IEEE P802.11  
Wireless LANs

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| Minutes for Task Group (TG) 802.11 be Extremely High Throughput January 2020 Meeting, in Irvine, CA, USA | | | | |
| Date: 2020-01-22 | | | | |
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|  |  |  |  |  |

Abstract

This document contains the meeting minutes of the IEEE 802.11be TG full sessions held in the January meeting.

Rev0: First version of the document.

Rev1: Updated a few typos.

**Introduction**

In this meeting, some sessions were parallel sessions with PHY+MAC, while others were joint sessions. The overall schedule of the sessions is present in the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
| AM 1 |  | **TGbe** | **TGbe Ad-Hoc**  **[MAC/PHY]** | **TGbe Ad-Hoc**  **[MAC/PHY]** |
| AM 2 |  | **TGbe** |  | **TGbe Ad-Hoc**  **[MAC/PHY]** |
| PM 1 | **TGbe** | **TGbe Ad-Hoc**  **[MAC/PHY]** | **TGbe** | **TGbe** |
| PM 2 | **TGbe Ad-Hoc**  **[MAC/PHY]** |  | **TGbe Ad-Hoc**  **[MAC/PHY]** | **TGbe** |
| EVE |  | **TGbe Ad-Hoc**  **[MAC/PHY]** |  |  |

The minutes corresponding to the ad-hocs can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 1: Monday 13 January PM1**

**Introduction**

1. The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order at 13:30. The agenda is found in 2128r3.
2. The Chair remainds about attendance and recaps the meeting protocol. Around 200 people in the room.
3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.
4. The Chair asks if there is any objection of approving the agenda on slides 12-14 in 2128r3. Agenda approved.
5. Summary from November 2019 meeting and conference calls.
6. **Motion to approve TG Minutes.**  
     
   Move to approve TGbe minutes of meetings and teleconferences from July 2019 meeting to today:

* F2F meeting: <https://mentor.ieee.org/802.11/dcn/19/11-19-2029-07-00be-meeting-minutes-november-2019.docx>
* Teleconferences: <https://mentor.ieee.org/802.11/dcn/19/11-19-2133-01-00be-telephone-conference-meeting-minutes-december-2019-and-january-2020.docx>

**Move:** Dennis Sundman **Second:** Subir Das  
  
**Discussion:** No discussion. **Result:** Approved with unanimous consent.

1. The chair explains the new sub-topic category for the contributions.

**Procedural Submissions**

1. [**2153r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-2153-00-00be-adopting-a-release-framework-to-meet-timeline.pptx)**, “Adopting a release framework to meet 802.11be timeline” – Laurent Cariou (Intel)**  
   **Summary:** The market is already building expectations based on the timeline. The authors believe it is important to identify the feature set early and that currently we are on a path of not meeting the timeline. They would like to group the candidate features into release 1 and release 2 feature sets. Proposal to release 1 list: 320 MHz BW, 4K QAM, Multiple RUs, Multi-link operation.  
     
   **Discussion:**  
   C: I am not convinced that the market has high expectation for the release of Wi-Fi 7.  
   C: In the PAR, there are many features. I propose we instead vote for the features to include in release 1.  
   A: We don’t attempt to take away features, just serialize the process. Regarding the idea of voting the features, I think it is a good idea.  
   C: These features are high power features, but we have no features for lower power.  
   C: I don’t think we can figure out the hooks for R2 without going into detail of those.  
   A: Correct. But I think this will not be a problem.  
   C: Regarding the R1 features, does these constitute a large enough step to be the next gen Wi-Fi?  
   A: I believe so.  
   C: Given the timeline I believe the idea is good.
2. [**0116r0**](https://mentor.ieee.org/802.11/dcn/20/11-20-0116-00-00be-discussion-on-timeline-for-802-11be.pptx)**, “Discussion on timeline for 802.11be” – Ming Gan (Huawei)**  
   **Summary:** The authors point out that the timeline can be adjusted. They believe we should not split features into different releases.  
     
   C: I don’t think it is part of the standardization to segment a standard into releases. If we look at 802.11ax, they are already planning the second release and the specification is not yet finalized.  
   C:

Straw poll #1: [**2153r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-2153-01-00be-adopting-a-release-framework-to-meet-timeline.pptx)**, “Adopting a release framework to meet 802.11be timeline” – Laurent Cariou (Intel). Slide 17.**Do you agree to define releases of features, and to allow the chair and ad hoc chairs of 802.11be to prioritize contributions and decisions related to release in the agenda, starting with release 1?  
- A minimum time per session [~10%] should be allocated for R2 features discussion. **Discussion:**  
C: I don’t think the part with “10%” should be in there.  
A: We wanted to show that we are not ignoring R2 features.  
C: I would like to have some sentence with R2 discussions.  
A: Ok.

**New text:**  
Do you agree to define releases of features, and to allow the chair and ad hoc chairs of 802.11be to prioritize contributions and decisions related to release in the agenda, starting with release 1?  
  
**Result:** Y/N/A: 75/49/18

**Recess.**

**Session 2: Monday 13 January PM2**

This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 3: Tuesday 14 January AM1**

**Introduction**

1. The Chair, Alfred Asterjadhi (Qualcomm) calls the meeting to order at 8:01. The agenda is the document 2128r6.
2. The Chair remainds about attendance.
3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.
4. The Chair notifies that the agenda of the session is to proceed with technical contributions. The Chair asks if there is any objection with the agenda. Nobody speaks up.

**Technical submissions Straw polls**

1. [**1143r3**](https://mentor.ieee.org/802.11/dcn/19/11-19-1143-03-00be-efficient-operation-for-multi-ap-coordination.pptx)**, “Efficient Operation for Multi-AP Coordination” – Sungjin Park (LG)**  
   **Straw poll**  
     
   Do you agree to add the following text to the TGbe SFD:  
   An EHT AP initiating the Multi-AP coordination may request to neighboring EHT AP(s) the information as follows:  
   - Neigboring EHT APs buffer status  
   - Neigboring EHT APs preferred channels\*.  
     
   \*Note: the definition of preferred channels is TBD, but it can be one of the follows:  
   - All available channels  
   - The channels with priority based on the ED value of the nighboring EHT AP per channel  
   - The channels based on CQI between neighboring EHT AP and STA associated with the neighboring EHT AP  
     
   **Discussion:**  
   C: The buffer status is probably not information that can be used. Furthermore, what is a neighboring AP?  
   C: Is this information shared over the air or backhaul?  
   A: Both are possible.  
   C: Can you add another note that the definition of neighboring AP is TBD?  
   A: Ok.  
   C: What is the time-scale here, over a single TXOP or larger time-scale?  
   A: I was thinking for a single TXOP.  
     
   **New text:**  
   Do you agree to add the following text to the TGbe SFD:  
   An EHT AP initiating the Multi-AP coordination may request to a set of EHT AP(s) the information as follows:  
   - Neigboring EHT APs buffer status  
   - Neigboring EHT APs preferred channels\*.  
     
