IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UHR SG June 2023 teleconference minutes | | | | |
| Date: 2023-06-01 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Ross Jian Yu | Huawei | Building F3, Huawei Industrial Base, Shenzhen, Guangdong, China |  | ross.yujian@huawei.com |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

This document contains the minutes for UHR SG June 2023 teleconference.

Revision history:

* Rev0: initial version.
* Rev1: add minutes for the 3rd call
* Rev2: add minutes for the 4th call

Abbreviations:

* A: Answer
* C: Comment

# 1st Conf. Call: June 1st Thursday (10:00–12:00 ET)

* The Chair, Laurent Cariou (Intel), calls 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 speaks/writes up**.

Copyright Policy: Participants are advised that

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

**Copyright Policy was presented.**

**Patent, Participation, Copyright and policy related subclause:** Please refer to Patent And Procedures**。**

* 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 “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “<UHR SG > conference call that you are attending.

If you are unable to record your attendance contact Laurent Cariou ([laurent.cariou@intel.com](mailto:laurent.cariou@intel.com)) and Ross Jian Yu ([ross.yujian@huawei.com](mailto:ross.yujian@huawei.com)) for assistance

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 [11-23-0934r](https://mentor.ieee.org/802.11/dcn/23/11-23-0934-00-0uhr-uhr-sg-june-2023-teleconference-agendas.docx)0

Discussion:

* + - C: 799r0 and 798r0 have not been uploaded
    - A: Put at the end of the agenda
    - C: My contribution is missing in the queue. Like to add my contribution in the queue.
    - A: I added it back.
    - C: Thank you
  + Agenda approved with unanimous consent.
* Announcements:

None

* Submissions
  + [11-23/0284r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0284-00-0uhr-beacon-design.pptx) Beacon design Liwen Chu (NXP)
    - C: I do have quite a few concerns. For hospital, devices seldom change. 11g devices in medical are still common. We just need to transmit anything. Slide 11, I am not sure how it works. HT element, we still use it for low MCS. Even we don’t need HT element, VHT or HT devices which haven’t tested absence, we expect to see some issues. For UHR onwards, we can test those. Have two beacons is the least worth approach.
    - A: As I mentioned, for some hotspot, we don’t expect this method will be used. For some BSS, the AP announces the old generations will not be allowed to associate this AP. The AP can use this method.
    - C: The EHT device expects HT element. How do you see that working?
    - A: Apply to UHR devices.
    - C: it is UHR+?
    - A: yes.
    - C: Beacon design 2, what will be included in beacon and what will be in beacon extension?
    - A: If the beacon is longer enough, the AP will try to separate.
    - C: beacon extension is for new generation, right?
    - A: yes. UHR.
    - C: what does the last sentence mean? Why do we have two these conditions?
    - A: because of robust low data and short beacon interval. If this AP has no critical update, the AP does not need to transmit beacon extension.
    - C: this beacon is for both beacon and beacon extension?
    - A: in this case, the AP may decide to not transmit beacon extension.
    - C: but still need to transmit something for synchronization?
    - A: yes
  + [11-23/0697r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0697-00-0uhr-qos-enhancements-for-uhr.pptx) QoS enhancements for UHR Dibakar Das (Intel)
    - C: I would prefer HOL per flow, but not per TID. For per flow, we do not out-of-order delivery. Identiy a flow. We need out of order delivery. SN counter, PN counter something specific to that flow or flows.
    - A: Maybe the same thing, but not sure. Let’s figure it offline.
    - C: You have reliability in mind. I am not convinced this will help reliability. Controversially, this scenario assumes there is loss link. What kind of reliability we have for this link already?

A: The MAC relialibity is not affected. We still retransmit the packet. We are not losing anything.

C: when we borrow something, need to verify…

C: Slide 6, what is the retransmit of the hole?

A: this is the baseline.

* + [11-23/0815r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0815-00-0uhr-consideration-of-industrial-automation-scenarios.pptx) Consideration of Industrial Automation Scenarios Akira Kishida (NTT)
    - C: unlicensed band, we should work as much as possible. The KPIs are pretty challenging.
    - A: we should consider what KPI, the target value are suitable for industrial automation.
    - C: As a group, it is good to think about it.
    - A: thank you.
* **SP: Do you agree that continuing consideration of network topologies for industrial automation in the UHR is helpful?**

-Yes

-No

-Abstain

Results: 50Y, 2N, 37A, 69 No answer

* AoB:

None

* Adjourned at 11:17 ET

# 2nd Conf. Call: June 5th Monday (10:00–12:00 ET)

* The Chair, Laurent Cariou (Intel), calls 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 speaks/writes up**.

Copyright Policy: Participants are advised that

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

**Copyright Policy was presented.**

**Patent, Participation, Copyright and policy related subclause:** Please refer to Patent And Procedures**。**

* 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 “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “<UHR SG > conference call that you are attending.

If you are unable to record your attendance contact Laurent Cariou ([laurent.cariou@intel.com](mailto:laurent.cariou@intel.com)) and Ross Jian Yu ([ross.yujian@huawei.com](mailto:ross.yujian@huawei.com)) for assistance

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 [11-23-0934r](https://mentor.ieee.org/802.11/dcn/23/11-23-0934-01-0uhr-uhr-sg-june-2023-teleconference-agendas.docx)1

Discussion:

* + - Agenda approved with unanimous consent.
* Announcements:

