IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Minutes 802.11 be PHY ad hoc Telephone Conferences,  Nov 2020 - Jan 2021 | | | | |
| Date: 2020-11-30 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Tianyu Wu | Apple |  |  | tianyu@apple.com |

Abstract

This document contains the PHY ad hoc meeting minutes for TGbe teleconferences held on:

* Nov 2, 2020
* Nov 12, 2020
* Nov 16, 2020
* Nov 19, 2020
* Nov 30, 2020

**Monday Nov 2nd, 2020 19:00 – 21:00 ET**

**Introduction**

1. The Chair (Sigurd Schelstraete, Quantenna/ON Semiconductor) calls the meeting to order at 19:00 ET.
2. The Chair follows the agenda in 11-20/1615r5.
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The Chair reminds everyone to report their attendance by using IMAT system and by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself if unable to record attendance via IMAT system.
5. Discussions on the agenda.

Technical Submissions: **Run SPs from Previous Topics**

* + [828r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0828-00-00be-ru-allocation-subfield-design-for-eht-trigger-frame.pptx) RU Allocation Subfield Design for EHT Trigger Frame Myeongjin Kim [SPs]
  + [1672r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1672-00-00be-ul-beamforming-for-tb-ppdus.pptx) UL Beamforming for TB PPDUs Shimi Shilo [SPs]
  + [~~1066r1~~](https://mentor.ieee.org/802.11/dcn/20/11-20-1066-01-00be-4x-eht-ltf-sequence.pptx) ~~4x EHT-LTF Sequence Jinyoung Chun [SPs]~~
  + [1703r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1703-00-00be-backward-compatible-trigger-frame-ru-allocation-table.pptx) Trigger frame RU allocation Table Steve Shellhammer[SPs]
  + [1375r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1375-03-00be-eht-nltf-design.pptx) EHT NLTF Design Rui Cao [SPs]
  + [1317r2](https://mentor.ieee.org/802.11/dcn/20/11-20-1317-02-00be-sig-contents-discussion-for-eht-sounding-ndp.pptx) SIG contents discussion for EHT sounding NDP Ross Jian Yu [SPs]
  + [1161r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1161-01-00be-eht-punctured-ndp-and-partial-bandwidth-feedback.pptx) EHT Punctured NDP and Partial Bandwidth feedback. Bin Tian [SPs]
  + 1238r11 Open Issues on Preamble Design Sameer Vermani. [SPs]

Technical Submissions: **Proposed Draft Text (PDTs) for fixings TBDs**

* + [1726r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1726-00-00be-pdt-phy-ppdu-formats-for-clause-36-1-4.docx) PPDU-Formats-for-clause-36.1.4 Dongguk Lim

Technical Submissions:

* + [1700r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1700-01-00be-dual-carrier-index-modulation.pptx) Dual-Carrier Index Modulation Ali Dogukan

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbe (PHY) | 11/2 | Agrawal, abhishek | ON Semiconductor |
| TGbe (PHY) | 11/2 | Aio, Kosuke | Sony Corporation |
| TGbe (PHY) | 11/2 | An, Song-Haur | INDEPENDENT |
| TGbe (PHY) | 11/2 | ANANDAKUMAR, KRISHNASAMY | Maxlinear Inc |
| TGbe (PHY) | 11/2 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 11/2 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Barr, David | MaxLinear |
| TGbe (PHY) | 11/2 | Batra, Anuj | Apple, Inc. |
| TGbe (PHY) | 11/2 | Beg, Chris | Cognitive Systems Corp. |
| TGbe (PHY) | 11/2 | Bei, Jianwei | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Ben Arie, Yaron | toga networks(a huawei company) |
| TGbe (PHY) | 11/2 | Berger, Christian | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Bluschke, Andreas | Signify |
| TGbe (PHY) | 11/2 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Chen, Cheng-Ming | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Chen, Xiaogang | Intel |
| TGbe (PHY) | 11/2 | Chen, Zheng | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/2 | Cheng, Xilin | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Cho, Hangyu | LG ELECTRONICS |
| TGbe (PHY) | 11/2 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 11/2 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 11/2 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 11/2 | Chung, Chulho | SAMSUNG |
| TGbe (PHY) | 11/2 | Costa, D.Nelson | Peraso Technologies Incorporated |
| TGbe (PHY) | 11/2 | Dash, Debashis | Apple, Inc. |
| TGbe (PHY) | 11/2 | Dauphinee, Leonard | MaxLinear Inc |
| TGbe (PHY) | 11/2 | DOAN, DUNG | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Dogukan, Ali | Vestel |
| TGbe (PHY) | 11/2 | Doostnejad, Roya | Intel Corporation |
| TGbe (PHY) | 11/2 | Du, Rui | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/2 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Feng, Xiang | Keysight Technologies |
| TGbe (PHY) | 11/2 | Furuichi, Sho | Sony Corporation |
| TGbe (PHY) | 11/2 | Gao, Zhigang | Cisco Systems, Inc. |
| TGbe (PHY) | 11/2 | Gardner, James | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Gong, Bo | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/2 | Grandhe, Niranjan | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Hart, Brian | Cisco Systems, Inc. |
| TGbe (PHY) | 11/2 | Hsiao, Ching-Wen | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 11/2 | Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbe (PHY) | 11/2 | Ibrahim, Mostafa | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 11/2 | Jamalabdollahi, Mohsen | Cisco Systems, Inc. |
| TGbe (PHY) | 11/2 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 11/2 | Jia, Jia | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/2 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 11/2 | Kadampot, Ishaque Ashar | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 11/2 | Kang, Sugbong | Apple, Inc. |
| TGbe (PHY) | 11/2 | Kerry, Stuart | OK-Brit; Self |
| TGbe (PHY) | 11/2 | Khude, Nilesh | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 11/2 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Lansford, James | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 11/2 | Li, Guoqing | Apple, Inc. |
| TGbe (PHY) | 11/2 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Li, Qinghua | Intel Corporation |
| TGbe (PHY) | 11/2 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 11/2 | Lin, Wei | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/2 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/2 | Liu, Der-Zheng | Realtek Semiconductor Corp. |
| TGbe (PHY) | 11/2 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Liu, Ying | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Lou, Hui-Ling | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Manakkal, Raja Rajesh | Broadcom Corporation |
| TGbe (PHY) | 11/2 | MELZER, Ezer | Toga Networks, a Huawei company |
| TGbe (PHY) | 11/2 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 11/2 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 11/2 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 11/2 | Mueller, Robert | Technische Universitaet Ilmenau |
| TGbe (PHY) | 11/2 | Nakano, Takayuki | Panasonic Corporation |
| TGbe (PHY) | 11/2 | Nassiri Toussi, Karim | Broadcom Corporation |
| TGbe (PHY) | 11/2 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 11/2 | Oh, Hyun Seo | Electronics and Telecommunications Research Institute (ETRI) |
| TGbe (PHY) | 11/2 | Ozbakis, Basak | VESTEL |
| TGbe (PHY) | 11/2 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 11/2 | Pirhonen, Riku | NXP Semiconductors |
| TGbe (PHY) | 11/2 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 11/2 | Prabhakaran, Dinakar | Broadcom Corporation |
| TGbe (PHY) | 11/2 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 11/2 | Pulikkoonattu, Rethnakaran | Broadcom Corporation |
| TGbe (PHY) | 11/2 | Rafique, Saira | Istanbul Medipol University ; VESTEL |
| TGbe (PHY) | 11/2 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 11/2 | REICH, MOR | Togan Networks, a Huawei Company |
| TGbe (PHY) | 11/2 | Rezk, Meriam | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Roy, Sayak | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Sato, Naotaka | Sony Corporation |
| TGbe (PHY) | 11/2 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 11/2 | Segev, Jonathan | Intel Corporation |
| TGbe (PHY) | 11/2 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Shah, Kunal | Itron Inc. |
| TGbe (PHY) | 11/2 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Sherlock, Ian | Texas Instruments Incorporated |
| TGbe (PHY) | 11/2 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 11/2 | Srinivasa, Sudhir | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Srinivasan, Shree Raman | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/2 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 11/2 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/2 | Urabe, Yoshio | Panasonic Corporation |
| TGbe (PHY) | 11/2 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 11/2 | Wang, Yi-Hsiu | Zeku |
| TGbe (PHY) | 11/2 | Ward, Lisa | Rohde & Schwarz |
| TGbe (PHY) | 11/2 | Wendt, Matthias | Signify |
| TGbe (PHY) | 11/2 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 11/2 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/2 | Xue, Ruifeng | Cisco Systems, Inc. |
| TGbe (PHY) | 11/2 | YAGHOOBI, HASSAN | Intel Corporation |
| TGbe (PHY) | 11/2 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 11/2 | Yang, Lin | Qualcomm Incorporated |
| TGbe (PHY) | 11/2 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 11/2 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 11/2 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 11/2 | Yu, Heejung | Korea University |
| TGbe (PHY) | 11/2 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/2 | Yu, Mao | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Yuan, Fangchao | HUAWEI |
| TGbe (PHY) | 11/2 | Zaman, Malia | IEEE Standards Association (IEEE-SA) |
| TGbe (PHY) | 11/2 | Zeng, Ruochen | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Zhang, Hongyuan | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Zhang, Yan | NXP Semiconductors |
| TGbe (PHY) | 11/2 | Zheng, Xiayu | NXP Semiconductors |