   \*Note: the definition of preferred channels is TBD, but it can be one of the follows:  
   - All available channels  
   - The channels with priority based on the ED value of the nighboring EHT AP per channel  
   - The channels based on CQI between neighboring EHT AP and STA associated with the neighboring EHT AP  
     
   \*Note: the set of EHT APs is TBD  
     
   **Result:** Y/N/A: 12/13/65.
2. [**1535r3**](https://mentor.ieee.org/802.11/dcn/19/11-19-1535-03-00be-sounding-for-ap-collaboration.pptx)**, “Sounding for AP Collaboration” – Junghoon Suh (Huawei)**  
   **Summary:** The contribution regards channel aggregation for Multi-AP transmissions.  
     
   **Straw poll #3**For the Joint Transmission, do you agree that each STA needs to aggregate the estimated channels with all the APs in collaboration before the CSI computation, and feedback the CSI information for the aggregated channel?  
   - That is, for JT, each STA shall compute the CSI information for the aggregated channel with the size of N\_GTX x N\_RX, where N\_GTX is the global number of TX across all participating APs for collaboration, and N\_RX is the number of RX at the individual STA which computes the CSI information.  
     
   **Discussion:**  
   C: This is the first time this straw poll is presented.  
   A: This was in the November meeting, but I didn’t present it.  
   C: What you want the STA to feedback is not known.  
   A: You anyway need to aggregate the knowledge.  
   C: Can you put a not that it will not be reflected in the SFD.  
     
   **New text:**  
   For the Joint Transmission, do you agree that each STA needs to aggregate the estimated channels with all the APs in collaboration before the CSI computation, and feedback the CSI information for the aggregated channel?  
   - That is, for JT, each STA shall compute the CSI information for the aggregated channel with the size of N\_GTX x N\_RX, where N\_GTX is the global number of TX across all participating APs for collaboration, and N\_RX is the number of RX at the individual STA which computes the CSI information.  
   - Not going to be reflected into the SFD for now.  
     
   **Result:** Y/N/A: 13/6/77
3. [**1582r**](https://mentor.ieee.org/802.11/dcn/19/11-19-1582-02-00be-coordinated-ap-time-and-frequency-sharing-in-a-transmit-opportunity-in-11be.pptx)**2, “Coordinated AP Time and Frequency Sharing in a Transmit Opportunity in 11be” – Lochan Verma, presented by George Cherian (Qualcomm)**  
   **Straw poll #1**Do you support that the 802.11be defines a procedure for an AP to share its frequency/time resources of an obtained TXOP with a set of APs?  
   - Set of APs is TBD  
     
   **Discussion:**C: I think this SP is too early. I cannot support it.  
   C: We should evaluate the performance before we run this SP.  
     
   **Result:** Y/N/A: 60/11/40  
     
   **Straw poll #2**In all modes of operation wherein an AP shares its frequency resource with a set of APs, the AP shall share its frequency resource in multiples of 20 MHz channels with a set of APs in an obtained TXOP?  
   - PPDU format of the transmission on the shared resource is TBD  
     
   **Discussion:**C: Are the 20 MHz contiguous or non-contiguous.  
   A: It is not part of this straw poll.  
   C: Have you considered power imbalances?A: Yes.  
   C: I have a related contribution and would like the straw poll to be deferred until I have presented.  
   C: I suggest you begin the SP with ”do you agree that” and remove question mark.  
   A: Ok.  
   C: Why do you need to restrict it to 20 MHz, when we already today do lower than 20 MHz.  
     
   **New text:**Do you agree to add to the SFD:  
   - In all modes of operation wherein an AP shares its frequency resource with a set of APs, the AP shall share its frequency resource in multiples of 20 MHz channels with a set of APs in an obtained TXOP  
   - PPDU format of the transmission on the shared resource is TBD  
     
   **Result:** Y/N/A: 42/26/41
4. [**1788r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1788-00-00be-coordinated-ofdma-operation.pptx)**, “Coordinated OFDMA Operation” – Yongho Seok (MediaTek)  
     
   Straw poll #2**Do you support the following coordinated OFDMA operation?  
   - An AP that intends to use the resource (i.e., frequency or time) shared by another AP shall be able to indicate its resource needs to the AP that shared the resource.  
     
   **Discussion:**   
   C: I cannot detect what the difference is with this straw poll and the first one from [**1582r**](https://mentor.ieee.org/802.11/dcn/19/11-19-1582-02-00be-coordinated-ap-time-and-frequency-sharing-in-a-transmit-opportunity-in-11be.pptx)**2.**C: I think you should modify the SP text.  
     
   **New text:**  
   Do you support to add the following in the TGbe SFD:  
   - An AP that intends to use the resource (i.e., frequency or time) shared by another AP shall be able to indicate its resource needs to the AP that shared the resource.  
     
   **Result:** Y/N/A: 50/2/34
5. [**1895r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-1895-01-00be-setup-for-multi-ap-coordination.pptx)**, “Setup for Multi-AP coordination” – Sungjin Park (LG)**  
   **Straw poll 1**  
   Do you agree to add the following text to the TGbe SFD:  
   An EHT AP supporting the Multi-AP coordination can send a frame (e.g., Beacon or other management frame) including capabilities of Multi-AP transmission schemes.

* Multi-AP transmission schemes are TBD (e.g., Coordinated OFDMA)

**Result:** Y/N/A: 42/0/32  
  
**Straw poll 2**Do you agree to add the following text to the TGbe SFD:  
- An EHT AP which obtains TXOP and initiates the Multi-AP coordination is the Master AP\*.  
- An EHT AP which is coordinated for the Multi-AP transmission by the Master AP is the Slave AP\*.  
  
\*Note: The name can be modified.  
  
**Discussion:**C: I read the SP as a suggestion for name, and the name can be changed. So I don’t understand the SP.  
C: Lets avoid the names master and slave.  
C: Maybe TXOP owner and participating AP.  
C: I don’t think TXOP owner is good either.  
C: Maybe sharing AP and shared AP.  
  
**New text:**Do you agree to add the following text to the TGbe SFD:  
- An EHT AP which obtains TXOP and initiates the Multi-AP coordination is the sharing AP\*.  
- An EHT AP which is coordinated for the Multi-AP transmission by the Master AP is the shared AP\*.  
  
\*Note: The name can be modified.  
  
**Result:** Y/N/A: 40/1/48

Straw polls finished. Moving on with regular submissions.

**Technical Submissions**

1. [**1779r5**](https://mentor.ieee.org/802.11/dcn/19/11-19-1779-05-00be-downlink-spatial-reuse-parameter-framework-with-coordinated-beamforming-null-steering-for-802-11be.pptx)**, “Downlink SR parameter framework with coordinated beamforming/null steering” – David Lopez-Perez (Nokia)**  
     
   **Summary:** The authors believe that using the 802.11ax SRP framework may be extended for signaling coordinated beamforming/null steering protocol.  
     
   **Discussion:**C: Slide 9. After Phase 2, are the DL simultaneous?  
   A: No.  
   C: So you add beamforming to spatial reuse.  
   A: Yes.  
   C: Do you have simulation results?  
   A: For UL.  
   C: Slide 6. Do you propose existing MU-RTS frame with a new flag?  
   A: Yes, we want to add a field.  
   C: Instead of using SRP inside MU-RTS we should put it in CTS.  
     
   **Straw poll**Do you believe that coordinated beamforming is an appealing concept and should be further explored within the 802.11be task group?  
     
   **Discussion:**C: I have a related presentation, would you like to defer the straw poll to later?  
   A: I prefer to run it now.  
   C: Do you want to include in SFD?  
   A: No.  
   C: Is this independent of the SRP?  
   A: Yes, this is high level SP.  
     
