IEEE P802.11  
Wireless LANs

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| UHR SG January 2023 Meeting Minutes | | | | |
| Date: 2023-01-16 | | | | |
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Abstract

This document contains the minutes for the UHR SG January 2023 Meeting Minutes.

Revision history:

* Rev0: initial version.

Abbreviations:

* C: Comment
* A: answer

# 1st Call: Tuesday EVE, (7:30pm-9:30pm ET)

* + The Chair, Laurent Cariou (Intel), calls the meeting to order at 19:30 ET. The Chair notifies the attendees that the agenda is in [11-22-2135r4](https://mentor.ieee.org/802.11/dcn/22/11-22-2135-04-0uhr-uhr-sg-january-2023-meeting-agenda.pptx).
  + Note that this is a hybrid meeting, with some participants in person and some participating online through a webex session
  + Need to pay the registration fee to attend

1. IEEE-SA Policies and Procedure

The chair reviews the IEEE-SA Patent Policy:

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. Speak up now and respond to this Call for Potentially Essential Patents. **Nobody speaks/writes up**.

1. The chair goes through other guidelines for IEEE WG meetings, Patent-related information, Participation in IEEE 802 Meetings, and Copyright. The Chair asks that it be minuted that the **Copyright Policy** was presented.
   * Chair provides an attendance reminder:

3.1. Please record your attendance during the session by using the IMAT system:

* + login to [imat](https://imat.ieee.org/attendance)
  + select “802 Wireless Interim Session - Mixed mode - January 2023”
  + select “C/LM/WG802.11 Attendance” entry
  + click “UHR SG session that you are attending
  1. If you are unable to record your attendance contact Laurent Cariou (laurent.cariou@intel.com) and Ross Jian Yu (ross.yujian@huawei.com) for assistance

1. Agenda:
   * Chair reviews proposed agenda in 11-22-[2135r4](https://mentor.ieee.org/802.11/dcn/22/11-22-2135-04-0uhr-uhr-sg-january-2023-meeting-agenda.pptx)
   * Discussion:
   * None
   * Agenda approved with unanimous consent.
2. Announcements:
   * None
3. Approval of SG Minutes

Move to approve UHR SG minutes listed below:

* + Nov plenary: <https://mentor.ieee.org/802.11/dcn/22/11-22-1817-00-0uhr-uhr-sg-november-2022-meeting-minutes.docx>
  + Teleconferences November-December: <https://mentor.ieee.org/802.11/dcn/22/11-22-2091-01-0uhr-uhr-sg-november-december-2022-teleconference-minutes.docx>

Move: Ross Jian Yu Second: Peshal Nayak

Discussion: None

Result: Approved with unanimous consent

1. Submissions:

PAR discussion

* During this meeting, goal is to focus discussion on the definition of objectives and KPIs (for the scope of the project) and on description of the need of the project
* Decision on band support will be done during the March meeting
  + [11-22-1919r](https://mentor.ieee.org/802.11/dcn/22/11-22-1919-04-0uhr-considerations-on-uhr-par-and-kpis.pptx)4 Considerations on UHR PAR and KPIs Akira Kishida (NTT)
* C: Agreed that latency is an important metric.

**SP:** Do you agree that the “Need for the Project” of UHR PAR should include use cases of the latency/jitter-sensitive applications such as robotics and industrial automation for industrial IoT, logistics, and smart agriculture, to expand the existing Wi-Fi market in addition to the proposed use cases so far?

* C: delete also
* C: we don’t have PAR at this moment. Use “should include”