**Straw Polls**

1. **SPs from 1375r3 – Rui Cao (NXP)**

SP#1: SP6 in 1375r3

* **Do you agree that** 
  + the number of EHT-LTF in 11be NDP transmissions can be larger than the initial number of EHT-LTF determined by Nss;
  + the support of extra LTF in NDP is optional for beamformee;
  + the same capability fields for non-OFDMA data transmission to multiple users applies to NDP:
    - The support of extra LTF is claimed by the capability bit of “Extra LTFs support for non-OFDMA PPDU”;
    - the supported maximum number of EHT-LTFs in NDP is claimed by the capability field of “maximum number of LTFs supported for non-OFDMA data transmission to multiple users and NDP”.

Yes/No/Abstain: 59/2/19

**Discussions on SP:**

C: How to signal the number of LTFs in one symbol in NDP Packet?

A: That is included in Ross’s contribution 1317.

C: How large of payload size will we see the gain? There will be loss for short data packet with the extra overhead.

A: No detailed analysis for data packet. This proposal is for NDP which the extra overhead is very small comparing to ~100ms period.

1. **SPs from 1317r3 – Mengshi Hu (Huawei)**

SP#2: SP3 in 1317r3

* **Do you agree to add the following text in the TGbe SFD:**
  + For an EHT sounding NDP:
    - Number of EHT-SIG symbols field indicates one symbol
    - EHT-SIG MCS field is set to MCS0
    - This is for R1.

Yes/No/Abstain: 52/3/18

SP#3: SP4 in 1317r3

* **Do you agree to add the following text in the TGbe SFD:**
  + Pre-FEC padding factor + PE disambiguity + LDPC extra symbol segment indication are repurposed to signal NSS (4 bit) in an EHT sounding NDP.
    - Indicating 1SS-8SS in R1
    - The other 8 entries are reserved for R2
    - This is for R1.

Yes/No/Abstain: 51/2/14

SP#4: SP5 in 1317r3

* **Do you agree to add the following text in the TGbe SFD:**
  + One reserved bit in EHT-SIG is used to indicate beamformed in an EHT sounding NDP.
    - This is for R1.
  + If the Beamformed field in EHT-SIG of an EHT sounding NDP is 1, then the receiver of the EHT sounding NDP should not perform channel smoothing when generating the compressed beamforming feedback report.

Yes/No/Abstain: 40/9/33

**Discussions on SP:**

C: Do we have beamformed NDP?

A: Yes. Beamforming bit set to 1, smoothing should not be done.

C: I think nobody will beamform the NDP.

C: Request to add Rx behavior as 11ax. Since this bit is to indicate whether STA should perform smoothing even no beamforming.

A: SP text updated.

1. **SPs from 1161r1 – Alice Chen (Qualcomm)**

SP#5: SP2 in 1161r1

* **Do you support the following feedback tone sets for 11be?**
  + 20/40MHz: Reuse 11ax feedback tone sets for 11be
  + 80MHz
    - Ng=4: Reuse the 11ax feedback tones of Ng=4 for 11be
    - Ng=16: Redefine the feedback tones of Ng=16 for 11be as [-500:16:-260, -252:16:-12, -4, 4, 12:16:252, 260:16:500]
  + 160/320MHz: Duplicate the feedback tone set of 80MHz
  + Full BW sounding feedback entire tone set

Yes/No/Abstain: 52/1/19

**Discussions on SP:**

C: For Ng=16, you shifted the 2nd 20MHz by 8 tones. Prefer to start each 242 from the edge and shift by 7 tones instead of 8 tones

A: Our design has all even tones. If some of the tones are odd tones, you need to have interpolation as extra effort. Want to be consistent between 1x, 2x and 4x.

SP#6: SP4 in 1161r1

* **Do you support the following feedback tone indices table with RU242 granularity for both Ng=4 and Ng=16 for 11be?**
  + If feedback request does not cover entire 80MHz segment, use the following table
  + If feedback request covers entire 80MHz segment, feedback the entire 80MHz segment feedback tone set (using the tables for RU996 in next slide)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU242 Index** | **20MHz** | **40MHz** | **80MHz** | **160MHz** | **320MHz** |
| **1** | [-122:Ng:-4, 4:Ng:122] | [-244:Ng:-4] | [-500:Ng:-260] | [-1012:Ng:-772] | [-2036:Ng:-1796] |
| **2** |  | [4:Ng:244] | [-252:Ng:-12] | [-764:Ng:-524] | [-1788:Ng:-1548] |
| **3** |  |  | [12:Ng:252] | [-500:Ng:-260] | [-1524:Ng:-1284] |
| **4** |  |  | [260:Ng:500] | [-252:Ng:-12] | [-1276:Ng:-1036] |
| **5** |  |  |  | [12:Ng:252] | [-1012:Ng:-772] |
| **6** |  |  |  | [260:Ng:500] | [-764:Ng:-524] |
| **7** |  |  |  | [524:Ng:764] | [-500:Ng:-260] |
| **8** |  |  |  | [772:Ng:1012] | [-252:Ng:-12] |
| **9** |  |  |  |  | [12:Ng:252] |
| **10** |  |  |  |  | [260:Ng:500] |
| **11** |  |  |  |  | [524:Ng:764] |
| **12** |  |  |  |  | [772:Ng:1012] |
| **13** |  |  |  |  | [1036:Ng:1276] |
| **14** |  |  |  |  | [1284:Ng:1524] |
| **15** |  |  |  |  | [1548:Ng:1788] |
| **16** |  |  |  |  | [1796:Ng:2036] |

* + Feedback tone table for Ng=4

|  |  |  |  |
| --- | --- | --- | --- |
| **RU996 Index** | **80MHz** | **160MHz** | **320MHz** |
| **1** | [-500:4:-4, 4:4:500] | [-1012:4:-516, -508:4:-12] | [-2036:4:-1540, -1532:4:-1036] |
| **2** |  | [12:4:508, 516:4:1012] | [-1012:4:-516, -508:4:-12] |
| **3** |  |  | [12:4:508, 516:4:1012] |
| **4** |  |  | [1036:4:1532, 1540:4:2036] |

* + Feedback tone table for Ng=16

|  |  |  |  |
| --- | --- | --- | --- |
| **RU996 Index** | **80MHz** | **160MHz** | **320MHz** |
| **1** | [-500:16:-260, -252:16:-12, -4, 4, 12:16:252, 260:16:500] | [-1012:16:-772, -764:16:-524, -516, -508, -500:16:-260, -252:16:-12] | [-2036:16:-1796, -1788:16:-1548, -1540, -1532, -1524:16:-1284, -1276:16:-1036] |
| **2** |  | [12:16:252, 260:16:500, 508, 516, 524:16:764, 772:16:1012] | [-1012:16:-772, -764:16:-524, -516, -508, -500:16:-260, -252:16:-12] |
| **3** |  |  | [12:16:252, 260:16:500, 508, 516, 524:16:764, 772:16:1012] |
| **4** |  |  | [1036:16:1276, 1284:16:1524, 1532, 1540, 1548:16:1788, 1796:16:2036] |

Yes/No/Abstain: 51/2/18

**Discussions on SP:**

C: All the puncturing case is based on 242 tone? For 484 tone, does RU242 index 3 and 4 combined together same as RU484?