   **Result:** Y/N/A: 82/2/31.

**Recess.**

**Session 4: Tuesday 14 January AM2**

**Introduction**

1. The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order at 10:30.
2. The Chair remainds about attendance.
3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.
4. The Chair notifies that the agenda of the session is to proceed with technical contributions. The Chair asks if there is any objection with the agenda 2128r6. Nobody speaks up.

**Technical Contributions**

1. [**1858r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-1858-01-00be-harq-system-level-simulation-results.pptx)**, “HARQ System Level Simulation Results” – Sebastian Max (Ericsson)**  
   **Summary:** The authors provide system simulation evaluations of HARQ in the reference scenario “Residential” from the TGax simulation scenarios. They also provide results with the idea of no rate adaptation scheme they call “Multi Layer”.  
     
   **Discussion:**  
   C: Do you consider the feedback channel in the simulations?  
   A: Yes, the HARQ feedback is re-using a modification of the BA mechanism for signaling the success per CW.  
   C: How do you do coding in the multi-layer?  
   A: We assume we take the least robust coding in multi-layer.  
   C: What kind of HARQ are you using?  
   A: The HARQ is modeled as using chase combining.  
   C: If I understand correctly you are using 4 layers for 256-QAM. What would happen if we went for 2 layers and MIMO?  
   A: I think we can combine this straight forwardly.
2. [**1903r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1903-00-00be-uplink-coordinated-multi-ap.pptx)**, “Uplink Coordinated Multi-AP” – Roya Doostnejad (Intel)**  
   **Summary:** The authors point out that doing Multi-AP coordination in UL is easier to realize than for the DL. APs may mitigate the noise by performing null-beamforming.  
     
   **Discussion:**C: How do you decide when to do coordination?  
   A: The idea is that you do it when there is interference, but we have not looked at specific rules.  
   C: Can you not harmonize the BA from the AP?  
   A: I am not sure it would work due to different delay.
3. [**1919r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-1919-01-00be-coordinated-ofdma.pptx)**, “Coordinated OFDMA” – Liwen Chu (NXP)**  
   **Summary:** The authors consider static and dynamic methods for performing coordinated OFDMA. The AP announces support for coordinated OFDMA through beacons.   
     
   **Discussion:**  
   C: What is the difference between coordinator and Master?  
   A: It’s the same.  
   C: Slide 2. Is it possible to select multiple APs as coordinator AP?  
   A: In principle it is OK.   
     
   **Straw poll 1**Do you support that  
   – In a coordinated OFDMA, both DL OFDMA and its corresponding UL OFDMA acknowledgment are allowed.  
     
   **Discussion:**C: We didn’t agree on coordinated OFDMA, so maybe we should run such a straw poll first.  
   A: Did we not? I think it is already agreed.  
   C: Can you modify the straw poll to emphesize that we also want coordinated OFDMA to be supported.  
     
   **New text:**Do you support that  
   – Coordinated OFDMA is supported in 11be, and  
   – In a coordinated OFDMA, both DL OFDMA and its corresponding UL OFDMA acknowledgment are allowed  
     
   **Result:** Y/N/A: 53/3/43
4. [**1931r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1931-00-00be-multi-ap-group-formation-follow-up.pptx)**, “Multi-AP group formation follow-up” – Cheng Chen (Intel)**  
   **Summary:** This contribution looks at how to form the Multi-AP groups. They have a triggering operation, where there are 2 modes: (1) every AP can intiate coordination, (2) only certain APs can initiate coordination.  
     
   **Discussion:**C: Is it correct that you want some sort of authorization mechanism?  
   A: In this contribution we don’t consider authorization.  
   C: How do we make sure that all APs can transmit to a particular STA?  
   A: In this contribution we don’t consider how to choose the APs. We look at a part of what we believe is the required framework.  
   C: In the second step of slide 7, does this happen when a TXOP is obtained?  
   A: No, this happens before that.  
   C: Do you think all schemes need to go through this procedure?  
   A: This is just a boundary.  
     
   **Straw poll**Do you agree to define a mechanism to determine whether an AP is part of a Multi-AP set that participates in Multi-AP transmission?  
     
   **Discussion:**  
   C: Why do we needto define this Multi-AP set? It is enough to set up a WLAN and we are done.  
   A: How to achieve this group we can discuss further.  
   C: I think we should update the SP text. “Define a mechanism to determine whether…”  
   C: I have a related presentation.  
     
   **Straw poll deferred.**
5. [**1961r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-1961-01-00be-multi-ap-group-establishment.pptx)**, “Multi-ap-group-establishment” – Bo Sun (ZTE)**  
   **Summary:** The authors consider the establishment of a Multi-AP through either static or dynamic formation. The dynamic group may be persistent through several multi-AP transmissions.

**Recess.**

**Session 5: Tuesday 14 January PM1**

This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 6: Tuesday 14 January EVE**

This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 7: Wednesday 15 January AM1**

This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 8: Wednesday 15 January PM1**

**Introduction**

1. The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order at 13:30.
2. The Chair remainds about attendance.
3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.
4. The Chair notifies that the agenda of the session is to proceed with technical contributions.
   1. Request to run a SP [1931r1](https://mentor.ieee.org/802.11/dcn/19/11-19-1931-01-00be-multi-ap-group-formation-follow-up.pptx) before we start with technical contributions.
   2. Request to run a SP [1961r2](https://mentor.ieee.org/802.11/dcn/19/11-19-1961-02-00be-multi-ap-group-establishment.pptx) before we start with technical contributions.
5. The Chair asks if there is any objection with the agenda 2128r8. No objection heard.

**Straw polls**

1. [**1931r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-1931-01-00be-multi-ap-group-formation-follow-up.pptx)**, “Multi-AP group formation follow-up” – Cheng Chen (Intel)**  
   **Straw poll**Do you agree to define a mechanism to determine whether an AP is part of an AP candidate set and can participate as a shared AP in Coordinated AP transmission initiated by a sharing AP?  
     
   **Result:** Y/N/A: 35/0/17
2. [**1961r2**](https://mentor.ieee.org/802.11/dcn/19/11-19-1961-02-00be-multi-ap-group-establishment.pptx)**, “Multi-AP Group Establishment” – Sun Bo (ZTE)**  
   **Straw poll**Do you support that an AP should deliver the information of the multi-AP group?  
   - A multi-AP group is a set of APs in which any two or more members can potentially perform multi-AP transmissions.  
     
   **Discussion:**C: Is this a straw poll to define the multi-AP group as a terminology?  
   A: We don’t want to define any terminology with this SP.  
   C: Can you add a note that terminology is TBD?  
   A: Ok.  
   C: To whom is the information delivered? Can you modify SP?  
   A: To a STA, I will update.  
   C: We had a SP of multi-AP group, where it was refered to as AP candidate set, maybe you want to update the SP?  
     
   **New text**Do you support that an AP should deliver the information of the multi-AP group to STAs?  
   - A multi-AP group is a set of APs in which any two or more members can potentially perform multi-AP transmissions.  
   - Note: the term of “multi-AP group” is TBD  
     
   **Straw poll deferred.**

**Technical Contributions**

1. [**1972r1**](https://mentor.ieee.org/802.11/dcn/19/11-19-1972-01-00be-operation-of-virtual-bss-architecture-for-multi-ap-coordination.pptx)**, “Operation of Virtual BSS Architecture for Multi-AP Coordination” – Guogang Huang (Huawei)**  
   **Summary:** The authors propose to introduce a virtual BSS for the Multi-AP coordination. The benefit with this is that if Multi-AP is used, it could be almost completely transparent to STAs in the virtual BSS.  
     