Result: (159=140+18+1)Y/13N/25A

* + [11-22-1921r0](https://mentor.ieee.org/802.11/dcn/22/11-22-1921-00-0uhr-more-info-about-uhr-par-and-update.pptx) More info about UHR PAR and update Ming Gan (Huawei)
* C: Can I confirm it would include security work?
* A: We do not exclude that. We can have further discussion if or not to include that in the PAR. If we follow previous PAR, we don’t mention security. But it doesn’t mean we cannot do security work.
* C: we are on the same page.
* C: Slide 6, what is the reference for minor improvement?
* A: For multi-AP coordination, co-SR, you can increase frequency reuse based on transmission power reduction.
* C: slide 3, you want to achieve Tput in mmwave. Any consideration on the bandwidth?
* A: for this table, we just the show minimum bandwidth in 11ad/ay. In UHR, the bandwidth could be smaller than this. Smaller bandwidth reduces the cost and helpful for the commercial mature.
* C: slide 4, the last bullet, the number 99 to 99.9999th should be careful to be put into PAR.
* A: understand. Just remove that, only say some improvement compared with 11be. This could be discussed.
* C: for 60GHz, 2560MHz, similar as 11ad/ay bandwidth. Any thoughts on the power consumption?
* A: we consider this from different perspective. In 11ad/ay, 2.16GHz is the smallest bandwidth. We chose this bandwidth just to achieve 100Gbps. This is the largest bandwidth for UHR whilst smallest bandwidth for 11ad/ay.
* A: if there is some interference in the OBSS, we consider the goal of two times improvement.
  + [11-22-2049r2](https://mentor.ieee.org/802.11/dcn/22/11-22-2049-02-0uhr-par-discussion.pptx) PAR Discussion Vinko Erceg (Broadcom)
* C: For your PAR language, improving robustness, by reducing worst case latency, and later you try to improve.
* C: you include topics, one of the topics is multi-AP coordination. I’d like to add some of the texts. The part you mention in presence of OBSS. That part could be good to be added.
* A: Let’s discuss. Let’s get everyone’s comment and merge.
* C: for roaming reliablity, I will be happy. Second thing is security. Third is to improve P2P support. What’s the technique?
* A: It has to do latency, Tput, reliability. Infrasture also, less interference, better scheduling.
* C: mmwave is not considered in your feature list, and could be included.
* A: the purpose of this presentation is that we have so much we could have if we don’t go 60GHz direction. That’s the right thing to do. I believe personally it is better to go without mmwave, I think the co-authors. That part will be decided in March anyway.
* C: I see you list bunch of features in 11be. If this is the case, this make UHR weaker than 11be.
* A: Some of them are too strong to be included in 11be, for example multi-AP. It will consume 5 years, and we have 4 more pages.
* C: I don’t see improving QoS.
* A: Automatically QoS will be improved with higher Tput, lower latency, jitter.
* C: Lightly licensed spectrum, what’s your thought?
* A: Rolf had a presntation. If there is spectrum, why not use that.
* C: last page, PAR discussion, slide 9, the group name is called UHR, I could not see what is the difference compared with EHT/be. Should we include any number.
* A: Try to keep it general at this point. How to zoom and agree. It will be difficult to agree. We just include one number in 11be, whch is 30Gbps.
* C: there is language, there is sentence of improved over 11be.
* A: even there is no words, we will improve. It will come automatically.
* C: a lot of feature lists in your slides. UHR just focus on some features, and try to reduce the scope.
* A: max 1/3 would be good. The selection would be in TG.
  + [11-23-0028r2](https://mentor.ieee.org/802.11/dcn/23/11-23-0028-02-0uhr-par-discussion.pptx) PAR discussion Laurent Cariou (Intel)
* C: Reliability is desirable. It would be good to include more general word.
* A: need for the project, can see a bit more to explain like multi-AP.
* C: I agree that we don’t put numerical values. So what is our project name?
* A: That’s the default name. We can always discuss that.
* C: if that’s the name, we actually require to have some numbers based on convention more. What is high?
* C: it is not easy to quantify latency and relialibity. Putting on some condition compared with 11be, that is far. Regarding Tput, we do have relative number. Without that, it is difficult to verify if we meet the PAR requirement. Ming’s 2x improvement could be one way.
* A: it is not easy. Still try to do the best.
* C: I would think it would be better to have some definiation of reliability. Otherwise, what high relialibty is.
* C: scope of the project, how do you proceed with the need for the project.
* A: I may present that during the week.
* C: Reliablity means can work in a wider range of conditions.
* A: We can discuss this offline.
* C: you want to make the PAR easy and don’t have KPI. It is not clear for the market.
* C: If there is new band, how do you compare with 11be.
* A: Tput and latency are comparable, super range. UHR may have other bands.
  + Recess at 21:30 ET