None

* Submissions
  + [11-23/0679r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0679-00-0uhr-low-latency-qos-based-on-l4s.pptx) Low Latency QoS based on L4S Lili Hervieu (CableLabs)
    - C: What you talk is above MAC?
    - A: The only thing would be affected is the MAC management of the ECN field. That would be in the MAC layer. Classify it as the L4S or non-L4S traffic.
    - C: you mention queuing delay does not depend on channel access delay?
    - A: There is delay due to EDCA and delay due to buffer. This is what I call queue delay.
    - C: This is also catergorized to channel access delay, right?
    - A: the line is not clear.
    - C: slide 8, in this slide, you show there are two queues. What is the behavior when the transmitter obtains the Tx opportunity? Which queue will be choosed?
    - A: no prioritization. Will depend on how you handle the queue. It depends on your own implementation.
  + [11-23/0610r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0610-01-0uhr-low-latency-traffic-delivery-in-uhr.pptx) Low latency traffic delivery in UHR Si-Chan Noh(Newracom)
    - C: For low latency and normal traffic, are they synchronized?
    - A: Not considered.
    - C: It is concise. Whilst it lacks a lot of details. Usually we do puncture when there exists interference. What would be the effect to the other devices?
    - A: There is a case the STA has a clear channel. Some channels for some STAs could be more efficient when assigned to low latency traffic.
    - C: You want DL and UL mixed together or DL DL, UL UL?
    - A: we assume it is UL UL.
    - C: the AP needs to detect?
    - A: before triggering, the AP needs to decide how to assign the channels.
    - C: why not just assign?
    - A: the puncturing information is not indicated in trigger?
    - C: why not directly indicate or use UORA?
    - A: the STA from OBSS cannot use that channel. The AP assign the channel to other STAs. The STA can use that channels.
    - C: as previuos commenter mentions, you may abuse some concept of preamble puncturing.
    - C: I think the previous commenter has asked a good question. Can you go to slide 4, we have multiple STAs have low traffic? How do they access the punctured channel?
    - A: in that case, out of the scope of this scheme. Need to discuss that separately.
  + [11-23/0312r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0312-00-0uhr-thoughts-on-secure-control-frames.pptx) Thoughts on Secure Control frames Alfred Asterjadhi (Qualcomm Inc.)
    - C: Regarding the motivation, for reliability and security, but does this add latency or delay?
    - A: In ideal case, no. When you refer to the extra padding, I guess the extra padding is 10us or 100s of us. The extra security, if you think don’t care which I do, you can turn it off.
    - C: MIC and PN of the trigger frame? Why don’t you encrypt the common info and user info?
    - A: that is an interesting thought. We target to increase reliability. Whether we need to encrypt it or not is an open question. Trying to see what is the goal from reliability point of view.
  + [11-23/0352r1](https://mentor.ieee.org/802.11/dcn/23/11-23-0352-01-0uhr-enhanced-security-discussion.pptx) enhanced security discussion Liwen Chu (NXP)
    - C: In the previous presentation, the author focuses on trigger frame. In your scheme, is that a specific control frame you focus?
    - A: Because we assume currently at least BA issue needs to be protected. At least for BA and trigger. For other frames, we can further discuss.
    - C: Simliar as the previous presenter, yes?
    - A: yes.
    - C: slide 3, you mention under MLO, CGTK should be per link?
    - A: for each transition key, PN related to that key, this PN will be applied to a single frame. Let’s say control transient key in two links, it is difficult to give PN under the same key if they use the same key for control frames in multiple links.
    - C: is there any distinction between the data and control frames?
    - A: data and control frames should be separated.
    - C: you use different keys?
    - A: Yes.
    - C: slide 6, you talk some devices needs padding? We can choose in hardware that doesn’t need padding. Wants to reduce ovheread. What level of padding do you assume?
    - A: currently not sure. Try to avoid padding. We cannot assume all the devices do not need padding. The additional encryption of the frame and descryption of the responding frame.
    - C: do you have a sense? xx us or 1ms?
    - A: it is up to the group to decide. But I think it is needed. Agree should keep it less if possible.
    - C: We are in a SG. We should narrow down the details. You suspect there may be legacy, they may not process successfully?
    - A: this is not the main reason. The reason is that if you look at baseline, each generation 11ax, 11be, we have this PPDU format selection. For trigger frame, explicty say it can be transmitted in non-HT PPDU. For other frames, it has restrictions on when can be carried in non-HT and non-HT duplicate PPDU. MU-BAR and M-BA will be carried in non-HT PPDU. We cannot use trigger frame method to have this padding field, per STA info to add. We need to use MPDU delimiter, in that sense, we need to change the PPDU format selection rule.
    - C: you are saying if the BA, CBA or the BAR is not transmitted in non-HT, we need to change the PPDU format selection rule.
    - A: yes.
    - C: slide 4, for Opt1, do you assume to protect all the fields or a particular field?
    - A: the whole frame.
  + [11-23/0356r1](https://mentor.ieee.org/802.11/dcn/23/11-23-0356-01-0uhr-mac-header-protection.pptx) MAC Header Protection Abhishek Patil (Qualcomm)
    - No Q&A
* AoB:

None

* Adjourned at 11:48 ET

# 3rd Conf. Call: June 12th Monday (10:00–12:00 ET)

* The Chair, Laurent Cariou (Intel), calls 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 speaks/writes up**.

Copyright Policy: Participants are advised that

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

**Copyright Policy was presented.**

**Patent, Participation, Copyright and policy related subclause:** Please refer to Patent And Procedures**。**

* 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 “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “<UHR SG > conference call that you are attending.

If you are unable to record your attendance contact Laurent Cariou ([laurent.cariou@intel.com](mailto:laurent.cariou@intel.com)) and Ross Jian Yu ([ross.yujian@huawei.com](mailto:ross.yujian@huawei.com)) for assistance

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 [11-23-0934r](https://mentor.ieee.org/802.11/dcn/23/11-23-0934-03-0uhr-uhr-sg-june-2023-teleconference-agendas.docx)3

Discussion:

* + - Agenda approved with unanimous consent.
* Announcements:

None

* Submissions
  + 11-23/[0631r1](https://mentor.ieee.org/802.11/dcn/23/11-23-0631-01-0uhr-secondary-channel-usage-and-secondary-20mhz-channel-backoff.pptx) secondary channel usage and secondary 20MHz channel backoff Liwen Chu (NXP)
    - C: Slide 6, for SST, you think there are different ways. Dynamic channel switch, you mention whehter combined with SST, both are workable, right?
    - A: It assumes both AP and STA can do dynamic channel switch. If you look at SST, in each subchannels, you can have STAs already parking in the subchannel will not lose the channel synchronization. Once AP switches to secondary subchannels, AP may lose synchronization, but the STAs parking in secondary subchannels will not lose medimum synchronization.
    - C: You talk about one link, primary channel, secondary channel, then suddenly you mention MLD. Why it is related with ML?
    - A: Single link feature. As I mentioned, medium synchronization similar to 11be may be used. We did some anaylsis whether this dynamic channel switch has similar possibility to lose medium synchronization. Mutliple link you will use one link, this is like dynamic channel negotiation. You switch to another link, is similar to you switch to a secondary 80MHz. We can tolerate the higher chance of losing medium synchronization.
  + [11-23/0771r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0771-00-0uhr-coordinated-r-twt-protection-in-multi-bss.pptx) Coordinated R-TWT Protection in Multi-BSS SunHee Baek (LG Electronics)
    - C: Slide 9, you are saying STA1-1 announces to AP1 it has not received any data with some threshold level. No.1, how STA 1-1, scheduled R-TWT for AP2 if it is far away from AP2. What threshold level, what measurement is needed?
    - A: STA 1-1, regarding the OBSS R-TWT SP, if AP schedules quit period, several STAs should follow. However, STA1-1 doesn’t affect the range of OBSS. The STA doesn’t follow the protection rule. The STA doesn’t receive any data that has the BSS color that is different from STA1.
    - C: STA1-1 doesn’t receive anything from AP2. How does he know AP2 exist?
    - A: In this case, STA1-1 doesn’t follow the R-TWT detection for the OBSS R-TWT SP.
    - A: for threshold, needs further investigation.
    - C: Prevoius slide, 11be STA will also respect the rules in BSS or in multiple BSSID. You want to have additional for UHR, UHR STAs don’t get over protected, is that your intention?
    - A: This EHT STA and UHR STA, the UHR STA has the UHR capability supports R-TWT in 11be. In this case, based on the current spec, the TWT element doesn’t indicate whether the associate AP schedule R-TWT. STAs in OBSS recoginae all R-TWT schedule by the associated AP. The UHR doesn’t indicate the OBSS R-TWT, just follow the protection rule.
    - C: Next slide, you say this may be over protecting, you want to limit that. Ending the TXOP before it starts.
    - C: Slide 5, in the first big bullet, you say either we need a management entity, or negotiation, each AP can obtain info from OBSS AP. Why do we need this management entity or negotiation?
    - A: the AP can overhear OBSS APs. I don’t know the spec does or not define the transmission between APs.
  + [11-23/0854r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0854-00-0uhr-obtaining-obss-channel-information-for-multi-ap-operation.pptx) Obtaining OBSS channel Information for Multi-AP operation Jinyoung Chun (LG Electronics)
    - C: Slide 6, we disccsued this in 11be CR. If there is a single BFee, we can only apply non-TB sounding.
    - A: Yes.
    - C: Non-TB sounding, feedback type is only SU type. You cannot get RU based channel information. We need to discuss MU type for non-TB sounding.
    - A: It is not OBSS sounding problem.
    - C: Cannot use this proposal for Co-BF. Also, in early stage of EHT, we actually discussed sequential sounding. If you really need sepearte sounding, when we do sounding for AP collaboration?
    - A: We can use the sequential sounding for this case. For joint transmission, it is another scope.
    - C: What type, what contents should be in this feedback? RSSI or SNR for each subcarrier?
    - A: currently I think RSSI or CQI is enough. Actually, I didn’t think of beamforming parameters now. It is better feedback just received power or SNR. Let’s think more.
  + [11-23/0225r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0225-00-0uhr-considering-unscheduled-ap-power-save.pptx) Considering Unscheduled AP Power Save Guogang Huang (Huawei)
    - C: AP in power save, in doze state. Doesn’t transmit beacon any more. How about legacy STAs?
    - A: The AP cannot allow legacy STAs to associate with it.
    - C: Cross link to wake up the AP. Need to be a little bit careful. You need to have STAs to transit from one link to another. Depends on the traffic, you may end up with the AP always wake up. We need to evaluate those. I may have some thougths on that.
    - A: the protocol should provide this option for the AP MLD. It can implement by the products. Anyway, it is an optional mode.
    - C: we can sync offline.
    - C: Slide 4, in the first bullet, the simplest way is to have one AP in active mode, the other in power save mode, why not make the second link the flexibity, implementation?
    - A: because for AP power save, we can turn off one or more affiliated APs, it is benefical to save power.
    - C: it can be left to AP’s implemeantion.
    - A: should define the procedure when AP MLD is in power save mode.
    - C: It is a good start. Need to investiage more. Do you have any thoughts on TID-to-link mapping?
    - A: need to renegotiate TID-to-link mapping. Can have offline discussion.
    - C: Simlar as advertise TID-to-link mapping. Leave 2.4GHz at night for IoT STAs, disable the other links. Disabled links become enabled?
    - A: advertised TID-to-link mapping to cancel the link disablement. I didn’t think in this direction. We can talk more offline.
  + [11-23/0581r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0581-00-0uhr-non-ap-initiated-txop-sharing.pptx) Non-AP initiated TXOP sharing Sanghyun Kim (WILUS)
    - C: When the AP returns the TXOP, the TXOP holder can use the wide bandwidth?
    - A: The AP doesn’t need to return the TXOP. The AP can allocate RU for the original non-AP STA1.
    - C: Current RDG allows the TXOP responders to return the TXOP. Does your scheme not allowing?
    - A: At this time point, AP does the channel access and becomes the TXOP holder.
    - C: If the AP shares to the non-AP STA. The STA may share to the AP. It may go back and forth. How are we gonna prevent from it?
    - A: Slide 8, may limit the length of the TXOP.
    - C: Three items, bandwidth extension at the AP, the AP becomes the TXOP holder, the other part is to serve the other STAs. For the wider bandwidth, you may need more investigation for the other BSSes which are using. In terms of the TXOP owner, in 11ax, when RDG is enhanced, the STA has to backoff and gain the TXOP. Essentially you have the AP itself being penalized. Those to ensure the AP which has obtained the TXOP is served well. Gives the TXOP holder, from regulatory perspective, it is still a TXOP sharing mechanism. Still provide the functionality you have in mind.
    - A: thank you.
    - C: slide 7, for the other STA, the AP tries to do the frame change. They will be set the NAV. How are those STAs gonna ignore the NAV and treat the AP as the TXOP holder.
    - A: the AP can set the TXOP holder a little bit longer than the original the STA.
    - C: if the initial already sets the TXOP to the maximum value. You cannot extend that.
    - A: yes.
    - C: non-AP STA needs to send trigger frame?
    - A: we can discuss the frame type. This control frame can carry the information of RU size. The AP can consider to allocate the RU considering the information. We can discuss the details.
    - C: if we change a different frame. It is not TXOP sharing anymore.
    - A: maybe.
    - C: From use case perspective, what is the motivation to gain a TXOP and give it to the AP. What is the guarantee the AP can schedule himself? The second question, is like moving the TXOP holder to the AP. Why do we want the AP to be the TXOP holder? What additional tasks, or it is just naming?
    - A: the STA can transmit low latency traffic first and shares the channel to the AP. It is non-AP STA’s choice. If the latency limitation is very short, can transmit low latency first. For the second one, we consider the TXOP holder can be the sharing AP. The AP should be the TXOP holder.
    - C: is this practical. The STA will use this channel to give to the AP. And the AP can share it to another AP as well.
    - A: if the non-AP STA is a 20 Mhz only STA. Then all the secondary channels are wasted. The AP can use the secondary channels for other purposes.
* AoB:

None

* Adjourned at 11:56 ET

# 4th Conf. Call: June 26th Monday (10:00–12:00 ET)

* The Chair, Laurent Cariou (Intel), calls 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 speaks/writes up**.