   **Discussion:**C: Slide 3, the red STAs, are they associated with any one AP?  
   A: Yes.   
   C: Is the coordinator always part of the transmission?  
   A: Yes.
2. [**1979r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1979-00-00be-ul-coordination-for-throughput-improvement-and-interference-reduction.pptx)**, “UL Coord. for Throughput Improvement and Interf. Reduction” – Genadiy Tsodik (Huawei)**  
   **Summary:** The authors propose to align UL transmissions among STAs (in different BSSs). By doing so, UL-MU-MIMO techniques can be applied to mitigate interference.  
     
   **Discussion:**  
   C: Can this be performed already with 802.11ax?  
   A: No, there is no way to coordinate.  
   C: Did you compare with TDMA/OFDMA?  
   A: No.  
     
   **Straw poll**  
   Do you support to introduce an UL AP Cooperation procedure in 802.11be?  
     
   **Discussion:**  
   C: With UL AP Cooperation, are you referring to any UL cooperation, or a specific one?  
   A: I don’t want to restrict to any specific UL cooperation.  
   C: Do you intend to put it into SFD?  
   A: I want to include to SFD.  
   C: Then I believe the straw poll is not clear.  
     
   **Straw poll deferred.**
3. [**0011r0**](https://mentor.ieee.org/802.11/dcn/20/11-20-0011-00-00be-considerations-on-coordinated-ofdma.pptx)**, “Considerations on Coordinated OFDMA” – Sungjin Park (LG)**  
   **Summary:** The authors propose a protocol for Master and Slave AP coordination for coordinated OFDMA. They present two options, where the total bandwidth is divided in different manner.  
     
   **Discussion:**C: Slide 11. For option 2, do we need to define a multi-AP preamble? But for option 1 you can re-use the preamble design without doing anything else.  
   A: Ok.  
   C: I believe it is a problem to do channel switching in option 1. For option 2, I don’t understand how you set the preamble.  
   C: We must take buffer status information complexity into account, is that taken into account for the ”low” complexity assessment on slide 13.  
   A: I have no strong opinion about that.  
   C: I prefer option 1, because for option 2 a new preamble will be needed.  
   C: What is the blue color symbolizing on slide 11?  
   A: Both APs transmitting at both bands.  
     
   **Straw poll**Which option do you prefer to adopt in the TGbe?  
   - Option 1: Slave AP schedules RU to be allocated to the STA associated with itself and the allocated RU should be within the allocated bandwidth from the Master AP.  
   - Option 2: Mater AP schedules RU to be allocated to the STA associated with Slave AP as well as the STA associated with Master AP and the allocated RU should be within the entire bandwidth used in C-OFDMA.  
     
   **Result:** Option1/Option2/Neither/Need more info: 18/11/1/47
4. [**0056r0**](https://mentor.ieee.org/802.11/dcn/20/11-20-0056-00-00be-preparations-for-coordinated-ofdma.pptx)**, “Preparations for coordinated OFDMA” – Rojan Chitrakar (Panasonic)**  
   **Summary:** The authors have identified that coordinated OFDMA may benefit different STAs differently. To perform good coordinated OFDMA they claim that prior information exchange is useful.

**Recess at 15:30.**

**Session 9: Wednesday 15 January PM2**

This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 10: Thursday 16 January AM1**  
This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 11: Thursday 16 January AM2**

This was a parallel MAC and PHY session. The corresponding minutes can be found at:

* MAC: <https://mentor.ieee.org/802.11/dcn/20/11-20-0207-01-00be-tgbe-mac-ad-hoc-meeting-minute-january-2020.docx>
* PHY: <https://mentor.ieee.org/802.11/dcn/20/11-20-0164-04-00be-11be-phy-ad-hoc-minutes-jan-2020.docx>

**Session 12: Thursday 16 January PM1**

**Introduction**

1. The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order at 13:30.
2. The Chair remainds about attendance.
3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.
4. The agenda is to first go through submissions and then motions. The Chair asks if there is any objection to go ahead with the agenda. No objection noted.

**Submissions**  
First there is a backlogged straw poll.  
Request to change the order of submissions.  
Request to add a presentation to the list of submission.  
Order of submissions updated according to 2128r9 slide 62.

1. [**20/1979**](https://mentor.ieee.org/802.11/dcn/19/11-19-1979-01-00be-ul-coordination-for-throughput-improvement-and-interference-reduction.pptx)**, “UL Coordination for Throughput Improvement and Interference Reduction” – Genadiy Tsodik (Huawei)**  
   **Straw poll**Do you think UL AP Coordination is an appealing direction which should be further evaluated in 802.11be?  
   - Not be included currently in SFD  
     
   **Result:** Y/N/A: 26/1/53
2. [**20/0203**](https://mentor.ieee.org/802.11/dcn/20/11-20-0203-00-00be-option-i-and-option-ii-which-way-to-go.pptx)**, “Option I and Option II: Which Way to Go” – Osama Aboul-Magd (Huawei)**  
   **Summary:** The authors prefer to run multiple TGs rather than introduce releases within one TG.  
     
   **Discussion:**C: I think there are pros and cons to both approaches.  
   A: I believe this issue is rather for the WG or even 802, rather than TG.  
   C: A problem with the second option is that a new PAR may include many new features. On the other hand in option 1 this is not possible.  
   A: The PAR states “candidate features”, so adding/removing features is a possibility regardless at any time point.
3. [**19/2153r3**](https://mentor.ieee.org/802.11/dcn/19/11-19-2153-03-00be-adopting-a-release-framework-to-meet-timeline.pptx)**, “Adopting a release framework to meet timeline” – Laurent Cariou (Intel)**  
   **Already presented. Running Straw poll #3:**  
   Do you agree to define releases of features, and to prioritize contributions and decisions related to release in the agenda, as summarized below, starting with Release 1?

* Release 1 Features are:
  + 320 MHz, 4KQAM, Multiple RUs per STA, Multi-link operation and a low complexity AP coordination feature
* Candidate Release 2 Features:
  + 16 spatial streams, HARQ, Additional multi-AP features (e.g. C-BF, JT), any other potential features in the scope of PAR (e.g. features for Time-sensitive networks)

Notes:

* The specification of release 1 features needs to be ready and stable in 11be D1.0/D2.0 at the target dates.
* The specification of release 2 features needs to be ready and stable in 11be D3.0/D4.0 at the target dates.
* The discussion on release 2 features is still allowed during release 1 phase.
* ­All releases target increasing throughput and/or reducing worst case latency, as defined in the PAR

**Discussion:**C: I find the 3rd note strange. I request that we delete the notes.  
A: I prefer to keep the notes.  
C: The “low complexity” is subjective.  
A: We need to discuss in the group what we mean with this.  
C: I think you should add power efficiency in the notes.  
A: Ok.  
C: None of these features in the releases are actually in the “Scope 5.2” in the PAR.  
C: I believe we should have more features in release 1, because otherwise we will spend all the time on multi-link.  
A: I have not seen any other feature that has been crystallized.  
C: How do we guarantee that features in release 2 are allowed in release 1 part?  
  