# 2nd Call: Wednesday, AM2, (10:30-12:30 ET)

1. The Chair, Laurent Cariou (Intel), calls the meeting to order at 10:30 ET. The Chair notifies the attendees that the agenda is in 11-22-[2135r5](https://mentor.ieee.org/802.11/dcn/22/11-22-2135-05-0uhr-uhr-sg-january-2023-meeting-agenda.pptx).
   1. Note that this is a hybrid meeting, with some participants in person and some participating online through a webex session
   2. Need to pay the registration fee to attend
2. IEEE-SA Policies and Procedure

The chair reviews the IEEE-SA Patent Policy:

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1. The chair goes through Other guidelines for IEEE WG meetings, Patent-related information, Participation in IEEE 802 Meetings, and Copyright. The Chair asks that it be minuted that the **Copyright Policy** was presented.
   * Chair provides an attendance reminder:

3.1. Please record your attendance during the session by using the IMAT system:

* + login to [imat](https://imat.ieee.org/attendance)
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  + select “C/LM/WG802.11 Attendance” entry
  + click “UHR SG session that you are attending

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

1. Agenda:
   * Chair reviews proposed agenda found in 11-22-[2135r5](https://mentor.ieee.org/802.11/dcn/22/11-22-2135-05-0uhr-uhr-sg-january-2023-meeting-agenda.pptx).
   * Discussion:
   * none
   * Agenda approved with unanimous consent.
2. Announcements:
   * None
3. Submissions

PAR discussion

* + [11-23-0028r3](https://mentor.ieee.org/802.11/dcn/23/11-23-0028-02-0uhr-par-discussion.pptx) PAR discussion Laurent Cariou (Intel)
* C: will we add numbers to quantify?
* A: The idea is to go without the numbers. This is the first step.
* C: I will oppose if there is no numbers in the PAR.
* C: yesterday’s presentation of Vinko is similar. Can we have a unified proposal. It would be easier. RvR is not captured here. It could be a way of different SNR.
* A: It is already harmonized.
* C: In Vinko’s presentation, there is some wording to capture some features. Satisfying the requirement of xxx, seamless connection
* A: it is thought of features. It is not to capture the scope.
* C: it is to explain the scenario. Not only within one single BSS, but multiple BSS.
* The presenter shows the PAR draft document (11-23/0078r0). That captures what you want to cover.
* C: this is too general, cannot compare with 11be.
* C: If you want to run the SP, this is really pre-mature. It is not constructive. You had a long discussion why we need to relialbity. I really don’t know what you mean by reliability. I guess you mean higher Tput low latency, not sure if everybody agrees. Here it is not clear. If our name is ultra high reliability, within the group, we need to know what is relaiblity and what does ultra high means.
* A: the goal of this SP is to get some consensus for tomorrow. The definition of reliability is what are trying to define here.
* C: It is very close between you and Vinko’s. Efficient use of the medium. We want Wi-Fi to be very robust, decode successfully. That’s a suggestion. May address people’s comment on the definition of reliability.
* C: This section requires that we need to prove. What kind of improvement, what kind of number we are talking about. It will be difficult to get the number. Given the process of establishing the program, we need the numbers. It is clear the group and the SA needs to do. Need several use cases, like some numbers to meet the VR requirements.
* C: prefer to include RvR.
* C: prefer to improve roaming.
* A: Added to the request here.
* C: Why capture P2P here? There is TDLS and IBSS. Do you want to the improve the operation?
* A: Not necessarily that. Want to have certain coordination. It is wider.
* C: I think it already covers STA to STA. 11be doesn’t mention P2P but we still improve that. I think not need to mention it here.
* C: without the number, the PAR is a little weak to me. It is clear to me how to vote.
* C: I agree in general I agree. I’d like to have more to coherenece between the two. It is better to run the SP when it is more clear.
* A: There is still time to collect people’s opinions.
* C: for Tput, we should follow the traditional way, to have number. Ming said 100Gbps, Vinko proposed 60Gbps. I am sure you can find some number. It is hard to prove to achieve a PAR with relative wording like to improve over 11ax.
* A: the issue is putting number, it affects the band support.
* C: I agree with Osama. It is to use the wording of section. I prefer you just run SP on some directions, Tput, latency for section 5.2. And can have more discussions. This is my opinion.
* C: if we have mmwave, of course it will get a Tput.
* A: we can find sceanrios that are clear.