A: Yes, exactly.

1. **SPs from 1238r11 – Sameer Vermani (Qualcomm)**

SP#7: SP1 in 1238r11

* **Do you support the 5-bit punctured channel information in U-SIG for the non-OFDMA case to use the BW dependent table on slide 25?**
  + Table tells, for a specific PPDU BW, the mapping of the “Punctured channel indication” field value to the non-OFDMA puncturing pattern being used in the PPDU

Yes/No/Abstain: 44/2/17

**PDT Contributions**

1. **11-20-1726r0 – PDT PHY PPDU Formats for clause 36.1.4 –** Dongguk Lim (LGE)

**Discussion:**

C: We need to define NON-HT duplicated format for 320MHz which is currently missing.

A: BW is not PPDU format and can be defined in other sub clauses.

SP#8: Do you agree to accept the proposed text in 1726r0 for addition to 11be D0.1?

Yes/No/Abstain: 40/0/12

**New Submissions**

1. **11-20-1700r3 – Dual-Carrier Index Modulation –** Ali Dogukan (VESTEL, Koc University)

**Summary:** Proposed DC-IM and TC-IM modulations.

**Discussion:**

C: Currently we only have DCM with MCS0. Are you proposing DC-IM and TC-IM with MCS1? TC-IM performance worse than DCM MCS1, why we need this?

C: At the receiver side, what is the constellation? QPSK?

A: 16QAM.

C: Everything need to be signaled for the receiver side? Do you calculate 4 LLRs are the receiver?

A: You can’t calculate 4, you need some combination scheme.

C: You have 2 coded bits or 4 coded bits?

A: Should be 3 coded bits otherwise the rate will be different.

A: 4 bits are transmitted, 2 bits for selection, 2 bits information.

C: The gain is really minor.

C: TC-IM in Channel B performance is worse while in Channel D is better.

C: How many extra MCS do you want to add? We can’t signal more MCS levels in PHY header.

A: 1 MCS level. Prefer to introduce TC-IM. Will consider how to signal them.

C: Please provide more references for this technique.

SP#9: Do you agree that DC-IM for Nss=1 is a MCS in 11be?

Yes/No/Abstain: 3/48/10

SP#10: Do you agree that TC-IM for Nss=1 is a MCS in 11be?

Yes/No/Abstain: 4/48/15

**Adjourn**

The meeting is adjourned at 21:00 PM ET

**Thursday Nov 12nd, 2020 10:00 – 12:00 ET**

**Introduction**

1. The Chair (Sigurd Schelstraete, Quantenna/ON Semiconductor) calls the meeting to order at 10:00 ET.
2. The Chair follows the agenda in 11-20/1615r11.
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The Chair reminds everyone to report their attendance by using IMAT system and by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself if unable to record attendance via IMAT system.
5. Discussions on the agenda.

Technical Submissions: **Run SPs from Previous Topics [nominally 10 mins total]**

* 1. [828r6](https://mentor.ieee.org/802.11/dcn/20/11-20-0828-06-00be-ru-allocation-subfield-design-for-eht-trigger-frame.pptx) RU Allocation Subfield Design for EHT Trigger Frame Myeongjin Kim

Technical Submissions: **Proposed Draft Text (PDTs) for fixings TBDs**

* 1. [1791r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1791-01-00be-pdt-tbd-phy-modulation-accuracy.docx) PHY Modulation Accuracy Wook Bong Lee
  2. [1792r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1792-00-00be-pdt-tbd-phy-frequency-tolerance.docx) PHY Frequency Tolerance Wook Bong Lee
  3. [1793r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1793-00-00be-pdt-tbd-phy-receive-specification-general-and-receiver-minimum-input-sensitivity-and-channel-rejection.docx) General and RX min. input sensitivity and channel rejection Wook Bong Lee
  4. [1796r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1796-00-00be-pdt-phy-cyclic-shift.docx) PDT PHY Cyclic Shift Wook Bong Lee
  5. [1766r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1766-00-00be-pdt-cca-sensitivity.docx) CCA sensitivity Lin Yang
  6. [1803r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1803-00-00be-pdt-phy-ru-mru-restrictions-for-20-mhz-operation.docx) RU/MRU Restrictions for 20MHz Operation Eunsung Park
  7. [1783r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1783-01-00be-update-on-pdt-phy-introduction-to-eht-phy.docx) Update on PDT-PHY-Introduction-to-EHT-PHY Bin Tian

Technical Submissions:

* 1. [1829r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1829-00-00be-reserved-bit-behavior-for-eht.pptx) Reserved Bit Behavior for EHT Sameer Vermani
  2. [1807r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1807-00-00be-eht-beamformee-ndp-and-partial-bw-feedback-support.pptx) EHT beamformee NDP & partial BW feedback support Rui Cao
  3. [1842r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1842-00-00be-duplication-in-time-domain-for-lpi.pptx) Duplication in time domain for LPI Yan Xin
  4. [1845r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1845-01-00be-ru-allocation-subfield-design-for-eht-trigger-frame-follow-up.pptx) RU Allocation subfield Design for EHT Trigger Frame follow up Myeongjin Kim

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbe (PHY) | 11/12 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 11/12 | Avital, Ziv | MaxLinear |
| TGbe (PHY) | 11/12 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 11/12 | ben yahia, olfa | Olfa ben yahia  Vestel |
| TGbe (PHY) | 11/12 | Chen, Xiaogang | Intel |
| TGbe (PHY) | 11/12 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 11/12 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 11/12 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 11/12 | Chung, Chulho | SAMSUNG |
| TGbe (PHY) | 11/12 | Dogukan, Ali | Vestel |
| TGbe (PHY) | 11/12 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 11/12 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 11/12 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 11/12 | Gong, Bo | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/12 | Handte, Thomas | Sony Corporation |
| TGbe (PHY) | 11/12 | Hart, Brian | Cisco Systems, Inc. |
| TGbe (PHY) | 11/12 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 11/12 | Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbe (PHY) | 11/12 | Jamalabdollahi, Mohsen | Cisco Systems, Inc. |
| TGbe (PHY) | 11/12 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 11/12 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 11/12 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 11/12 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 11/12 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 11/12 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/12 | Liu, Der-Zheng | Realtek Semiconductor Corp. |
| TGbe (PHY) | 11/12 | Lopez, Miguel | Ericsson AB |
| TGbe (PHY) | 11/12 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 11/12 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 11/12 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 11/12 | Ozbakis, Basak | VESTEL |
| TGbe (PHY) | 11/12 | Ozpoyraz, Burak | Vestel |
| TGbe (PHY) | 11/12 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 11/12 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 11/12 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 11/12 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 11/12 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 11/12 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 11/12 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 11/12 | THOUMY, Francois | Canon Research Centre France |
| TGbe (PHY) | 11/12 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/12 | Van Zelst, Allert | Qualcomm Incorporated |
| TGbe (PHY) | 11/12 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 11/12 | Verenzuela, Daniel | Sony Corporation |
| TGbe (PHY) | 11/12 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 11/12 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 11/12 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/12 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 11/12 | yi, yongjiang | Futurewei Technologies |
| TGbe (PHY) | 11/12 | ZEGRAR, Salah Eddine | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 11/12 | Zhang, Yan | NXP Semiconductors |

**Straw Polls**

1. **SPs from 828r6, 828r7 – Myeongjin Kim (Samsung)**

SP#1: SP2 in 828r6

* **Do you support that the TGbe SFD shall include the following table?**
  + Indices for small-size MRUs in an OFDMA 20 MHz EHT PPDU

|  |  |  |
| --- | --- | --- |
| **MRU type** | **MRU index** | **MRU combination** |
| RU52+RU26 | MRU 1 | 52-tone RU 2 + 26-tone RU 2 |
| MRU 2 | 52-tone RU 2 + 26-tone RU 5 |
| MRU 3 | 52-tone RU 3 + 26-tone RU 8 |
| RU106+RU26 | MRU 1 | 106-tone RU 1 + 26-tone RU 5 |
| MRU 2 | 106-tone RU 2 + 26-tone RU 5 |

Yes/No/Abstain: 22/1/8

**Discussions on SP:**

C: We have another contribution on 8 bits RU allocation table.

A: This is just on RU indexing, not related to the table.