**New text:**  
Do you agree to define releases of features, and to prioritize contributions and decisions related to release in the agenda, as summarized below, starting with Release 1?

* Release 1 Features are:
  + 320 MHz, 4KQAM, Multiple RUs per STA, Multi-link operation and a low complexity AP coordination feature
* Candidate Release 2 Features:
  + 16 spatial streams, HARQ, Additional multi-AP features (e.g. C-BF, JT), any other potential features in the scope of PAR (e.g. features for Time-sensitive networks)

Notes:

* The specification of release 1 features needs to be ready and stable in 11be D1.0/D2.0 at the target dates.
* The specification of release 2 features needs to be ready and stable in 11be D3.0/D4.0 at the target dates.
* The discussion on release 2 features is still allowed during release 1 phase.
* ­All releases target increasing throughput and/or reducing worst case latency and/or improving power efficiency, as defined in the PAR

**Result:** Y/N/A: 98/12/18  
  
**Straw poll turned into   
Motion, document** [**19/2153r4**](https://mentor.ieee.org/802.11/dcn/19/11-19-2153-04-00be-adopting-a-release-framework-to-meet-timeline.pptx) **slide 19:**Move to agree to define releases of features, and to prioritize contributions and decisions related to release in the agenda, as summarized below, starting with Release 1

* Release 1 Features are:
  + 320 MHz, 4KQAM, Multiple RUs per STA, Multi-link operation and a low complexity AP coordination feature
* Candidate Release 2 Features:
  + 16 spatial streams, HARQ, Additional multi-AP features (e.g. C-BF, JT), any other potential features in the scope of PAR (e.g. features for Time-sensitive networks)

Notes:

* The specification of release 1 features needs to be ready and stable in 11be D1.0/D2.0 at the target dates.
* The specification of release 2 features needs to be ready and stable in 11be D3.0/D4.0 at the target dates.
* The discussion on release 2 features is still allowed during release 1 phase.
* ­All releases target increasing throughput and/or reducing worst case latency and/or improving power efficiency, as defined in the PAR

**Move:** Laurent Cariou, **Second:** Bin Tian  
  
**Result:** Y/N/A: 85/5/19  
  
**Motion PASSES.**

1. [**20/115r2**](https://mentor.ieee.org/802.11/dcn/20/11-20-0115-02-00be-multi-link-feature-candidates-for-r1.pptx)**, “Multi-Link Feature Candidates For R1” – Huizhao Wang (Quantenna)**  
   **Summary:** The authors propose a detailed set of features for release 1.  
     
   **Discussion:**  
   C: I believe the list you have on slide 3 may be extended.  
   C: I agree we should limit the scope, but I am not convinced this list is complete.  
   A: I will defer SP2.  
   C: I believe you should defer SP1 as well.  
     
   **Straw poll 1**Do you agree to define a limited scope of features for Multi-Link for Release 1?  
     
   **Discussion:**C: What is the intention of this SP?  
   A: If yes, the group is committed to action on limiting the scope of Multi-link.  
   C: Does it mean that whatever does not fall within that limit will be part of release 2?  
   A: Yes, I believe so.  
     
   **Result:** Y/N/A: 21/41/55
2. [**20/116r4**](https://mentor.ieee.org/802.11/dcn/20/11-20-0116-04-00be-discussion-on-timeline-for-802-11be.pptx)**, “Discussion on timeline for 802.11be” – Ming Gan (Huawei)**  
   **Summary:** Already presented. The authors would like to reduce the frequency of telephone conference calls and increase the number of face-to-face meetings.  
     
   **Straw poll #1**Do you support to hold TGbe ad hoc face-to-face meetings right before IEEE 802.11 F2F meeting, starting from March 2020?  
     
   **Discussion:**C: I believe reducing teleconference calls is not a good idea. Furthermore, I’m not convinced adding more face-to-face meetings will solve the problem.  
   C: I don’t think we need a PHY ad-hoc for March.  
   C: Regarding the MAC side, I believe it may be needed for March.  
   C: The problem is that we run the SP in the F2F so contributions need to be presented twice.  
   C: I would like to point out that TGax is not finished and we typically have ad-hoc before the meeting.  
   C: The quality on the teleconference calls is bad. Maybe we could educate the group.  
     
   **New text:**  
   Do you support to hold TGbe MAC ad hoc face-to-face meetings right before March IEEE 802.11 F2F meeting?  
     
   **Result:** Y/N/A: 39/23/48  
     
   **Straw poll #2**Do you support to hold TGbe PHY ad hoc face-to-face meetings right before March IEEE 802.11 F2F meeting?  
     
   **Deferred.**

**Motions**

1. **Motion 50**Move to add to the TGbe SFD:   
   - the 802.11be amendment shall define mechanism(s) in support of priority access to a non-AP STA for NS/EP Priority Service   
   - Note: Non-AP STA for national security (NS)/emergency preparedness (EP) Priority Service is a regular non-AP STA authorized to NS/EP Service **Move:** Subir Das, **Second:** Srinivas Srinivasa  
     
   **Discussion:** None.  
     
   **Result:** Approved by unanimous consent.  
     
   **Motion** **PASSES.**
2. **Motion 51**Move to add the following text to 11be SFD:  
   For each of the enabled links, frame exchanges are possible when the corresponding non-AP STA of the enabled link is in the awake state.

NOTE-A link is enabled when that link can be used to exchange frames subject to STA power states.

NOTE-When a link is disabled (i.e. not enabled) by an MLD the frame exchanges are not possible.  
  
**Move:** Minyoung Park, **Second:** Po-Kai Huang

**Discussion:** None.  
  
**Result:** Approved by unanimous consent.   
  
**Motion PASSES.**

1. **Motion 52**Move to add the following text to 11be SFD:

* An AP of an AP MLD may transmit on a link a frame that carries an indication of buffered data for transmission on other enabled link(s)

**Move:** Minyoung Park, **Second:** Po-Kai Huang  
  
**Discussion:**  
C: What does this motion imply?  
A: The idea is to limit STAs from jumping around among links.  
  
**Result:** Y/N/A: 45/7/23  
  
**Motion PASSES.**

1. **Motion 53**Move to add the following to 11be SFD:

* An AP that intends to use the resource (i.e., frequency or time) shared by another AP shall be able to indicate its resource needs to the AP that shared the resource.

**Move:** Yongho Seok, **Second:** James Yee  
  
**Discussion:** None.  
  
**Result:** Approved with unanimous consent.  
 **Motion PASSES.**

1. **Motion 54**Move to add the following to 11be SFD:

* 802.11be defines a directional-based TID-to-link mapping mechanism among the setup links of a multi-link logical device (MLD)
  + By default, after the multi-link setup, all TIDs are mapped to all setup links.
  + The multi-link setup may include the TID-to-link mapping negotiation.
    - TID-to-link mapping can have the same or different link-set for each TID unless a non-AP MLD indicates that it requires to use the same link-set for all TIDs during the multi-link setup phase.
    - NOTE: Such indication method by the non-AP MLD is TBD (implicit or explicit).
* The TID-to-link mapping can be updated after multi-link setup through a negotiation, which can be initiated by any MLD
  + Format TBD
    - NOTE: When the responding MLD can not accept the update, it can reject the TID-to-link mapping update

**Move:** Yongho Seok, **Second:** James Yee  
  
**Discussion:** None.  
  
**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 55**Move to add the following to 11be SFD:

11be shall define a mechanism to determine whether an AP is part of an AP candidate set and can participate as a shared AP in Coordinated AP transmission initiated by a sharing AP.  
  