Technical proposals

The presenter requests to move 11-23/0027r1 ahead.

Change of the agenda is approved unanimously.

* + [11-23-0027r1](https://mentor.ieee.org/802.11/dcn/23/11-23-0027-01-0uhr-uplink-mu-mimo-improvements.pptx) Uplink MU MIMO Improvements Sigurd Schelstraete (MaxLinear)
    - * C: slide 7, AP will provide block-diagonal precoding matrix, it is every subcarrier?
      * A: That is detail.
      * C: there is multi-ways to do interpolation. Do you want to specify how to interpolate.
      * C: any TxBF for the green curve?
      * A: nope.
      * C: do you consider the overall efficiency.
      * A: 9% overhead of sounding.
      * C: What kind of receiver is used for your results?
      * A: linear receivers.
      * C: 3 users, 3 SS, are there still gains? Did you use channel aging for your simulations?
      * A: Non-linear equalizers, the gain are a bit lower. Channel aging was used here.
      * C: How much channel aging you are using?
      * A: we can take it offline.
      * C: do you have results on LOS?
      * A: will check offline.
  + [11-22-1822r0](file:///D:\202301%20Baltimore\Recap%20on%20Coordinated%20Spatial%20Reuse%20Operation) Recap on Coordinated Spatial Reuse Operation Kosuke Aio (Sony Group Corporation)
* C: for obtaining the SINR, you mentioned that you propose to measurement request/response. My question is how frequent these measurement it has to be done? My 2nd question is how do you assume the transmission between APs? What do you expect DL and UL transmission within the same TXOP.
* A: AP doesn’t require frequent mearuement because it only relies on RSSI and RSSI doesn’t change fastly. The AP2AP transmission, I assume wired backhaul. But it may be ok for wireless backhaul case.
* C: slide 6, sharing AP collects information from candidate APs, why? Sharing AP should be able to decide himself?
* A: if the sharing AP does the overall scheduling, then it is needed. Otherwise, it is not needed.

The presenter requests to move 11-22/2203r0 and 11-22/2204r0 ahead.

Change of the agenda is approved unanimously.

* + [11-22-2203r0](https://mentor.ieee.org/802.11/dcn/22/11-22-2203-00-0uhr-emlsr-ap-mobile-ap-operation.pptx) EMLSR AP/mobile AP operation Sindhu Verma (Broadcom)
* C: the requirement on STA side, as long as we put restriction on non-AP side, we can use existing mechanism. Can you identify what is not sufficient regarding today’s EMLSR protocol? Is there a hole there?
* A: the current non-STR mobile AP’s transmission highly depends on the primary link.
  + Recess at 12:30 ET

# 3rd Call: Thursday, PM2, (16:00-18:00 ET)

1. The Chair, Laurent Cariou (Intel), calls the meeting to order at 16:00 ET. The Chair notifies the attendees that the agenda is in 11-22-[2135r7](https://mentor.ieee.org/802.11/dcn/22/11-22-2135-07-0uhr-uhr-sg-january-2023-meeting-agenda.pptx).
2. Note that this is a hybrid meeting, with some participants in person and some participating online through a webex session
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2. Chair provides an attendance reminder:

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  + click “UHR SG session that you are attending
  1. If you are unable to record your attendance contact Laurent Cariou (laurent.cariou@intel.com) and Ross Jian Yu (ross.yujian@huawei.com) for assistance