SP#2: SP3 in 828r6

* **Do you support that the TGbe SFD shall include the following table?**
  + Indices for small-size MRUs in an OFDMA 40 MHz EHT PPDU

|  |  |  |
| --- | --- | --- |
| **MRU type** | **MRU index** | **MRU combination** |
| RU52+RU26 | MRU 1 | 52-tone RU 2 + 26-tone RU 2 |
| MRU 2 | 52-tone RU 2 + 26-tone RU 5 |
| MRU 3 | 52-tone RU 3 + 26-tone RU 8 |
| MRU 4 | 52-tone RU 6 + 26-tone RU 11 |
| MRU 5 | 52-tone RU 6 + 26-tone RU 14 |
| MRU 6 | 52-tone RU 7 + 26-tone RU 17 |
| RU106+RU26 | MRU 1 | 106-tone RU 1 + 26-tone RU 5 |
| MRU 2 | 106-tone RU 2 + 26-tone RU 5 |
| MRU 3 | 106-tone RU 3 + 26-tone RU 14 |
| MRU 4 | 106-tone RU 4 + 26-tone RU 14 |

Yes/No/Abstain: 33/0/11

**Discussions on SP:**

No discussion.

SP#3: SP4b in 828r6

* **Do you support that the TGbe SFD shall include the following table?**
  + Indices for large-size MRUs in an 80 MHz EHT PPDU and in a non-OFDMA 80MHz EHT PPDU

|  |  |  |
| --- | --- | --- |
| **MRU type** | **MRU index** | **MRU combination** |
| RU484+RU242 | MRU 1 | RU484+RU242; [empty-RU242 RU242 RU484] |
| MRU 2 | RU484+RU242; [RU242 empty-RU242 RU484] |
| MRU 3 | RU484+RU242; [RU484 empty-RU242 RU242] |
| MRU 4 | RU484+RU242; [RU484 RU242 empty-RU242] |

Yes/No/Abstain: 34/0/11

**Discussions on SP:**

No discussion.

SP#4: SP5 in **828r7**

* **Do you support that the TGbe SFD shall include the following table?**
  + Indices for large-size MRUs in an 160MHz EHT PPDU and in a non-OFDMA 160MHz EHT PPDU

|  |  |  |
| --- | --- | --- |
| **MRU type** | **MRU index** | **MRU combination** |
| RU996+RU484 | MRU 1 | RU996+RU484; [empty-RU484 RU484 RU996] |
| MRU 2 | RU996+RU484; [RU484 empty-RU484 RU996] |
| MRU 3 | RU996+RU484; [RU996 empty-RU484 RU484] |
| MRU 4 | RU996+RU484; [RU996 RU484 empty-RU484] |
| RU996+RU484+  RU242 (Only for non-OFDMA) | MRU 1 | RU996+RU484+RU242; [empty-RU242 RU242 RU484 RU996] |
| MRU 2 | RU996+RU484+RU242; [RU242 empty-RU242 RU484 RU996] |
| MRU 3 | RU996+RU484+RU242; [RU484 empty-RU242 RU242 RU996] |
| MRU 4 | RU996+RU484+RU242; [RU484 RU242 empty-RU242 RU996] |
| MRU 5 | RU996+RU484+RU242; [RU996 empty-RU242 RU242 RU484] |
| MRU 6 | RU996+RU484+RU242; [RU996 RU242 empty-RU242 RU484] |
| MRU 7 | RU996+RU484+RU242; [RU996 RU484 empty-RU242 RU242] |
| MRU 8 | RU996+RU484+RU242; [RU996 RU484 RU242 empty-RU242] |

Yes/No/Abstain: 40/0/9

**Discussions on SP:**

C: Please use R7, I removed 80+80 from the SP.

SP#5: SP6 in **828r7**

* **Do you support that the TGbe SFD shall include the following table?**
  + Indices for large-size MRUs in a 320MHz EHT PPDU and in a non-OFDMA 320MHz EHT PPDU

|  |  |  |
| --- | --- | --- |
| **MRU type** | **MRU index** | **MRU combination** |
| 2×RU996+RU484 | MRU 1 | 2×RU996+RU484; [empty-RU484 RU484 RU996 RU996 empty-RU996] |
| MRU 2 | 2×RU996+RU484; [RU484 empty-RU484 RU996 RU996 empty-RU996] |
| MRU 3 | 2×RU996+RU484; [RU996 empty-RU484 RU484 RU996 empty-RU996] |
| MRU 4 | 2×RU996+RU484; [RU996 RU484 empty-RU484 RU996 empty-RU996] |
| MRU 5 | 2×RU996+RU484; [RU996 RU996 empty-RU484 RU484 empty-RU996] |
| MRU 6 | 2×RU996+RU484; [RU996 RU996 RU484 empty-RU484 empty-RU996] |
| MRU 7 | 2×RU996+RU484; [empty-RU996 empty-RU484 RU484 RU996 RU996] |
| MRU 8 | 2×RU996+RU484; [empty-RU996 RU484 empty-RU484 RU996 RU996] |
| MRU 9 | 2×RU996+RU484; [empty-RU996 RU996 empty-RU484 RU484 RU996] |
| MRU 10 | 2×RU996+RU484; [empty-RU996 RU996 RU484 empty-RU484 RU996] |
| MRU 11 | 2×RU996+RU484; [empty-RU996 RU996 RU996 empty-RU484 RU484] |
| MRU 12 | 2×RU996+RU484; [empty-RU996 RU996 RU996 RU484 empty-RU484] |
| 3×RU996 | MRU 1 | 3×RU996; [empty-RU996 RU996 RU996 RU996] |
| MRU 2 | 3×RU996; [RU996 empty-RU996 RU996 RU996] |
| MRU 3 | 3×RU996; [RU996 RU996 empty-RU996 RU996] |
| MRU 4 | 3×RU996; [RU996 RU996 RU996 empty-RU996] |
| 3×RU996+RU484 | MRU 1 | 3×RU996+RU484; [empty-RU484 RU484 RU996 RU996 RU996] |
| MRU 2 | 3×RU996+RU484; [RU484 empty-RU484 RU996 RU996 RU996] |
| MRU 3 | 3×RU996+RU484; [RU996 empty-RU484 RU484 RU996 RU996] |
| MRU 4 | 3×RU996+RU484; [RU996 RU484 empty-RU484 RU996 RU996] |
| MRU 5 | 3×RU996+RU484; [RU996 RU996 empty-RU484 RU484 RU996] |
| MRU 6 | 3×RU996+RU484; [RU996 RU996 RU484 empty-RU484 RU996] |
| MRU 7 | 3×RU996+RU484; [RU996 RU996 RU996 empty-RU484 RU484] |
| MRU 8 | 3×RU996+RU484; [RU996 RU996 RU996 RU484 empty-RU484] |

Yes/No/Abstain: 37/0/7

**Discussions on SP:**

C: RU index is defined for up to 320MHz BW. Will you define small MRU for up to 320MHz?

A: We can define in 1845.

**PDT Contributions**

1. **11-20-1791r1 – PDT PHY Modulation Accuracy –** Wook Bong Lee (Samsung)

**Discussion:**

C: Are we using the red wording for TBD text?

A: Yes.

C: There are still a lot of TBDs. Do you have plan to remove TBDs?

A: Yes. Will bring contribution to resolve the TBDs.

SP#6: Do you agree with the changes proposed in 1791r1 for 11be D0.1?

Yes/No/Abstain: 39/1/6

1. **11-20-1792r0 – PDT PHY Frequency Tolerance –** Wook Bong Lee (Samsung)

**Discussion:**

C: For the 2nd sentence, can I also remove the note 2?

A: We still need it. Since each 160MHz may use difference RF LO.

C: There is only one note, remove the note index.

C: There will be further discussion on whether to allow two RF LOs.

SP#7: Do you agree with the changes proposed in 1792r0 for 11be D0.1?

Yes/No/Abstain: 36/0/5

1. **11-20-1793r0 – PDT PHY Receive specification: General and receiver minimum input sensitivity and channel rejection –** Wook Bong Lee (Samsung)

**Discussion:**

SP#8: Do you agree with the changes proposed in 1793r0 for 11be D0.1?

Yes/No/Abstain: 36/0/6

1. **11-20-1796r1 – PDT PHY Cyclic Shift –** Wook Bong Lee (Samsung)

**Discussion:**

C: “Note that the cyclic shift values for greater than 8 total number of transmit chains may be changed in release 2. ” This sentence makes the spec seems not complete for LB.