**Move:** Cheng Chen, **Second:** Po-Kai Huang  
  
**Discussion:**  
C: In the straw poll it was a note that the name is “TBD”  
A: That was another straw poll.  
  
**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 56**  
   Move to add the following to 11be SFD:

Define a procedure for an AP to share its frequency/time resources of an obtained TXOP with a set of APs

* Set of APs is TBD

**Move:** George Cherian, **Second:** Duncan Ho  
  
**Discussion:** None.  
  
**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 57**Move to add the following to 11be SFD:

* An RU Allocation subfield is present in the Common field of the EHT-SIG field of an EHT PPDU sent to multiple users.
  + Compressed modes are TBD
  + Contents of RU allocation subfield are TBD

**Move:** Ross Jian Yu, **Second:** Ming Gan  
  
**Discussion:** None.  
  
**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 58**Move to add the following to 11be SFD:

There exists at least one compressed mode in which RU Allocation subfield doesn’t exist in the Common field of the EHT-SIG field of an EHT PPDU sent to multiple users.

* Signaling method is TBD

**Move:** Ross Jian Yu, **Second:** Ming Gan

**Discussion:** None.   
  
**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 59**  
   Move to add the following to 11be SFD:

* The following subfields exist in U-SIG of an EHT PPDU sent to multiple users.
  + EHT-SIG MCS
  + Number of EHT-SIG Symbols

**Move:** Ross Jian Yu, **Second:** Ming Gan

**Discussion:** None.  
  
**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 60**Move to add the following to 11be SFD:

* Coordinated OFDMA is supported in 11be, and in a coordinated OFDMA, both DL OFDMA and its corresponding UL OFDMA acknowledgement are allowed

**Move:** Liwen Chu, **Second:** Ming Gan  
  
**Discussion:**C: I see multiple protocol for coordinated OFDMA. I need more time to understand how this works. So, I speak against the motion.  
  
**Result:** Y/N/A: 25/3/31  
  
**Motion PASSES.**

1. **Motion 61**Move to add the following to 11be SFD:

The established block Ack agreement allows the QoS Data frames of the TID, aggregated within the A-MPDUs, to be exchanged between the two MLDs on any available link.

**Move:** Liwen Chu, **Second:** Zhou Lan

**Discussion:** None.

**Result:** Y/N/A:47/1/13 **Motion PASSES.**

**Recess at 15:30.**

**Session 13: Thursday 16 January PM2**

**Introduction**

1. The Chair, Alfred Asterjadhi (Qualcomm), calls the meeting to order at 16:30.
2. The Chair remainds to announce affiliation when speaking, and about attendance.
3. The Chair goes through the patent guidelines and asks if there is somebody that is aware of potentially essential patents. Nobody speaks up.
4. Agenda can be found in 19/2128r11.

**Motions**

1. **Motion 62**Move to add the following to 11be SFD:

* For each block ack agreement, there exists one receive reordering buffer based on MPDUs in the MLD which is the recipient of the QoS Data frames for that block ack agreement.
* The receive reordering buffer operation is based on the Sequence Number space that is shared between the two MLDs.

**Move:** Liwen Chu, **Second:** Po-Kai Huang

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 63**  
   Move to add the following to 11be SFD:

* The receive status of QoS Data frames of a TID received on a link shall be signaled on the same link and may be signaled on other available link(s)

**Move:** Liwen Chu, **Second:** Po-Kai Huang

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 64**Move to add the following to 11be SFD:

* An AP of an AP MLD may transmit on a link a frame that carries an indication of individually addressed frames buffered for transmission on other enabled link(s)
  + An non-AP MLD needs to be aware on which link(s) the AP MLD provides the indication
  + The mechanism to determine on which link(s) the AP MLD provides the indication is TBD
* An AP of an AP MLD may transmit on a link a frame that carries an indication of individually addressed frames buffered for transmission on any enabled links
  + An non-AP MLD needs to be aware on which link(s) the AP MLD provides the indication
  + The mechanism to determine on which link(s) the AP MLD provides the indication is TBD

**Move:** Liwen Chu, **Second:** Laurent Cariou

**Discussion:**  
C: First bullet point seems very similar to Motion 52. Second bullet point I see vagueness, I suggest removing that part.  
C: The second bullet is not clear what is meant by “a link”.

**Result:** Y/N/A: 18/15/15.  
  
**Motion FAILS.**

1. **Motion 65**Move to add the following to 11be SFD:

* 11be supports a total maximum of 16 spatial streams (total across all the scheduled STAs) for MU-MIMO  
    
  **Move:** Wook Bong Lee, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 66**Move to add the following to 11be SFD:

* 11be defines a maximum of 16 spatial streams for SU-MIMO.

**Move:** Wook Bong Lee, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 67**Move to add the following to 11be SFD:

* Setup a BA agreement for multi-link operation by using ADDBA request and ADDBA response frames.

**Move:** Yunbo Li, **Second:** Ross Jian Yu

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 68**Move to add the following to 11be SFD:

* A new element will be defined as a container to advertise and exchange capability information for multi-link setup.

**Move:** Yunbo Li, **Second:** Ross Jian Yu

**Discussion:** None.

**Result:** Y/N/A: 41/3/18.  
  
**Motion PASSES.**

1. **Motion 70 (note: motion 69 was run after motion 77)**Move to add the following to 11be SFD:

11be shall define a mechanism to teardown an existing multi-link setup agreement

**Move:** Po-Kai Huang, **Second:** Ming Gan

**Discussion**: None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 71**Move to add the following to 11be SFD:

* After multi-link setup between two MLDs, different GTK/IGTK/BIGTK in different links with different PN spaces are used
  + GTK/IGTK/BIGTK in different links can be delivered in one 4-way handshake

**Move:** Po-Kai Huang, **Second:** Ming Gan

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 72**Move to add the following to 11be SFD:

* An EHT AP supporting the Multi-AP coordination can send a frame (e.g., Beacon or other management frame) including capabilities of Multi-AP transmission schemes.
* Note: Multi-AP transmission schemes are TBD (e.g., Coordinated OFDMA)

**Move:** Jeongki Kim, Second: Ming Gan

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 73**Move to add the following to 11be SFD:

* An EHT AP which obtains a TXOP and initiates the Multi-AP coordination is the Sharing AP\*
* An EHT AP which is coordinated for the Multi-AP transmission by the Sharing AP is the Shared AP\*

\*Note: The name can be modified.

**Move:** Jeongki Kim, **Second:** Ming Gan

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 74**Move to add the following to 11be SFD:

* 802.11be shall include 1x EHT-LTF and 2x EHT-LTF

**Move:** Dandan Liang, **Second:** Jung Hoon Suh

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 75**Move to add the following to 11be SFD:

* 802.11be shall include 4x EHT-LTF.