1. Agenda:
   * Chair reviews proposed agenda found in 11-22-[2135r7](https://mentor.ieee.org/802.11/dcn/22/11-22-2135-07-0uhr-uhr-sg-january-2023-meeting-agenda.pptx):
     1. There is a request to add a SP
     2. Agenda approved with unanimous consent.
2. Announcements:
   * None
3. Submissions

PAR discussion

* + [11-23-0028r5](https://mentor.ieee.org/802.11/dcn/23/11-23-0028-05-0uhr-par-discussion.pptx) Discussion following offline convergence during the week on section 5.2 of PAR Laurent Cariou (Intel)
* The author pointed out that [11-23-0078r2](https://mentor.ieee.org/802.11/dcn/23/11-23-0078-02-0uhr-uhr-draft-proposed-par.docx) is the word version of the proposed PAR
* C: overlapping BSS may be relevant in general, not just to latency/jitter, could be added to RvR.
* C: the first bullet has SINR, which is kind of the same.
* C: I agree this is more general
* A: yes it is a bit more general/wider
* C: I am fine with latency and Tput, they are clear. Efficient use of the medium, it is important but I am not sure that’s proper for objective. It is something to meet final objective.
* A: there is a strong request. I agree with you that’s less quantifiable.
* C: should avoid wording like comparing with 11be. I am in favior of object and has number of its own.
* A: it comes back to how you quantify the objective. It is TBD. If there is a number, we don’t have to compare with 11be, like Tput. For latency, it is hard to find a target without a comparison.
* C: otherwise, you have to define the sceanario, you need to run some simulations
* A: It is the TBD thing we are going to discuss about.
* C: About efficient use, same as previous commenter. The other comment is about tail latency. Do you have definition about tail latency
* A: That is important for some member and ok for many members. The tail latency, to avoid the term worst case latency.
* C: maybe similar as RTA report. There is some bound for percentile latency.
* A: it is difficult to find a number. We try to see if there is a number which is difficult.
* C: last comment is about TBD value. If we want to SP, we should discuss the name together, otherwise it is not complete.
* A: the name is an issue with NesCom, mentioned by Dorothy. If quantifying helps, that could be one remedy.
* C: the second bullet, it is about multi-AP case, you mention two cases. The relay case is mentioned or not?
* A: Sure. The OBSS can relay one for another.
* C: Regarding 802.11be, it is going on. Comparing with an evolving standard is not good for NesCom. Regarding latency and jitter, you said it is hard to measure. If it is hard to measure, how are we going to know it is better than 802.11be. I prefer specific object for improved P2P.
* A: If the other things could improve, that is given. As for comparsion with 11be, the 11be is pretty stable. Could be easy to do.
* C: does people in NesCom know 11be are stable, which is not in SB yet.
* C: regarding the quantification, we have the number of 11be. It is hard to difficult to find real use case. If we have to quantify, I am not in favor of Tput quantification. The name of the UHR is really fit for me.
* A: that’s a fair point.
* C: this text you’re showing is for the scope of the project (section 5.2)?
* A: yes. The word doc [11-23-0078r2](https://mentor.ieee.org/802.11/dcn/23/11-23-0078-02-0uhr-uhr-draft-proposed-par.docx) would be easier to check.
* C: Thanks for the efforts. I am supportive fo this. Need this to be a base. If people don’t want to mention a specific amendement, can say compare with previous amendemnts in the same band. For metric, it is good prevous we have a simple metric. If people really have some metric, better to bring a specific suggestion. Last but not least, if we put OBSS there, if you see there is something RvR, at range, when you draw the figure, if there is OBSS, don’t know how to draw the figure. Let’s support it and start to work on that.
* C: Editorial comment, SAP data rate. What do you mean by improving P2P operation. Are there any aspects besides the three mentioned above? Should I mention more than P2P topolgy?
* A: P2P coordination.
* C: If we want to highlight P2P, define it more clearly. Also can we have some rough numbers to quantify high. Not to say quantify precisely. Try to indicate how big step we are trying to achive.
* C: can you explain the correlation between enhancing reliability and increasing throughput?
* A: definition of reliability is always difficult, throughput and latency requirements are met
* C: we do have people who know NesCom. I think we should specify every abbreviation. Should also note that at NesCom PAR has less details. Usually we have .11 PAR passed easily as we have many details. Keep in mind what is covered and what is not covered in the standard. There is tech boundary in the PAR. We shoud as explicit and as specific as we can.
* C: we have run the SP yesterday that scalability can be enhanced for P2P.
* C: the goal is to only reliability or the overall performance, other aspects.
* A: what you describe is part of reliability.
* C: enhance power save and P2P, it is not clear to us. Better to the objective of comparison. is it for 11be?
* A: corrected – compared to 11be
* SP: **Do you agree to use the following as an initial draft for the description of the objectives/KPI part in section 5.2.b. Scope of the project of the UHR PAR (*band support part will be discussed separately in March*):**
* **This amendment defines standardized modifications to both the 802.11 physical layers (PHY) and the 802.11 Medium Access Control (MAC) that enhance Wireless Local Area Network (WLAN) reliability by enabling:**
  + at least one mode of operation capable of increasing throughput, as measured at the MAC data service Access Point (SAP), at different Signal to Interference and Noise Ratio (SINR) levels (Rate-vs-Range), compared to 802.11be
  + at least one mode of operation capable of improving tail latency and jitter compared to 802.11be including scenarios of overlapping Basic Service Sets (BSSs) and mobility between BSSs
  + more efficient use of the medium compared to 802.11be