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

**Copyright Policy was presented.**

* + **Patent, Participation, Copyright and policy related subclause:** Please refer to Patent And Procedures**。**
* 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 “802.11 Telecons (<Month>)” entry, 3) select “C/LM/WG802.11 Attendance” entry, 4) click “<UHR SG > conference call that you are attending.
    - If you are unable to record your attendance contact Laurent Cariou ([laurent.cariou@intel.com](mailto:laurent.cariou@intel.com)) and Ross Jian Yu ([ross.yujian@huawei.com](mailto:ross.yujian@huawei.com)) for assistance
    - 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 [11-23-0934r](https://mentor.ieee.org/802.11/dcn/23/11-23-0934-04-0uhr-uhr-sg-june-2023-teleconference-agendas.docx)4
  + Discussion:
    - 11-23/0668r0 was requested to be removed from today’s agenda.
    - Agenda approved with unanimous consent.
  + Announcements:
    - None
* Submissions
  + [11-23/0776r1](https://mentor.ieee.org/802.11/dcn/23/11-23-0776-01-0uhr-performance-of-c-bf-and-c-sr.pptx) Performance of C-BF and C-SR Ron Porat (Broadcom)
    - C: Slide 3, when you say genie MCS prediction, what do you mean here?
    - A: the process of simulation, the AP decides the precoder based on CSI, Rx MMSE. Based on that, the AP can decide on the achieve MCS. It is like any system level simulations.
    - C: You mention about partial nulling. Only null one sream, what do you mean by partial nulling?
    - A: STA is 2x2, transmits using 1SS. The other AP is nulling in one direction.
    - C: you only null the SS which causes the interference?
    - A: Place a null in a particular direction. As far as a 4 antenna AP, the 2nd AP, null in one stream, taking a sense, taking one antenna out, that means taking two antennas out. Parital means less than 2.
    - C: For the baseline, is what they can do in a single BSS?
    - A: yes.
    - C: the four AP case, if there are more STAs, you can use MU-MIMO?
    - A: I consider it in scenario 2.
  + [11-23/0616r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0616-00-0uhr-overhead-analysis-of-coordinated-spatial-reuse.pptx) Overhead Analysis of Coordinated Spatial Reuse Kosuke Aio (Sony Corporation)
    - C: Slide 3, I think the negotiation phase is not only for CSR, but all multi-AP scenario.
    - A: Agree. Actually, the negotiation phase, TGbe, has passed the motion for C-TDMA. I reuse the protocol for C-SR. Can be used for C-TDMA, C-SR, C-BF and so on.
    - C: Negotiation for every AP’s TXOP? Is it needed for per TXOP?
    - A: Here I assume the negotiation is before every transmission. It is not per TXOP, but per transmission. Shared AP will change per data transmission according to the queue. It may be better sharing AP can confirm before every transmission. It is ok to skip the negotiation under some conditions.
    - C: considering two AP negotioate over the air. How close are the two APs? Have you condiered AP2 may be transmitting to its own STAs.
    - A: I need to check the pathloss between APs. In my memory, room size is 10m. The Rx power is above ED. Varied by shadowing 50%. Let me check later.
    - C: coherence time, need to do this measurement at a certain frequency. For interference nulling, you don’t need full CSI. Large channel coherence time may be longer.
    - A: I see your point. I will check the definition of coherence time.
    - C: Could you go to slide 6? I remember the performance of CSR depends on the topology. Have you changed your topology? Where are the STAs’ location?
    - A: I only change the room size from 5 to 15 meter. The STAs deployed in the room randomly. The SNR gets lower by the room size increases. At the same time, interfenrece gets lower. I agree performance of C-SR depends on topology and sceanario. Will try to simulate.
    - C: you mention measurement pahse and negotiation pahse. You assume measurement happens before negotiation. In more general assumption, larger number of APs need to be in measurement phase before negotiation phase.
    - A: I agree.
  + [11-23/0839r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0839-00-0uhr-multi-ap-coordination-based-on-scma.pptx) Multi-AP Coordination based on SCMA Gang Xie (BUPT)
    - C: What is the complexity at the Rx side? What is the performance gain compared with JT and Co-BF? What is effect of time and frequency offset?
    - A: In our SCMA mode, the AP transmits to STA based on factor, due to the sparse nature, the AP does not need to share all the data but only shares a small portion, which reduces the overhead of data sharing, compared with JT. The overhead of using of trigger frame etc. is comparable with JT. We will study more later.
    - C: What detection algorithm do you use?
    - A: The main issue is the complexity and the limitation of factor matrix. We use MPA - message passing algorithm.
    - C: The protocol is almost the same as JT. This scheme can use the data sharing and reduce the data sharing overhead. How much is the overhead of data sharing on the performance? Have you evaluated the performance?
    - A: we have some simulations on the Tput. The complexity on the detection is still under study.
    - C: have you compared with JT?
    - A: yeah. We have performance like Tput and we compare to the JT. The SCMA mode has better performance.
    - C: do you remember
  + [11-23/0855r0](https://mentor.ieee.org/802.11/dcn/23/11-23-0855-00-0uhr-nnull-beam-steering-based-spatial-reuse.pptx) NNULL-beam-steering-based-spatial-reuse Xiangxin Gu (Unisoc)
    - No Q&A
* AoB:
  + None
* Adjourned at 11:27 ET