**Move:** Dandan Liang, **Second:** Jung Hoon Suh

**Discussion:** None.  
  
**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 76**Move to add the following to 11be SFD:

* Small-size RUs can only be combined with small-size RUs and large-size RUs can only be combined with large-size Rus.
* RUs with equal to or more than 242 tones are defined as large-size RUs
* RUs with less than 242 tones are defined as small-size RUs

**Move:** James Yee, **Second:** Bin Tian

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 77**Move to add the following to 11be SFD:

Combination of small-size RUs shall not cross 20MHz channel boundary.

**Move:** James Yee, **Second:** Youhan Kim

**Discussion:** None

**Result:** Y/N/A: 45/17/20.  
  
**Motion FAILS.**

1. **Motion 69**  
   Move to add the following to 11be SFD:

Combination of small-size RUs shall not cross 20MHz channel boundary.  
- The combination that includes RU 106 plus center 26-tone RU case is TBD.

**Move:** Bin Tian, **Second:** Ross Jian Yu

**Discussion:** None

**Result:** Y/N/A: 58/8/10.  
  
**Motion PASSES.**

1. **Motion 78**Move to add the following to 11be SFD:

Only allowed small-RU combinations are RU106+RU26 and RU52+RU26.

**Move:** James Yee, **Second:** Yongho Seok

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 79**Move to add the following to 11be SFD:

For 20 and 40 MHz PPDU, within 20MHz boundary, any contiguous RU26 and RU106 can be combined.

**Move:** James Yee, **Second:** Yongho Seok

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 80**Move to add the following to 11be SFD:

* For 20 and 40 MHz PPDU, the blue colored combination of RU52 and RU26 are allowed.

**Move:** James Yee, **Second:** Yongho Seok

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 81**Move to add the following to 11be SFD:

* For 80MHz PPDU, the blue colored combination of RU52 and RU26 are allowed.

**Move:** James Yee, **Second:** Yongho Seok

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 82**Move to add the following to 11be SFD:

* For LDPC coding, for combined RUs sent to a user with RU size less than 242-tone, a single tone mapper shall be used.

**Move:** Ross Jian Yu, **Second:** Wook Bong Lee

**Discussion:** None

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 83**Move to add the following to 11be SFD:

* 11be supports EHT-LTF for 16 spatial streams.

**Move:** Jinsoo Choi, **Second:** Wook Bong Lee

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 84**

Move to add the following to 11be SFD:

For a link setup between an AP MLD and a non-AP MLD, a non-AP STA operating on that link can send to an AP operating on that linkan indication that (an)other non-AP STA(s) within the same non-AP MLD that is (are) in awake state.

**Move:** Jeongki Kim, **Second:** Abhishek Patil

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 85**Move to add the following to 11be SFD:

For the PPDU transmitted to MU, the User field having TBD bits is contained in the user specific field of EHT-SIG

* The User field indicates user information assigned to each RU similar to that used in HE MU PPDU
* Detailed descriptions are TBD

**Move:** Eunsung Park, **Second:** Ross Jian Yu

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 86**  
   Move to add the following to 11be SFD:

* For the OFDMA transmission in contiguous 240MHz, for one STA large size RU aggregation is allowed only within 160MHz which is composed of two adjacent 80MHz channels
* For the OFDMA transmission in non-contiguous 160+80MHz, for one STA large size RU aggregation is allowed only within contiguous 160MHz or the other 80MHz, respectively
* 2x996+484 RU combinations is TBD

**Move:** Eunsung Park, **Second:** Bin Tian

**Discussion:** None.

**Result:** Approved with ununamious consent.  
**Motion PASSES.**

1. **Motion 87**Move to add the following to 11be SFD:

* For the OFDMA transmission in 320/160+160 MHz, for one STA large size RU aggregation is allowed only within primary 160 or secondary 160, respectively
  + Note that primary 160 is composed of primary 80 and secondary 80 and secondary 160 is 160MHz channel other than primary 160 in 320/160+160 MHz
* Exception: 3x996 is supported
* 3x996+484 RU combinations is TBD

**Move:** Eunsung Park, **Second:** Bin Tian

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 88**Move to add the following to 11be SFD:

* The U-SIG shall contain Bandwidth Information, carried as a version independent field.
  + This field may also convey some puncturing information.
  + Number of bits for this field is TBD.

**Move:** Sameer Vermani, **Second:** Bin Tian

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 89**Move to add the following to 11be SFD:

* The U-SIG shall contain a PPDU type field, carried as a version dependent field.
* Number of bits for this field is TBD.

**Move:** Sameer Vermani, **Second:** Bin Tian

**Discussion:** No discussion.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 90**Move to add the following to 11be SFD:

* CCA minimum BW resolution is 20MHz
* Preamble puncturing resolution is 20MHz

**Move:** Bin Tian, **Second:** Ross Jian Yu

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 91**

Move to add the following to 11be SFD:

* In 11be, there is only one PSDU per STA for each link

**Move:** Bin Tian, **Second:** Sameer Vermani

**Discussion:** None

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 92**Move to add the following to 11be SFD:

* In 11be, for LDPC encoding each PSDU only uses one encoder

**Move:** Bin Tian, **Second:** Sameer Vermani

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 93**Move to add the following to 11be SFD:

* In 80MHz non-OFDMA the following conditional mandatory (conditional on supporting puncturing) large RU combinations are supported
  + Any one of four 242RU can be punctured

|  |  |  |
| --- | --- | --- |
| **RU size** | **Agg. BW** | **Notes** |
| 484+242 | 60 MHz | 4 options |

**Move:** Ron Porat, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent  
  
**Motion PASSES.**

1. **Motion 94**Move to add the following to 11be SFD:

* In 160MHz non-OFDMA the following conditional mandatory (conditional on supporting puncturing) large RU combinations are supported
  + Any one of eight 242RU can be punctured
  + Any one of four 484RU can be punctured

|  |  |  |  |
| --- | --- | --- | --- |
| **80MHz**  **RU size** | **80MHz**  **RU size** | **Agg. BW** | **Notes** |
| 484 | 996 | 120 MHz | 4 options |
| 484+242 | 996 | 140 MHz | 8 options |

**Move:** Ron Porat, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 95**  
   Move to add the following to 11be SFD:

* In 240MHz non-OFDMA the following conditional mandatory (conditional on supporting puncturing) large RU combinations are supported
  + Any one of six 484RUs can be punctured
  + Any one of three 996RUs can be punctured

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **80MHz**  **RU size** | **80MHz RU size** | **80MHz**  **RU size** | **Agg. BW** | **Notes** |
| 484 | 996 | 996 | 200 MHz | 6 options |
| - | 996 | 996 | 160 MHz | 3 options |

**Move:** Ron Porat, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 96**Move to add the following to 11be SFD:

* In 320MHz non-OFDMA the following conditional mandatory (conditional on supporting puncturing) large RU combinations are supported
  + Any one of eight 484RUs can be punctured
  + Any one of four 996RUs can be punctured

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **80MHz**  **RU size** | **80MHz**  **RU size** | **80MHz**  **RU size** | **80MHz**  **RU size** | **Agg. BW** | **Notes** |
| 484 | 996 | 996 | 996 | 280 MHz | 8 options |
| - | 996 | 996 | 996 | 240 MHz | 4 options |

**Move:** Ron Porat, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 97**Move to add the following to 11be SFD:

* In 80MHz OFDMA the following large RU combinations are supported

|  |  |  |
| --- | --- | --- |
| **RU size** | **Agg. BW** | **Notes** |
| 484+242 | 60 MHz | 4 options |

**Move:** Ron Porat, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 98**Move to add the following to 11be SFD:

* In 160MHz OFDMA the following large RU combinations are supported

|  |  |  |
| --- | --- | --- |
| **RU size** | **Agg. BW** | **Notes** |
| 484+996 | 120 MHz | 4 options |

**Move:** Ron Porat**, Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 99**Move to add the following to 11be SFD:

* The following subfields exist in U-SIG and/or EHT-SIG of an EHT PPDU sent to single user:
  + MCS
  + NSTS
  + GI+EHT-LTF Size
  + Coding

**Move:** Ross Jian Yu**, Second:** Youhan Kim

**Discussion:** None.  
  
**Result:** Approved with unanimous consent.  
 **Motion PASSES.**

1. **Motion 100**Move to add the following to 11be SFD:

* The following subfield exists in U-SIG or EHT-SIG of an EHT PPDU sent to multiple users:
  + GI+EHT-LTF Size

**Move:** Ross Jian Yu, **Second:** Youhan Kim

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 101**Move to add the following to 11be SFD:

* At any point in time, a TID shall always be mapped to at least one link that is set up, unless admission control is used

**Move:** Laurent Cariou, **Second:** Po-Kai Huang

**Discussion:** None.

**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 102**Move to add the following to 11be SFD:

Management frames are allowed on all enabled links, following baseline

**Move:** Laurent Cariou, **Second:** Po-Kai Huang

**Discussion: None.**

**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 103**  
   Move to add the following to 11be SFD:

* If a TID is mapped in UL to a set of enabled links for a non-AP MLD, then the non-AP MLD can use any link within this set of enabled links to transmit data frames from that TID
* If a TID is mapped in DL to a set of enabled links for a non-AP MLD, then:
  + the non-AP MLD can retrieve buffered BUs corresponding to that TID on any links within this set of enabled links
  + The AP MLD can use any link within this set of enabled links to transmit data frames from that TID, subject to existing restrictions for transmissions of frames that apply to those enabled links
  + An example of restriction is if the STA is in doze state

**Move:** Laurent Cariou**, Second:** Minyoung Park

**Discussion:**C: Part of the text regarding buffers have a very direct impact. I speak against this motion.

**Result:** Y/N/A:25/3/21 **Motion PASSES.**

1. **Motion 104**Move to add the following to 11be SFD:

* A non-AP MLD monitors and performs basic operations (such as traffic indication, BSS parameter updates, etc.) on one or more link(s)

**Move:** Abhishek Patil, **Second:** Youhan Kim

**Discussion:** None

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 105**Move to add the following to 11be SFD:

* A link, that is setup as part of a multi-link setup, is defined as Enabled if that link can be used for frame exchange and at least one TID is mapped to that link
  + Note: frame exchange on a link is subject to the power state of the corresponding non-AP STA

**Move:** Abhishek Patil, **Second:** Yongho Seok

**Discussion:** None.

**Result:** Approvid with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 106**Move to add the following to 11be SFD:

* An AP MLD can recommend a non-AP MLD to use one or more enabled links
  + The AP’s indication could be carried in a broadcast or a unicast frame

**Move:** Abhishek Patil, **Second:** George Cherian

**Discussion:** None.

**Result:** Approved with unanimous consent.

**Motion PASSES.**

1. **Motion 107**Move to add the following to 11be SFD:

* The extra 4 subcarriers are applied to L-SIG and RL-SIG.
  + The indices for extra subcarriers are [-28, -27, 27, 28]
  + The extra subcarriers are BPSK modulated
  + The coefficients [-1 -1 -1 1 ] as in 11ax are mapped to the extra subcarriers

**Move:** Dongguk Lim, **Second:** Ross Jian Yu

**Discussion:** None.

**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 108**Move to add the following to 11be SFD:

The value of the RA/TA fields sent over-the-air in the MAC header of a frame is the MAC address of the STA affiliated with the MLD corresponding to that link

**Move:** Duncan Ho**, Second:** Po-Kai Huang

**Discussion:** None.

**Result:** Approved with unanimous consent. **Motion PASSES.**

1. **Motion 109**Move to add the following to 11be SFD:

The MAC address of each affiliated AP within an AP MLD shall be different from each other unless the affiliated APs cannot perform simultaneous Tx/Rx operation (e.g., due to near band in-device interference), in which case the MAC address properties are TBD

Note: it is TBD whether we allow the operation of an AP MLD without simultaneous Tx/Rx operation

**Move:** Duncan Ho, **Second:** Yongho Seok

**Discussion:** None.

**Result:** Approved with unanimous consent.  
  
**Motion PASSES.**

1. **Motion 110**Move to add the following to 11be SFD:  
   - Each non-AP STA affiliated with a non-AP MLD that is operating on an enabled link maintains its own power state/mode.  
     
   **Move:** Abhishek Patil, **Second:** Rojan Chitrakar  
     
   **Discussion:** None.  
     
   **Result:** Approved with unanimous consent.  
     
   **Motion PASSES.**

Amending the agenda. Moving Presentations last.

**Teleconference plan**

January 30 (Thursday) -MAC/PHY 19:00-22:00 ET

February 6 (Thursday)- Joint 10:00-12:00 ET

February 13 (Thursday)- Joint 19:00-22:00 ET

February 20 (Thursday)- MAC/PHY 10:00-12:00 ET

February 27 (Thursday)- Joint 19:00-22:00 ET

March 5 (Thursday)- MAC/PHY 10:00-12:00 ET

The chair asks if there is any objection to this teleconference plan. No objection noted.

Teleconference plan approved.

**Straw polls for ad-hoc meetings**

1. Do you plan to attend ad-hoc TGbe meetings, that would be held in Atlanta, Georgia, USA at the Hilton Atlanta Hotel, for the purpose of discussion technical contributions with the following dates:  
   14-15th of March 2020 for MAC ad-hoc meeting  
     
   Discussion:  
   C: Jon needs to know how many people would attend. Then he can check if he can arrange rooms.  
   C: I believe we should try with first one day ad-hoc and not two.  
   C: We could speed up things by having more parallel sessions.
2. **Another straw poll:**Do you plan attending a one day MAC ad-hoc meeting?  
   - Option1: In the Bay Area (sponsored by Laurent/Intel) – During week-days  
   - Option2: In Atlanta (sponsored by IEEE/may need registration fee) – Sunday   
   - Option3: None.  
   - Option4: Abstain.  
     
   **Discussion:**C: I recommend ad-hoc on Friday+Saturday, then people get Sunday off to rest for the coming week.  
     
   **Result:** Opt1/Opt2/Opt3/Opt4: 33/30/12/3
3. **Motion:** Authorize TGbe to hold a MAC ad-hoc meeting in San Jose, California, USA, hosted by Intel Corp., for the purpose of discussing technical contributions on Friday 13th of March 2020.  
     
   **Mover:** Laurent Cariou, **Second:** Po-Kai Huang  
     
   **Discussion:** None.  
     
   **Result:** Y/N/A: 28/19/11  
     
   **Motion PASSES.**

**Goals for March 2020**

Continue presentations.  
  
**The chair asks if there is any other business. No other business noted.**

**Meeting adjourned at 18:00.**