Additionally, the amendment will also provide mechanisms for enhanced power save and improved Peer-to-Peer (P2P) operation compared to 802.11be.

Note: quantifying target values and corresponding metrics (units) are TBD

* C: I would like to understand the implication. What does it mean?
* A: you prove the text as a baseline.
* C: why are we taking the SP now?
* A: to get if the group has a consensus for the baseline.
* C: there are still people commenting.

Result: 121Y/54N/26A/71No answer

**SP by Ming Gan Huawei**

* SP: **Doyou agree to include at least throughput, latency/jitter and reliability as objectives in the scope of project of the UHR PAR document?**
* C: not EHT. Should be UHR. It is general. Missing a lot of details I care. If I vote yes, what does it mean?
* A: We can add other things later as I don’t say they are the only goals.
* C: should we say at least.
* C: what’s your definiation of reliability? To me latency/jitter is relaiblity. Also I don’t know how to vote like the previous commenter. Laurent’s SP is more complete.
* A: Relaiblity is defined in RTA. Percetnage of packets received during a latency bound.
* C: agree with the previous commenter.
* C: agree with the previous commenter. There is no PAR. We are not at this stage.
* C: nobody has any quantification. Maybe instead of terms we don’t have any explanation. I would propose the group called reliability extensions. Instead of saying ultra-high.

Results: 92Y/72N/40A/70No answer

Technical proposals

* + [11-22-2188r0](https://mentor.ieee.org/802.11/dcn/22/11-22-2188-00-0uhr-joint-transmission-for-uhr-a-refresher-and-new-results.pptx) Joint Transmission for UHR -A Refresher and New Results Ron Porat (Broadcom)
* C: Auxiliary AP syncs with the primary AP. The auxiliary needs to switch Tx and Rx?
* A: Yes. Need some quiet time.
* C: What is the assumption of the backhaul?
* A: the backhaul is out of the simulation assuming the AP knows the information.
* C: channel model, do you model mobility?
* A: we have aging -30dBc. There is an aging between sounding and channel transmission.
* C: you mention soft handover, that is related with moblity.
* A: that is outside the presentation.
* C: the fourth sublet, STA 1 is moving the sevring AP to the target AP, you are saying the joint transmission, can be received the STA. What’s your thought about that?
* A: we kind of try to make before break with joint transmission. If not dong JT, the two APs may not be synchronized.

1. Goals for March 2023

* Finalize and motion PAR and CSD documents

No discussions

1. Teleconference/ad-hoc plan

* February 6th 10am-12pm ET
* February 20th 10am-12pm ET
* May add more if need to later

1. Adjourn at 18:00 ET