# Appendix

Attendee List for 1st Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| UHR SG | 6/1 | AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| UHR SG | 6/1 | Aio, Kosuke | Sony Corporation |
| UHR SG | 6/1 | Asai, Yusuke | NTT |
| UHR SG | 6/1 | Baek, SunHee | LG ELECTRONICS |
| UHR SG | 6/1 | Baykas, Tuncer | Ofinno |
| UHR SG | 6/1 | Bredewoud, Albert | Broadcom Corporation |
| UHR SG | 6/1 | Chen, You-Wei | MediaTek Inc. |
| UHR SG | 6/1 | CHENG, yajun | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/1 | Chiang, James | MediaTek Inc. |
| UHR SG | 6/1 | Chng, Baw | BAWMAN LLC |
| UHR SG | 6/1 | CHUN, JINYOUNG | LG ELECTRONICS |
| UHR SG | 6/1 | Chung, Chulho | SAMSUNG |
| UHR SG | 6/1 | da Silva, Claudio | Meta Platforms Inc. |
| UHR SG | 6/1 | Dong, Xiandong | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/1 | Eren, Tuncay | Istanbul Medipol University, Vestel |
| UHR SG | 6/1 | Erkucuk, Serhat | Ofinno |
| UHR SG | 6/1 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| UHR SG | 6/1 | Fang, Yonggang | MediaTek Inc. |
| UHR SG | 6/1 | Fujimori, Yuki | Canon Research Centre France |
| UHR SG | 6/1 | Gao, Ning | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/1 | GUIGNARD, Romain | Canon Research Centre France |
| UHR SG | 6/1 | Gupta, Binita | Meta Platforms, Inc. |
| UHR SG | 6/1 | Handte, Thomas | Sony Group Corporation |
| UHR SG | 6/1 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| UHR SG | 6/1 | Ho, Duncan | Qualcomm Incorporated |
| UHR SG | 6/1 | Hsu, Ostrovsky | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/1 | HUANG, CHIHAN | MediaTek Inc. |
| UHR SG | 6/1 | Huang, Po-Kai | Intel |
| UHR SG | 6/1 | Huq, Kazi Mohammed Saidul | NO AFFILIATION |
| UHR SG | 6/1 | Jang, Insun | LG ELECTRONICS |
| UHR SG | 6/1 | Jen, Elliot YuChih | Samsung Research America |
| UHR SG | 6/1 | Kim, Jeongki | Ofinno |
| UHR SG | 6/1 | Kim, Sang Gook | LG ELECTRONICS |
| UHR SG | 6/1 | Kim, Sanghyun | WILUS Inc. |
| UHR SG | 6/1 | Kim, Youhan | Qualcomm Technologies, Inc. |
| UHR SG | 6/1 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| UHR SG | 6/1 | Klein, Arik | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Koundourakis, Michail | Samsung Cambridge Solution Center |
| UHR SG | 6/1 | Kuo, Chih-Chun | MediaTek Inc. |
| UHR SG | 6/1 | Lalam, Massinissa | SAGEMCOM SAS |
| UHR SG | 6/1 | Lee, Wookbong | Apple Inc. |
| UHR SG | 6/1 | Levy, Joseph | InterDigital, Inc. |
| UHR SG | 6/1 | Li, Weiyi | Spreadtrum |
| UHR SG | 6/1 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/1 | Li, Ying | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Lim, Dong Guk | LG ELECTRONICS |
| UHR SG | 6/1 | Lin, Zinan | InterDigital, Inc. |
| UHR SG | 6/1 | Lou, Hanqing | InterDigital, Inc. |
| UHR SG | 6/1 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/1 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| UHR SG | 6/1 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| UHR SG | 6/1 | Ma, Yunsi | HiSilicon (Shanghai) Technologies Co., LTD. |
| UHR SG | 6/1 | Maguluri, Anilkumar | Synaptics |
| UHR SG | 6/1 | McCann, Stephen | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Minotani, Jun | Panasonic Corporation |
| UHR SG | 6/1 | Miwa, Shinya | Canon Research Centre France |
| UHR SG | 6/1 | Montemurro, Michael | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Mutgan, Okan | Nokia |
| UHR SG | 6/1 | Nayak, Peshal | Samsung Research America |
| UHR SG | 6/1 | Nezou, Patrice | Canon Research Centre France |
| UHR SG | 6/1 | Noh, Si-Chan | Newracom Inc. |
| UHR SG | 6/1 | Park, Minyoung | Intel |
| UHR SG | 6/1 | Park, Sungjin | Senscomm |
| UHR SG | 6/1 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| UHR SG | 6/1 | Petrick, Albert | InterDigital, Inc. |
| UHR SG | 6/1 | Pettersson, Charlie | Ericsson AB |
| UHR SG | 6/1 | Ptasinski, Henry | Element78 Communications LLC |
| UHR SG | 6/1 | Qi, Yue | Samsung Research America |
| UHR SG | 6/1 | Quan, Yingqiao | Spreadtrum |
| UHR SG | 6/1 | Ratnam, Vishnu | Samsung Research America |
| UHR SG | 6/1 | Redlich, Oded | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Schelstraete, Sigurd | MaxLinear |
| UHR SG | 6/1 | Shen, Andy | Futurewei Technologies |
| UHR SG | 6/1 | Shilo, Shimi | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Sosack, Robert | Molex Incorporated |
| UHR SG | 6/1 | Stanley, Dorothy | Hewlett Packard Enterprise |
| UHR SG | 6/1 | Strobel, Rainer | MaxLinear |
| UHR SG | 6/1 | SUH, JUNG HOON | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Taori, Rakesh | Infineon Technologies |
| UHR SG | 6/1 | Tsujimaru, Yuki | Canon Inc. |
| UHR SG | 6/1 | Val, Inaki | MaxLinear, Inc. |
| UHR SG | 6/1 | Verenzuela, Daniel | Sony Corporation |
| UHR SG | 6/1 | Wang, Lei | Futurewei Technologies |
| UHR SG | 6/1 | Wei, Dong | NXP Semiconductors |
| UHR SG | 6/1 | Wullert, John | Peraton Labs |
| UHR SG | 6/1 | Xin, Yan | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Yamada, Ryota | SHARP CORPORATION |
| UHR SG | 6/1 | Yang, Jimmy | Moxa Inc. |
| UHR SG | 6/1 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/1 | Yi, Yongjiang | Spreadtrum Communication USA, Inc |
| UHR SG | 6/1 | Yoon, Yelin | LG ELECTRONICS |
| UHR SG | 6/1 | Yu, Jian | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Zhang, Jiayi | Ofinno |
| UHR SG | 6/1 | Zhao, Yue | Huawei Technologies Co., Ltd |
| UHR SG | 6/1 | Zhou, Pei | TCL |

Attendee List for 2nd Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| UHR SG | 6/5 | Aio, Kosuke | Sony Corporation |
| UHR SG | 6/5 | Ajami, Abdel Karim | Qualcomm Technologies, Inc |
| UHR SG | 6/5 | Alayedi, Mohanad | Istanbul Medipol University, Vestel |
| UHR SG | 6/5 | Aldana, Carlos | Facebook |
| UHR SG | 6/5 | Anwyl, Gary | MediaTek Inc. |
| UHR SG | 6/5 | Asai, Yusuke | NTT |
| UHR SG | 6/5 | Asterjadhi, Alfred | Qualcomm Technologies, Inc |
| UHR SG | 6/5 | Chen, You-Wei | MediaTek Inc. |
| UHR SG | 6/5 | Chiang, James | MediaTek Inc. |
| UHR SG | 6/5 | CHUN, JINYOUNG | LG ELECTRONICS |
| UHR SG | 6/5 | DeLaOlivaDelgado, Antonio | InterDigital, Inc. |
| UHR SG | 6/5 | Dong, Xiandong | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/5 | Erkucuk, Serhat | Ofinno |
| UHR SG | 6/5 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| UHR SG | 6/5 | Fang, Juan | Intel |
| UHR SG | 6/5 | Fang, Yonggang | MediaTek Inc. |
| UHR SG | 6/5 | Gidvani, Ravi | SAMSUNG ELECTRONICS |
| UHR SG | 6/5 | Gu, Xiangxin | Unisoc |
| UHR SG | 6/5 | GUIGNARD, Romain | Canon Research Centre France |
| UHR SG | 6/5 | Gupta, Binita | Meta Platforms, Inc. |
| UHR SG | 6/5 | Ho, Duncan | Qualcomm Incorporated |
| UHR SG | 6/5 | Hsu, Ostrovsky | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/5 | HUANG, CHIHAN | MediaTek Inc. |
| UHR SG | 6/5 | Huang, Po-Kai | Intel |
| UHR SG | 6/5 | Iwai, Takashi | Panasonic Corporation |
| UHR SG | 6/5 | Jang, Insun | LG ELECTRONICS |
| UHR SG | 6/5 | Jen, Elliot YuChih | Samsung Research America |
| UHR SG | 6/5 | Jung, Insik | LG ELECTRONICS |
| UHR SG | 6/5 | Kim, Geon Hwan | LG ELECTRONICS |
| UHR SG | 6/5 | Kim, Sanghyun | WILUS Inc. |
| UHR SG | 6/5 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| UHR SG | 6/5 | Klein, Arik | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Lanante, Leonardo | Ofinno |
| UHR SG | 6/5 | Lee, Wookbong | Apple Inc. |
| UHR SG | 6/5 | Li, Weiyi | Spreadtrum |
| UHR SG | 6/5 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/5 | Li, Ying | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Lim, Dong Guk | LG ELECTRONICS |
| UHR SG | 6/5 | Lin, Zinan | InterDigital, Inc. |
| UHR SG | 6/5 | Lou, Hanqing | InterDigital, Inc. |
| UHR SG | 6/5 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/5 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| UHR SG | 6/5 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| UHR SG | 6/5 | Ma, Yunsi | HiSilicon (Shanghai) Technologies Co., LTD. |
| UHR SG | 6/5 | Maguluri, Anilkumar | Synaptics |
| UHR SG | 6/5 | Minotani, Jun | Panasonic Corporation |
| UHR SG | 6/5 | Monajemi, Pooya | Apple Inc. |
| UHR SG | 6/5 | Mutgan, Okan | Nokia |
| UHR SG | 6/5 | Nayak, Peshal | Samsung Research America |
| UHR SG | 6/5 | Noh, Si-Chan | Newracom Inc. |
| UHR SG | 6/5 | Ouchi, Masatomo | Canon |
| UHR SG | 6/5 | Park, Sungjin | Senscomm |
| UHR SG | 6/5 | Patil, Abhishek | Qualcomm Incorporated |
| UHR SG | 6/5 | Patwardhan, Gaurav | Hewlett Packard Enterprise |
| UHR SG | 6/5 | Petrick, Albert | InterDigital, Inc. |
| UHR SG | 6/5 | Pettersson, Charlie | Ericsson AB |
| UHR SG | 6/5 | Ptasinski, Henry | Element78 Communications LLC |
| UHR SG | 6/5 | Qi, Yue | Samsung Research America |
| UHR SG | 6/5 | Quan, Yingqiao | Spreadtrum |
| UHR SG | 6/5 | Ryu, Kiseon | NXP Semiconductors |
| UHR SG | 6/5 | Sato, Takuhiro | SHARP CORPORATION |
| UHR SG | 6/5 | Schelstraete, Sigurd | MaxLinear |
| UHR SG | 6/5 | Serizawa, Kazunobu | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/5 | Sevin, Julien | Canon Research Centre France |
| UHR SG | 6/5 | Shen, Andy | Futurewei Technologies |
| UHR SG | 6/5 | Shilo, Shimi | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Smith, Luther | Cable Television Laboratories Inc. (CableLabs) |
| UHR SG | 6/5 | Song, Hao | Intel |
| UHR SG | 6/5 | Sosack, Robert | Molex Incorporated |
| UHR SG | 6/5 | Strobel, Rainer | MaxLinear |
| UHR SG | 6/5 | SUH, JUNG HOON | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Sun, Bo | Sanechips |
| UHR SG | 6/5 | Tsodik, Genadiy | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Urabe, Yoshio | Panasonic Holdings Corporation |
| UHR SG | 6/5 | Val, Inaki | MaxLinear, Inc. |
| UHR SG | 6/5 | Verenzuela, Daniel | Sony Corporation |
| UHR SG | 6/5 | VIGER, Pascal | Canon Research Centre France |
| UHR SG | 6/5 | Wang, Hao | Tencent |
| UHR SG | 6/5 | Wang, Qi | Apple, Inc. |
| UHR SG | 6/5 | Wang, Xiaofei | InterDigital, Inc. |
| UHR SG | 6/5 | Wu, Tianyu | Apple, Inc. |
| UHR SG | 6/5 | YANG, RUI | InterDigital, Inc. |
| UHR SG | 6/5 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/5 | Yee, James | MediaTek Inc. |
| UHR SG | 6/5 | Yi, Yongjiang | Spreadtrum Communication USA, Inc |
| UHR SG | 6/5 | Yoon, Yelin | LG ELECTRONICS |
| UHR SG | 6/5 | Yu, Jian | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Zhang, Jiayi | Ofinno |
| UHR SG | 6/5 | Zhang, Yan | Apple Inc |
| UHR SG | 6/5 | Zhao, Yue | Huawei Technologies Co., Ltd |
| UHR SG | 6/5 | Zhou, Pei | TCL |