A: This will not change in release 1.

C: Propose to just define for up to 8 transmit chains and add “when the total number of transmit chains are less than or equal to 8. ”

A: Updated to r2.

SP#9: Do you agree to add the proposed text in 1796r2 to 11be D0.1?

Yes/No/Abstain: 37/0/3

1. **11-20-1766r0 – PDT PHY CCA Sensitivity –** Lin Yang (Qualcomm)

**Discussion:**

C: 36.3.19.6.4 talked about OBSS\_PD regarding 40, 80, 160. Do you have plan to talk about 320MHz?

A: This is just copy from 11ax and should add 320Mhz to the text.

C: Highlight 35.xx.x.x, MAC group may need to confirm this section for whether to reuse 11ax or have a new subclause.

A: Ok. Highlighted and updated to r1.

C: I am not sure we have agreed on OBSS\_PD.

A: I assume this will be inherit from 11ax.

C: Per20bitmap is not used in ax?

A: This is newly added in latest draft of 11ax.

SP#10: Do you agree to add the proposed text in 1766r1 to 11be D0.1?

Yes/No/Abstain: 33/0/11

**New Submissions**

1. **11-20-1829r0 – Reserved Bit Behaviour for EHT –** Sameer Vermani (Qualcomm)

**Summary:** Proposed receiver behaviour for 11be R1 devices for reserved bits in the preamble and reserved states of certain fields.

**Discussion:**

C: Disregard seems similar to original meaning of reserved bits. Can you change “Disregard bits” to “reserved bits”?

A: A lot of Reserved bits in previous spec means validate bits. Also avoid confusion with MAC reserved bits.

C: Agree in general but need some time to double check.

C: It’s not did before to specify Rx behaviour.

A: It’s good to let Rx know whether the PPDU can be understand and what Rx can behave.

C: Why need another validate bit when you already have one bit after PPDU type and one bit after Puncture?

A: It’s possible for R2 device using same PPDU type and puncture mode but also using some new feature R1 devices don’t have so it’s better for R1 device to terminate.

C: Don’t care bits are more important to allow R1 and R2 devices sharing one PPDU. Validate bits are less important, right?

A: Yes, Validate bit can help power save and avoid confusing R1 device.

SPs deferred.

1. **11-20-1807r0 – EHT Beamformee NDP and Partial BW Feedback Support –** Rui Cao (NXP)

**Summary:** Proposed to support partial BW sounding and Beamformee to support sounding NDP wider than its operating BW.

**Discussion:**

No time for discussion.

SPs deferred.

**Adjourn**

The meeting is adjourned at 12:00 PM ET

**Monday Nov 16th, 2020 10:00 – 12:00 ET**

**Introduction**

1. The Chair (Sigurd Schelstraete, Quantenna/ON Semiconductor) calls the meeting to order at 10:00 ET.
2. The Chair follows the agenda in 11-20/1615r12.
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The Chair reminds everyone to report their attendance by using IMAT system and by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself if unable to record attendance via IMAT system.
5. Discussions on the agenda.

Technical Submissions: **Run SPs from Previous Topics [nominally 10 mins total]**

* 1. [1807r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1807-00-00be-eht-beamformee-ndp-and-partial-bw-feedback-support.pptx) EHT beamformee NDP & partial BW feedback support Rui Cao
  2. [1829r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1829-00-00be-reserved-bit-behavior-for-eht.pptx) Reserved Bit Behavior for EHT Sameer Vermani

Technical Submissions: **Proposed Draft Text (PDTs) for fixings TBDs**

* 1. [1803r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1803-00-00be-pdt-phy-ru-mru-restrictions-for-20-mhz-operation.docx) RU/MRU Restrictions for 20 MHz Operation Eunsung Park
  2. [1783r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1783-01-00be-update-on-pdt-phy-introduction-to-eht-phy.docx) Update on PDT-PHY-Introduction-to-EHT-PHY Bin Tian

Technical Submissions:

* 1. [1857r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1857-00-00be-update-on-eht-partial-bw-feedback-tone-indices-table.pptx) Update on EHT Partial BW Feedback Tone Indices Table Alice Chen
  2. [1842r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1842-00-00be-duplication-in-time-domain-for-lpi.pptx) Duplication in time domain for LPI Yan Xin
  3. [1845r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1845-01-00be-ru-allocation-subfield-design-for-eht-trigger-frame-follow-up.pptx) RU Alloc. Subfield Design for EHT Trigger Frame Follow up Myeongjin Kim
  4. [1847r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1847-00-00be-eht-ppe-thresholds-field.pptx) EHT PPE Thresholds Field Mengshi Hu

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbe (PHY) | 11/16 | An, Song-Haur | INDEPENDENT |
| TGbe (PHY) | 11/16 | Ansley, Carol | IEEE member / Self Employed |
| TGbe (PHY) | 11/16 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 11/16 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 11/16 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 11/16 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 11/16 | Dogukan, Ali | Vestel |
| TGbe (PHY) | 11/16 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Gong, Bo | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/16 | Handte, Thomas | Sony Corporation |
| TGbe (PHY) | 11/16 | Hart, Brian | Cisco Systems, Inc. |
| TGbe (PHY) | 11/16 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| TGbe (PHY) | 11/16 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbe (PHY) | 11/16 | Jamalabdollahi, Mohsen | Cisco Systems, Inc. |
| TGbe (PHY) | 11/16 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 11/16 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 11/16 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 11/16 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 11/16 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 11/16 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 11/16 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/16 | Liu, Der-Zheng | Realtek Semiconductor Corp. |
| TGbe (PHY) | 11/16 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Lopez, Miguel | Ericsson AB |
| TGbe (PHY) | 11/16 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 11/16 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 11/16 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 11/16 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 11/16 | Ozpoyraz, Burak | Vestel |
| TGbe (PHY) | 11/16 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 11/16 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 11/16 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 11/16 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 11/16 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 11/16 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 11/16 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 11/16 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 11/16 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 11/16 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/16 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 11/16 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/16 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 11/16 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 11/16 | Wilhelmsson, Leif | Ericsson AB |
| TGbe (PHY) | 11/16 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/16 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 11/16 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 11/16 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 11/16 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 11/16 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/16 | Zaman, Malia | IEEE Standards Association (IEEE-SA) |
| TGbe (PHY) | 11/16 | Zhang, Yan | NXP Semiconductors |

**Straw Polls**

1. **SPs from 1807r0 – Rui Cao (NXP)**

SP#1: SP1 in 1807r0.

**Do you agree 11be to define sounding to STAs of mixed BW?**

* + Beamformer can group STAs of mixed BW in one NDPA and NDP with NDP BW larger or equal to the STA’s operating BW.
  + Beamformee supports receiving NDP of BW wider than its operating BW.
    - 20MHz operating STA participating in 320MHz NDP is TBD.
    - 40MHz operating STA is excluded.

Yes/No/Abstain: 42/0/8

**Discussions on SP:**

C: Why make 20MHz operating STA optional to participate in wide BW NDP?

A: There are some extra challenge for 20MHz operation STAs.

C: There will be some tone shift for 20MHz BW operation participating wide BW OFDMA transmission. Is the rule similar to RU restriction rules for 20MHz operation STA?

A: It matches.

C: It seems reasonable to make 20MHz STA optional to receive wider BW NDP.

C: 40MHz is the most popular operation BW in 5GHz. Why exclude 40MHz operating STA?

A: 40MHz is not required to participate in OFDMA.

SP#2: SP2 in 1807r0.

**Do you agree that the beamformee support of receiving NDP with BW wider than STA’s operating BW is**

* + mandatory for STAs with operating BW>=80MHz
  + optional for STAs with operating BW=20MHz

Yes/No/Abstain: 38/0/11

**Discussions on SP:**

No discussion.

SP#3: SP3 in 1807r0.

**Do you agree to 11be beamformee mandatory support all partial BW feedback modes aligned with the large RU/MRU?**

Yes/No/Abstain: 39/0/8

**Discussions on SP:**

No discussion.

1. **SPs from 1829r0 – Sameer Vermani (Qualcomm)**

SP#4: SP1 in 1829r0.

* **Do you agree that we need two different kinds of reserved bits in the EHT preamble?**
  + Validate
    - Reserved bits with Terminate as Rx behavior for an R1 device
  + Disregard
    - Reserved bits with Don’t Care or Ignore as Rx behavior for an R1 device

Yes/No/Abstain: 41/1/9

**Discussions on SP:**

No Discussion.

SP#5: SP2 in 1829r0.

* **Do you agree to have the following 3 validate bits in the U-SIG**
  + 1 below *Punctured channel indication* field
  + 1 below the *PPDU type and compression mode* field
  + 1 more to tell R1 devices to terminate processing in certain R2 transmissions (which still use an R1 PPDU type and R1 puncturing pattern)
    - NOTE: Definitions of R1 and R2 devices are TBD.

Yes/No/Abstain: 32/2/12

**Discussions on SP:**

C: If the 3rd item is satisfied, do you still need the 1st item? If you want to terminate an R1 device, just set this bit in 3rd item.

A: Both are needed. If there are new punctured channel are indicated, need to use the 1st item and the R1 STA should terminated.

C: R1 and R2 devices are not defined. Can we add R1 and R2 devices are TBD?

A: SP text updated.

SP#6: SP4 in 1829r0.

* **Do you agree to have the following rule about any new potential entries of RU allocation table in R2** 
  + Values greater than 303
    - For any states of the RU allocation sub-field that are defined as reserved in R1, R1 device can assume that “Field value modulo 8 +1” tells the number of R2 users
  + When reserved values < 303 are used, R1 devices will terminate reception

Yes/No/Abstain: 30/1/16

**Discussions on SP:**

C: Why >303?

A: 303 is the largest value in RU allocation table.

C: Is 303 is included?

A: No. 303 is not reserved and is already used by R1.

C: R2 may have new RU allocation values. If the value is >303, R1 STA will not understand and should terminate the reception.

A: For the new RU allocations, this idea gives a method for R1 devices to calculate how many users are allocated on the RU. R1 devices need this information to find position of its own user field.

**PDT Contributions**

1. **11-20-1803r0 – PDT RU/MRU Restrictions for 20 MHz Operation –** Eunsung Park (LG)

**Discussion:**

C: Some text modification suggested on index numbers.

A: Will update the PDT text and run the SP in next PHY meeting.

1. **11-20-1783r1 – Update PDT Introduction to EHT PHY –** Bin Tian (Qualcomm)

**Discussion:**

C: A few places mentioned RUs of 20MHz only STA on primary channel. For non-primary channel, is it covered?

A: First item covers optional support of 242 tone RU on primary channel. Following items covers conditional optional support for all RU sizes for non-primary channels, conditioned on SST support.

C: We are no long support 26+106 for 20MHz only STA.

A: Will remove it and update to R2.

C: Do we need the first entire? Suggest removing the “entire”.

C: Leave to later to clarify by defining the terminology for OFDMA and non-OFDMA transmission.

SP#7: Do you agree to accept the changes in 1783r2 to update 11be D0.1?

Yes/No/Abstain: 34/0/4

**New Submissions**

1. **11-20-1857r0 – Update on EHT Partial BW Feedback Tone Indices Table –** Alice Chen (Qualcomm)

**Summary:** Propose a change to the partial CSI feedback tone indices table of RU242 granularity to fix an error.

**Discussion:**

C: The proposal is to make 20MHz consistent with 11ax. Is 40MHz same as 11ax?

A: Yes. There are no other inconsistency.

SP#8: SP1 in 1857r0.

* **Do you support the to fix the following in the feedback tone indices table with RU242 granularity for 11be?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU242 Index** | **20MHz** | **40MHz** | **80MHz** | **160MHz** | **320MHz** |
| **1** | Ng=4: [-122, -120:4:-4, -2, 2, 4:4:120, 122]; Ng=16: [-122, -116:16:-4, -2, 2, 4:16:116, 122] | [-244:Ng:-4] | [-500:Ng:-260] | [-1012:Ng:-772] | [-2036:Ng:-1796] |
| **2** |  | [4:Ng:244] | [-252:Ng:-12] | [-764:Ng:-524] | [-1788:Ng:-1548] |
| **3** |  |  | [12:Ng:252] | [-500:Ng:-260] | [-1524:Ng:-1284] |
| **4** |  |  | [260:Ng:500] | [-252:Ng:-12] | [-1276:Ng:-1036] |
| **5** |  |  |  | [12:Ng:252] | [-1012:Ng:-772] |
| **6** |  |  |  | [260:Ng:500] | [-764:Ng:-524] |
| **7** |  |  |  | [524:Ng:764] | [-500:Ng:-260] |
| **8** |  |  |  | [772:Ng:1012] | [-252:Ng:-12] |
| **9** |  |  |  |  | [12:Ng:252] |
| **10** |  |  |  |  | [260:Ng:500] |
| **11** |  |  |  |  | [524:Ng:764] |
| **12** |  |  |  |  | [772:Ng:1012] |
| **13** |  |  |  |  | [1036:Ng:1276] |
| **14** |  |  |  |  | [1284:Ng:1524] |
| **15** |  |  |  |  | [1548:Ng:1788] |
| **16** |  |  |  |  | [1796:Ng:2036] |

Yes/No/Abstain: 40/1/5

1. **11-20-1842r0 – Duplication in time domain for LPI –** Yan Xin (Huawei)

**Summary:** Propose a DUP-T mode which duplicate in time domain for all defined BWs.

**Discussion:**

C: Is this apply to LPI or all channels?

A: Currently for LPI but up to group’s discussion.

C: Do you plan to propose a new mode or replace the existing LPI ER mode?

A: We are open now.

C: I don’t think we need to support 20/40MHz modes since the preamble will be the limit.

A: We can think about preamble enhancement if support 20/40.

Will continue discussion and SP in next PHY call.

**Adjourn**

The meeting is adjourned at 12:00 PM ET

**Thursday Nov 19th, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Sigurd Schelstraete, Quantenna/ON Semiconductor) calls the meeting to order at 19:00 ET.
2. The Chair follows the agenda in 11-20/1615r16.
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The Chair reminds everyone to report their attendance by using IMAT system and by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself if unable to record attendance via IMAT system.
5. Discussions on the agenda.

Technical Submissions: **Run SPs from Previous Topics [nominally 10 mins total]**

* + [1441r5](https://mentor.ieee.org/802.11/dcn/20/11-20-1441-05-00be-ru-restriction-for-20mhz-operation.pptx) RU Restriction for 20MHz Operation Eunsung Park [SPs]
  + [1845r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1845-01-00be-ru-allocation-subfield-design-for-eht-trigger-frame-follow-up.pptx) RU Alloc. Subfield Design for EHT Trigger Frame Follow up Myeongjin Kim

[SP1&2 only]

Technical Submissions: **Proposed Draft Text (PDTs) for fixings TBDs**

* + [1803r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1803-00-00be-pdt-phy-ru-mru-restrictions-for-20-mhz-operation.docx) RU/MRU Restrictions for 20 MHz Operation Eunsung Park [SP]
  + [1873r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1873-00-00be-pdt-phy-txtime-and-psdu-length-calculation.docx) PDT PHY TXTIME and PSDU LENGTH Calculation Youhan Kim [SP]
  + [1836r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1836-00-00be-pdt-phy-tx-procedure.docx) PDT-PHY-Tx-Procedure Xiaogang Chen [SP]
  + [1837r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1837-00-00be-pdt-phy-rx-procedure.docx) PDT-PHY-Rx-Procedure Xiaogang Chen [SP]
  + [1479r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1479-03-00be-pdt-phy-t-block.docx) PDT-PHY-T\_block Xiaogang Chen [SP]
  + [1462r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1462-03-00be-pdt-phy-tx-mask.docx) PDT-PHY-Tx-Mask Xiaogang Chen [SP]
  + [1783r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1783-03-00be-update-on-pdt-phy-introduction-to-eht-phy.docx) Updated on PDT-PHY-Introduction-to-EHT-PHY Bin Tian
  + [1888r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1888-00-00be-pdt-phy-removing-non-contiguous-ppdu.docx) PDT-PHY-removing-non-contiguous-PPDU Youhan Kim
  + [1876r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1876-00-00be-update-on-pdt-phy-pilot.docx) Update on PDT-PHY-Pilot Jinyoung Chun
  + [1867r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1867-00-00be-pdt-phy-non-ht-duplicate-transmission.docx) PDT-PHY-non-HT-duplicate-transmission Rui Cao
  + [1868r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1868-01-00be-pdt-phy-ofdm-modulation.docx) PDT-PHY-OFDM-modulation Rui Cao
  + [1791r2](https://mentor.ieee.org/802.11/dcn/20/11-20-1791-02-00be-pdt-tbd-phy-modulation-accuracy.docx) PHY Modulation Accuracy Wook Bong Lee
  + [1875r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1875-00-00be-pdt-phy-update-to-preamble-u-sig.docx) PDT PHY Update to Preamble U-SIG Sameer Vermani
  + [1878r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1878-00-00be-pdt-phy-update-to-eht-sounding-ndp.docx) PDT PHY Update to EHT Sounding NDP Sameer Vermani
  + [1882r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1882-01-00be-pdt-phy-overview-of-the-ppdu-enconding-process.docx) Overview of the PPDU Encoding Process Youhan Kim
  + [1884r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1884-00-00be-pdt-phy-stream-parser.docx) Stream Parser Youhan Kim
  + [1883r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1883-00-00be-pdt-eht-ppdu-format-update.docx) PHY-EHT-PPDU-Format-Update Dongguk Lim
  + [1885r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1885-00-00be-pdt-eht-preamble-l-stf-l-ltf-and-l-sig-update.docx) HT-Preamble-L-STF,L-LTF, and L-SIG-Update Dongguk Lim
  + [1495r4](https://mentor.ieee.org/802.11/dcn/20/11-20-1495-04-00be-pdt-of-eht-ltf-sequences.docx) PDT of EHT LTF sequences Chenchen Liu

Technical Submissions:

* + [1842r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1842-00-00be-duplication-in-time-domain-for-lpi.pptx) Duplication in time domain for LPI Yan Xin [SP]
  + [1845r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1845-01-00be-ru-allocation-subfield-design-for-eht-trigger-frame-follow-up.pptx) RU Alloc. Subfield Design for EHT Trigger Frame Follow up Myeongjin Kim
  + [1703r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1703-01-00be-backward-compatible-trigger-frame-ru-allocation-table.pptx) IEEE 802.11ax Backward Compatible Trigger Frame RU Allocation Table Steve Shellhammer
  + [1847r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1847-00-00be-eht-ppe-thresholds-field.pptx) EHT PPE Thresholds Field Mengshi Hu
  + [1879r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1879-00-00be-mu-mimo-over-mcs15.pptx) MU-MIMO over MCS15 Ron Porat
  + [1880r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1880-00-00be-sr-field-in-tb-ppdu.pptx) SR field in TB PPDU Ron Porat

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbe (PHY) | 11/19 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 11/19 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 11/19 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 11/19 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 11/19 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 11/19 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Gong, Bo | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/19 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbe (PHY) | 11/19 | Jamalabdollahi, Mohsen | Cisco Systems, Inc. |
| TGbe (PHY) | 11/19 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 11/19 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 11/19 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 11/19 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 11/19 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 11/19 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 11/19 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/19 | Liu, Der-Zheng | Realtek Semiconductor Corp. |
| TGbe (PHY) | 11/19 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 11/19 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 11/19 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 11/19 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 11/19 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 11/19 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 11/19 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 11/19 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 11/19 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/19 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 11/19 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 11/19 | Tian, Tao | Unisoc Comm. |
| TGbe (PHY) | 11/19 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/19 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 11/19 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 11/19 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 11/19 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/19 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 11/19 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 11/19 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 11/19 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 11/19 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/19 | Zaman, Malia | IEEE Standards Association (IEEE-SA) |
| TGbe (PHY) | 11/19 | Zhang, Yan | NXP Semiconductors |

**Straw Polls**

1. **SPs from 1441r5 – Eunsung Park (LG)**

SP#1: SP3b in 1441r5.

* **Do you agree to add the following text to TGbe SFD?**
  + 242-tone RUs shall not be allocated to 20MHz operating STAs for 40 / 80 / 160 / 320 MHz EHT TB PPDU
  + This is for rel. 1

Yes/No/Abstain: 29/1/3

**Discussions on SP:**

No discussion.

1. **SPs from 1845r2 – Myeongjin Kim (Samsung)**

SP#2: SP1 in 1845r3.

* Do you support update table 36-5, 36-6 and table 36-7 in D0.1 based on SP1 of 11-20/1845r3?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU type** | **RU index and subcarrier range** | | | | |
| **26-tone RU** | **RU 1 [–499: –474]** | **RU 2 [–473: –448]** | **RU 3 [–445: –420]** | **RU 4 [–419: –394]** | **RU 5 [–392: –367]** |
| **RU 6 [–365: –340]** | **RU 7 [–339: –314]** | **RU 8 [–311: –286]** | **RU 9 [–285: –260]** |  |
| **RU 10 [–252: –227]** | **RU 11 [–226: –201]** | **RU 12 [–198: –173]** | **RU 13 [–172: –147]** | **RU 14 [–145: –120]** |
| **RU 15 [–118: –93]** | **RU 16 [–92: –67]** | **RU 17 [–64: –39]** | **RU 18 [–38: –13]** | **RU 19 [Not Defined]** |
| **RU 20 [13: 38]** | **RU 21 [39: 64]** | **RU 22 [67: 92]** | **RU 23 [93: 118]** | **RU 24 [120: 145]** |
| **RU 25 [147: 172]** | **RU 26 [173: 198]** | **RU 27 [201: 226]** | **RU 28 [227: 252]** |  |
| **RU 29 [260: 285]** | **RU 30 [286: 311]** | **RU 31 [314: 339]** | **RU 32 [340: 365]** | **RU 33 [367: 392]** |
| **RU 34 [394: 419]** | **RU 35 [420: 445]** | **RU 36 [448: 473]** | **RU 37 [474: 499]** |  |

Yes/No/Abstain: 30/1/6

(Please find the table in the word document attached in the SP1 of 1845r3 for the tables for 160MHz and 320MHz.)

**Discussions on SP:**

C: Change RU19 from “It does not exist” to “Reserved”

C: Change to “Not defined” is better.

A: Updated to R3.

C: There may have other places need to check whether this change is applied.

SP#3: SP2 in 1845r2.

* **Do you support that the TGbe SFD shall include the following table?**
  + Indices for small-size MRUs in an OFDMA 80MHz, 160MHz, and 320HMz EHT PPDU described in Word document

Yes/No/Abstain: 35/0/6

(Please find the table in the word document attached in the SP2 of 1845r2.)

**PDT Contributions**

1. **11-20-1803r2 – RU/MRU Restrictions for 20MHz Operation –** Eunsung Park (LG)

**Discussion:**

C: The 26+106-tone MRU is not supported in R1, so it will be more clear to remove the “26+106-tone MRU” paragraph from page 3.

A: Ok. Will update to next revision.

Come back for SP after the author update the PDT Text.

SP#9: Do you agree to accept the proposed text in 1803r3 for 11be D0.2?

Accepted unanimously.

1. **11-20-1873r0 – PDT PHY TXTIME and PSDU LENGTH Calculation –** Youhan Kim (Qualcomm)

**Discussion:**

No discussion.

SP#4: Do you agree to accept the proposed text in 1873r0 for 11be D0.2?

Accepted unanimously.

1. **11-20-1836r0 – PDT-PHY-Tx-Procedure –** Xiaogang Chen (Intel)

**Discussion:**

No discussion.

SP#5: Do you agree to accept the proposed text in 1836r0 for 11be D0.2?

Accepted unanimously.

1. **11-20-1837r1 – PDT-PHY-Rx-Procedure –** Xiaogang Chen (Intel)

**Discussion:**

C: Add value: LENGH is the value of the LENGTH field.

C: We removed the non-primary channel check and only keep the per 20MHz check. So suggest to remove the descriptions for secondary 20/40/….etc on page 4.

C: Better keep it as TBD for now.

A: Ok. Updated to R2.

SP#6: Do you agree to accept the proposed text in 1837r2 for 11be D0.2?

Accepted unanimously.

1. **11-20-1479r4 – PDT-PHY-T\_block –** Xiaogang Chen (Intel)

**Discussion:**

No discussion.

SP#7: Do you agree to accept the proposed text in 1479r4 for 11be D0.2?

Accepted unanimously.

1. **11-20-1462r4 – PDT-PHY-Tx-Mask –** Xiaogang Chen (Intel)

**Discussion:**

No discussion.

SP#8: Do you agree to accept the proposed text in 1462r4 for 11be D0.2?

Accepted unanimously.

1. **11-20-1783r3 – Updated on PDT-PHY-Introduction-to-EHT-PHY –** Bin Tian (Qualcomm)

**Discussion:**

No discussions.

SP#10: Do you agree to accept the proposed text in 1783r3 for 11be D0.2?

Accepted unanimously.

1. **11-20-1888r2 – PDT-PHY-removing-non-contiguous-PPDU –** Youhan Kim (Qualcomm)

**Discussion:**

No discussions.

SP#11: Do you agree to accept the proposed text in 1888r2 for 11be D0.2?

Accepted unanimously.

1. **11-20-1876r3 –** Update on PDT-PHY-Pilot **–** Jinyoung Chun(LG)

**Discussion:**

C: Can you add Note after table 36-34 that this is a new subcarrier?

C: Suggest to add a “Not defined”.

A: Ok. Will update to R4.

SP#12: Do you agree to accept the proposed text in 1876r4 for 11be D0.2?

Accepted unanimously.

1. **11-20-1867r1 – PDT-PHY-non-HT-duplicate-transmission –** Rui Cao(NXP)

**Discussion:**

C: Will the Inactive subchannels also defined in 11be?

A: It’s already in the draft.

C: 20MHz punctured value in RU allocation table should be copied in this document.

C: Is there any rule/limitation for puncturing for non-HT dup PPDU? Or same as EHT PPDU?

A: We don’t have any SP or motion on it.

C: Need to finalize later.

C: Can we simply transfer Inactive subchannels in ax to be? Do we need some change to support 320MHz BW?

SP#13: Do you agree to accept the proposed text in 1867r1 for 11be D0.2?

Accepted unanimously.

1. **11-20-1868r2 – PDT-PHY-OFDM-modulation –** Rui Cao(NXP)

**Discussion:**

No discussions.

SP#14: Do you agree to accept the proposed text in 1868r2 for 11be D0.2?

Accepted unanimously.

1. **11-20-1791r4 – PHY Modulation Accuracy** **–** Wook Bong Lee(Samsung)

**Discussion:**

C: Change RU to MRU in table 36-45 for all the MRUs.

C: What about 3x996? It should be MRU.

C: Delete the Editor’s note after the table.

A: Updated to r5.

SP#15: Do you agree to accept the proposed text in 1791r5 for 11be D0.2?

Accepted unanimously.

1. **11-20-1875r1 – PDT PHY Update to Preamble U-SIG** **–** Sameer Vermani(Qualcomm)

**Discussion:**

C: Do you have somewhere explain the meaning of validate bit and disregard bit?

A: There is some definition in Rx procedure document.

C: It will be clearer to add some explanation in the table to help people understand. Maybe add in next draft version.

C: “Validate” should use capital V

C: Some discussions and updates for PPDU type & Compression mode subfield.

C: In U-SIG of TB PPDU, the disregard bit should be copied from the trigger frame. Should not mention “set to 1”. Should specify the value in trigger frame.

C: The “UL/DL” bit need to set to 1 to indicate the PPDU is addressed to AP.

C: In this document, do we have a definition for version independent fields?

A: We should add this definition in the future.

SP#16: Do you agree to accept the proposed text in 1875r2 for 11be D0.2?

Accepted unanimously.

1. **11-20-1878r0 – PDT PHY Update to EHT Sounding NDP** **–** Sameer Vermani(Qualcomm)

**Discussion:**

C: Change to Use EHT MU PPDU with EHT-SIG field contents of NDP mode

C: Add “encoded using MCS0” for EHT-SIG field.

A: Update to R1.

SP#17: Do you agree to accept the proposed text in 1878r1 for 11be D0.2?

Accepted unanimously.

1. **11-20-1884r0 – Stream Parser –** Youhan Kim(Qualcomm)

**Discussion:**

No discussions.

SP#18: Do you agree to accept the proposed text in 1884r0 for 11be D0.2?

Accepted unanimously.

1. **11-20-1882r3 – Overview of the PPDU Encoding Process –** Youhan Kim(Qualcomm)

**Discussion:**

No discussions.

SP#19: Do you agree to accept the proposed text in 1882r3 for 11be D0.2?

Accepted unanimously.

1. **11-20-1883r1 – PHY-EHT-PPDU-Format-Update –** Dongguk Lim(LG)

**Discussion:**

C: Do you think EHT NDP PPDU is one of the EHT MU PPDU?

A: It is considered as a variant of EHT MU PPDU similar to 11ax.

C: Reminder to Editor: The red wording are newly proposed text, not for TBD.

SP#20: Do you agree to accept the proposed text in 1883r1 for 11be D0.2?

Accepted unanimously.

1. **11-20-1885r0 – HT-Preamble-L-STF,L-LTF, and L-SIG-Update** **–** Dongguk Lim(LG)

**Discussion:**

No discussions.

SP#21: Do you agree to accept the proposed text in 1885r0 for 11be D0.2?

Accepted unanimously.

1. **11-20-1495r5 – PDT of EHT LTF sequences –** Ross Jian Yu(Huawei)

**Discussion:**

C: LTF for TB NDP feedback PPDU need to be removed. It’s not defined in 11be.

A: Will update to R6.

SP#22: Do you agree to accept the proposed text in 1495r6 for 11be D0.2?

Accepted unanimously.

**Adjourn**

The meeting is adjourned at 21:56 PM ET

**Monday Nov 30th, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Sigurd Schelstraete, Quantenna/ON Semiconductor) calls the meeting to order at 19:00 ET.
2. The Chair follows the agenda in 11-20/1615r19.
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The Chair reminds everyone to report their attendance by using IMAT system and by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself if unable to record attendance via IMAT system.
5. Announcements:
   * Update on 11be Draft (Editor): There are ~ 300-400 TBDs in PHY part, Suggest PHY group work to remove more TBDs.
6. Discussions on the agenda.

Technical Submissions: **Run SPs from Previous Topics [nominally 10 mins total]**

Technical Submissions: **Proposed Draft Text (PDTs) for fixings TBDs**

* + [1876r5](https://mentor.ieee.org/802.11/dcn/20/11-20-1876-05-00be-update-on-pdt-phy-pilot.docx) Update on PDT-PHY-Pilot Jinyoung Chun [Fix Overview & Re-SP]
  + [1868r3](https://mentor.ieee.org/802.11/dcn/20/11-20-1868-03-00be-pdt-phy-ofdm-modulation.docx) PDT-PHY-OFDM-modulation Rui Cao [Fix Overview & Re-SP]

Technical Submissions:

* + [1842r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1842-00-00be-duplication-in-time-domain-for-lpi.pptx) Duplication in time domain for LPI Yan Xin [SP]
  + [1845r4](https://mentor.ieee.org/802.11/dcn/20/11-20-1845-03-00be-ru-allocation-subfield-design-for-eht-trigger-frame-follow-up.pptx) RU Alloc. Subfield Design for EHT Trigger Frame Follow up Myeongjin Kim
  + [1703r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1703-01-00be-backward-compatible-trigger-frame-ru-allocation-table.pptx) IEEE 802.11ax Backward Compatible Trigger Frame RU Allocation Table Steve Shellhammer [SPs]
  + [1847r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1847-00-00be-eht-ppe-thresholds-field.pptx) EHT PPE Thresholds Field Mengshi Hu
  + [1879r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1879-00-00be-mu-mimo-over-mcs15.pptx) MU-MIMO over MCS15 Ron Porat
  + [1880r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1880-00-00be-sr-field-in-tb-ppdu.pptx) SR field in TB PPDU Ron Porat
  + [1896r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1896-00-00be-two-los-for-320-mhz-transmission.pptx) Two LOs for 320 MHz Transmission Ross Jian Yu

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| Breakout | Timestamp | Name | Affiliation |
| TGbe (PHY) | 11/30 | Agrawal, abhishek | ON Semiconductor |
| TGbe (PHY) | 11/30 | Aio, Kosuke | Sony Corporation |
| TGbe (PHY) | 11/30 | ANANDAKUMAR, KRISHNASAMY | Maxlinear Inc |
| TGbe (PHY) | 11/30 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 11/30 | