Kanke | Apple Inc. |
| TGbn (Joint) | 2/26 | Wullert, John | Peraton Labs |
| TGbn (Joint) | 2/26 | Xia, Qing | Sony Corporation |
| TGbn (Joint) | 2/26 | Yamada, Ryota | SHARP CORPORATION |
| TGbn (Joint) | 2/26 | Yang, Jay | ZTE Corporation |
| TGbn (Joint) | 2/26 | Yang, Jimmy | Moxa Inc. |
| TGbn (Joint) | 2/26 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| TGbn (Joint) | 2/26 | Yee, James | MediaTek Inc. |
| TGbn (Joint) | 2/26 | Yoon, Yelin | LG ELECTRONICS |
| TGbn (Joint) | 2/26 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Yukawa, Mitsuyoshi | Canon |
| TGbn (Joint) | 2/26 | Zhang, Jiayi | Ofinno |
| TGbn (Joint) | 2/26 | Zhang, John | GuangDong OPPO Mobile Telecommunications Corp., Ltd. |
| TGbn (Joint) | 2/26 | Zhang, Maolin | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Zhang, Yan | Apple Inc. |
| TGbn (Joint) | 2/26 | Zhao, Yue | Huawei Technologies Co., Ltd |
| TGbn (Joint) | 2/26 | Zhong, Ke | Ruijie Networks Co.,Ltd. |
| TGbn (Joint) | 2/26 | Zhou, Pei | TCL |

* Attendee List for the 8th Conf. Call:

(To be added.)