Attendee List for 3rd Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| UHR SG | 6/12 | AbidRabbu, Shaima' | Istanbul Medipol University; Vestel |
| UHR SG | 6/12 | Aboulmagd, Osama | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Aio, Kosuke | Sony Corporation |
| UHR SG | 6/12 | Ajami, Abdel Karim | Qualcomm Technologies, Inc |
| UHR SG | 6/12 | Anwyl, Gary | MediaTek Inc. |
| UHR SG | 6/12 | Asai, Yusuke | NTT |
| UHR SG | 6/12 | Baek, SunHee | LG ELECTRONICS |
| UHR SG | 6/12 | Baykas, Tuncer | Ofinno |
| UHR SG | 6/12 | Bredewoud, Albert | Broadcom Corporation |
| UHR SG | 6/12 | Carney, William | Sony Group Corporation |
| UHR SG | 6/12 | Cha, Dongju | LG ELECTRONICS |
| UHR SG | 6/12 | Chen, You-Wei | MediaTek Inc. |
| UHR SG | 6/12 | CHENG, yajun | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/12 | Chng, Baw | BAWMAN LLC |
| UHR SG | 6/12 | Choi, Jinsoo | LG ELECTRONICS |
| UHR SG | 6/12 | CHUN, JINYOUNG | LG ELECTRONICS |
| UHR SG | 6/12 | Chung, Chulho | SAMSUNG |
| UHR SG | 6/12 | Coffey, John | Realtek Semiconductor Corp. |
| UHR SG | 6/12 | Costa, D.Nelson | Peraso Technologies Incorporated |
| UHR SG | 6/12 | Derham, Thomas | Broadcom Corporation |
| UHR SG | 6/12 | Dong, Xiandong | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/12 | Erkucuk, Serhat | Ofinno |
| UHR SG | 6/12 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| UHR SG | 6/12 | Fang, Juan | Intel |
| UHR SG | 6/12 | Fang, Yonggang | MediaTek Inc. |
| UHR SG | 6/12 | Fischer, Matthew | Broadcom Corporation |
| UHR SG | 6/12 | Fujimori, Yuki | Canon Research Centre France |
| UHR SG | 6/12 | Ghosh, Chittabrata | Apple Inc. |
| UHR SG | 6/12 | Gu, Xiangxin | Unisoc |
| UHR SG | 6/12 | GUIGNARD, Romain | Canon Research Centre France |
| UHR SG | 6/12 | Gupta, Binita | Meta Platforms, Inc. |
| UHR SG | 6/12 | Haider, Muhammad Kumail | Meta Platforms Inc. |
| UHR SG | 6/12 | Handte, Thomas | Sony Group Corporation |
| UHR SG | 6/12 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| UHR SG | 6/12 | HUANG, CHIHAN | MediaTek Inc. |
| UHR SG | 6/12 | Jang, Insun | LG ELECTRONICS |
| UHR SG | 6/12 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| UHR SG | 6/12 | Kim, Geon Hwan | LG ELECTRONICS |
| UHR SG | 6/12 | Kim, Jeongki | Ofinno |
| UHR SG | 6/12 | Kim, Myeong-Jin | SAMSUNG |
| UHR SG | 6/12 | Kim, Sanghyun | WILUS Inc. |
| UHR SG | 6/12 | Kim, Youhan | Qualcomm Technologies, Inc. |
| UHR SG | 6/12 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| UHR SG | 6/12 | Klein, Arik | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Kuo, Chih-Chun | MediaTek Inc. |
| UHR SG | 6/12 | Lee, Wookbong | Apple Inc. |
| UHR SG | 6/12 | Li, Weiyi | Spreadtrum |
| UHR SG | 6/12 | li, yan | ZTE Corporation |
| UHR SG | 6/12 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/12 | Lim, Dong Guk | LG ELECTRONICS |
| UHR SG | 6/12 | Lin, Zinan | InterDigital, Inc. |
| UHR SG | 6/12 | Lorgeoux, Mikael | Canon Research Centre France |
| UHR SG | 6/12 | Lu, kaiying | MediaTek Inc. |
| UHR SG | 6/12 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/12 | Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| UHR SG | 6/12 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| UHR SG | 6/12 | Ma, Yunsi | HiSilicon (Shanghai) Technologies Co., LTD. |
| UHR SG | 6/12 | Mantha, Abhishek | Broadcom Corporation |
| UHR SG | 6/12 | McCann, Stephen | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Minotani, Jun | Panasonic Corporation |
| UHR SG | 6/12 | Monajemi, Pooya | Apple Inc. |
| UHR SG | 6/12 | Motozuka, Hiroyuki | Panasonic Holdings Corporation |
| UHR SG | 6/12 | Mutgan, Okan | Nokia |
| UHR SG | 6/12 | Naik, Gaurang | Qualcomm Technologies, Inc |
| UHR SG | 6/12 | Nayak, Peshal | Samsung Research America |
| UHR SG | 6/12 | Ng, Boon Loong | Samsung Research America |
| UHR SG | 6/12 | Noh, Si-Chan | Newracom Inc. |
| UHR SG | 6/12 | Park, Sungjin | Senscomm |
| UHR SG | 6/12 | Patil, Abhishek | Qualcomm Incorporated |
| UHR SG | 6/12 | Ptasinski, Henry | Element78 Communications LLC |
| UHR SG | 6/12 | Qi, Yue | Samsung Research America |
| UHR SG | 6/12 | Quan, Yingqiao | Spreadtrum |
| UHR SG | 6/12 | Ratnam, Vishnu | Samsung Research America |
| UHR SG | 6/12 | Schelstraete, Sigurd | MaxLinear |
| UHR SG | 6/12 | Serizawa, Kazunobu | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/12 | Sevin, Julien | Canon Research Centre France |
| UHR SG | 6/12 | Shen, Andy | Futurewei Technologies |
| UHR SG | 6/12 | Shilo, Shimi | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Shirakawa, Atsushi | SHARP CORPORATION |
| UHR SG | 6/12 | Smith, Luther | Cable Television Laboratories Inc. (CableLabs) |
| UHR SG | 6/12 | Song, Hao | Intel |
| UHR SG | 6/12 | Strobel, Rainer | MaxLinear |
| UHR SG | 6/12 | SUH, JUNG HOON | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Sun, Bo | Sanechips |
| UHR SG | 6/12 | Tsodik, Genadiy | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Tsujimaru, Yuki | Canon Inc. |
| UHR SG | 6/12 | Urabe, Yoshio | Panasonic Holdings Corporation |
| UHR SG | 6/12 | Val, Inaki | MaxLinear, Inc. |
| UHR SG | 6/12 | VIGER, Pascal | Canon Research Centre France |
| UHR SG | 6/12 | Wang, Lei | Futurewei Technologies |
| UHR SG | 6/12 | Yang, Jay | Nokia |
| UHR SG | 6/12 | Yang, Jimmy | Moxa Inc. |
| UHR SG | 6/12 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/12 | Yee, James | MediaTek Inc. |
| UHR SG | 6/12 | Yi, Yongjiang | Spreadtrum Communication USA, Inc |
| UHR SG | 6/12 | Yoon, Yelin | LG ELECTRONICS |
| UHR SG | 6/12 | Yu, Jian | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Zhang, Jiayi | Ofinno |
| UHR SG | 6/12 | Zhang, Yan | Apple Inc |
| UHR SG | 6/12 | Zhao, Yue | Huawei Technologies Co., Ltd |
| UHR SG | 6/12 | Zhou, Lei | H3C Technologies Co., Limited |
| UHR SG | 6/12 | Zhou, Pei | TCL |

Attendee List for 4th Conf. Call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| UHR SG | 6/26 | Aio, Kosuke | Sony Corporation |
| UHR SG | 6/26 | Ajami, Abdel Karim | Qualcomm Technologies, Inc |
| UHR SG | 6/26 | Anwyl, Gary | MediaTek Inc. |
| UHR SG | 6/26 | Asai, Yusuke | NTT |
| UHR SG | 6/26 | Baek, SunHee | LG ELECTRONICS |
| UHR SG | 6/26 | Baykas, Tuncer | Ofinno |
| UHR SG | 6/26 | Bredewoud, Albert | Broadcom Corporation |
| UHR SG | 6/26 | Carney, William | Sony Group Corporation |
| UHR SG | 6/26 | Cha, Dongju | LG ELECTRONICS |
| UHR SG | 6/26 | Chen, You-Wei | MediaTek Inc. |
| UHR SG | 6/26 | CHENG, yajun | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/26 | Chiang, James | MediaTek Inc. |
| UHR SG | 6/26 | Choi, Jinsoo | LG ELECTRONICS |
| UHR SG | 6/26 | Chu, Liwen | NXP Semiconductors |
| UHR SG | 6/26 | CHUN, JINYOUNG | LG ELECTRONICS |
| UHR SG | 6/26 | Chung, Chulho | SAMSUNG |
| UHR SG | 6/26 | Costa, D.Nelson | Peraso Technologies Incorporated |
| UHR SG | 6/26 | DeLaOlivaDelgado, Antonio | InterDigital, Inc. |
| UHR SG | 6/26 | Erkucuk, Serhat | Ofinno |
| UHR SG | 6/26 | Fan, Shuang | Sanechips Technology Co., Ltd. |
| UHR SG | 6/26 | Fang, Juan | Intel |
| UHR SG | 6/26 | Fang, Yonggang | MediaTek Inc. |
| UHR SG | 6/26 | Fischer, Matthew | Broadcom Corporation |
| UHR SG | 6/26 | Fujimori, Yuki | Canon Research Centre France |
| UHR SG | 6/26 | Gao, Ning | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/26 | Ghosh, Chittabrata | Apple Inc. |
| UHR SG | 6/26 | Gu, Xiangxin | Unisoc |
| UHR SG | 6/26 | GUIGNARD, Romain | Canon Research Centre France |
| UHR SG | 6/26 | Haider, Muhammad Kumail | Meta Platforms Inc. |
| UHR SG | 6/26 | Handte, Thomas | Sony Group Corporation |
| UHR SG | 6/26 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| UHR SG | 6/26 | Hsu, Ostrovsky | Xiaomi Communications Co., Ltd. |
| UHR SG | 6/26 | Hu, Chunyu | Facebook |
| UHR SG | 6/26 | Hu, Xiaokun | Ruijie Networks Co., Ltd. |
| UHR SG | 6/26 | HUANG, CHIHAN | MediaTek Inc. |
| UHR SG | 6/26 | Huang, Po-Kai | Intel |
| UHR SG | 6/26 | Jang, Insun | LG ELECTRONICS |
| UHR SG | 6/26 | Jung, Insik | LG ELECTRONICS |
| UHR SG | 6/26 | Kim, Geon Hwan | LG ELECTRONICS |
| UHR SG | 6/26 | Kim, Myeong-Jin | SAMSUNG |
| UHR SG | 6/26 | Kim, Youhan | Qualcomm Technologies, Inc. |
| UHR SG | 6/26 | Kishida, Akira | Nippon Telegraph and Telephone Corporation (NTT) |
| UHR SG | 6/26 | Klein, Arik | Huawei Technologies Co., Ltd |
| UHR SG | 6/26 | Kuo, Chih-Chun | MediaTek Inc. |
| UHR SG | 6/26 | Lanante, Leonardo | Ofinno |
| UHR SG | 6/26 | Lee, Wookbong | Apple Inc. |
| UHR SG | 6/26 | Li, Jialing | Qualcomm Technologies, Inc |
| UHR SG | 6/26 | Li, Weiyi | Spreadtrum |
| UHR SG | 6/26 | Li, Yapu | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/26 | Li, Ying | Huawei Technologies Co., Ltd |
| UHR SG | 6/26 | Lim, Dong Guk | LG ELECTRONICS |
| UHR SG | 6/26 | Lou, Hanqing | InterDigital, Inc. |
| UHR SG | 6/26 | Lu, Liuming | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| UHR SG | 6/26 | LUO, YE | Nokia |
| UHR SG | 6/26 | Ma, Yongsen | SAMSUNG ELECTRONICS |
| UHR SG | 6/26 | Ma, Yunsi | HiSilicon (Shanghai) Technologies Co., LTD. |
| UHR SG | 6/26 | Minotani, Jun | Panasonic Corporation |
| UHR SG | 6/26 | Motozuka, Hiroyuki | Panasonic Holdings Corporation |
| UHR SG | 6/26 | Mutgan, Okan | Nokia |
| UHR SG | 6/26 | Nayak, Peshal | Samsung Research America |
| UHR SG | 6/26 | Nezou, Patrice | Canon Research Centre France |
| UHR SG | 6/26 | Noh, Si-Chan | Newracom Inc. |
| UHR SG | 6/26 | Ouchi, Masatomo | Canon |
| UHR SG | 6/26 | Palayur, Saju | Maxlinear Inc. |
| UHR SG | 6/26 | Park, Sungjin | Senscomm |
| UHR SG | 6/26 | Patil, Abhishek | Qualcomm Incorporated |
| UHR SG | 6/26 | Ptasinski, Henry | Element78 Communications LLC |
| UHR SG | 6/26 | Qi, Yue | Samsung Research America |
| UHR SG | 6/26 | Quan, Yingqiao | Spreadtrum |
| UHR SG | 6/26 | Ratnam, Vishnu | Samsung Research America |
| UHR SG | 6/26 | Ryu, Kiseon | NXP Semiconductors |
| UHR SG | 6/26 | Sato, Takuhiro | SHARP CORPORATION |
| UHR SG | 6/26 | Schelstraete, Sigurd | MaxLinear |
| UHR SG | 6/26 | Serizawa, Kazunobu | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/26 | Shafin, Rubayet | Samsung Research America |
| UHR SG | 6/26 | Shen, Andy | Futurewei Technologies |
| UHR SG | 6/26 | Shilo, Shimi | Huawei Technologies Co., Ltd |
| UHR SG | 6/26 | Smith, Luther | Cable Television Laboratories Inc. (CableLabs) |
| UHR SG | 6/26 | Strobel, Rainer | MaxLinear |
| UHR SG | 6/26 | SUH, JUNG HOON | Huawei Technologies Co., Ltd |
| UHR SG | 6/26 | Taori, Rakesh | Infineon Technologies |
| UHR SG | 6/26 | Tsodik, Genadiy | Huawei Technologies Co., Ltd |
| UHR SG | 6/26 | Tsujimaru, Yuki | Canon Inc. |
| UHR SG | 6/26 | Val, Inaki | MaxLinear, Inc. |
| UHR SG | 6/26 | Verenzuela, Daniel | Sony Corporation |
| UHR SG | 6/26 | VIGER, Pascal | Canon Research Centre France |
| UHR SG | 6/26 | Wang, Hao | Tencent |
| UHR SG | 6/26 | Wang, Xiaofei | InterDigital, Inc. |
| UHR SG | 6/26 | Wu, Kanke | Qualcomm Incorporated |
| UHR SG | 6/26 | Yang, Jay | Nokia |
| UHR SG | 6/26 | Yang, Jimmy | Moxa Inc. |
| UHR SG | 6/26 | Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| UHR SG | 6/26 | Yee, James | MediaTek Inc. |
| UHR SG | 6/26 | Yi, Yongjiang | Spreadtrum Communication USA, Inc |
| UHR SG | 6/26 | Yoon, Yelin | LG ELECTRONICS |
| UHR SG | 6/26 | Zhang, Jiayi | Ofinno |
| UHR SG | 6/26 | Zhao, Yue | Huawei Technologies Co., Ltd |
| UHR SG | 6/26 | Zhou, Lei | H3C Technologies Co., Limited |
| UHR SG | 6/26 | Zhou, Pei | TCL |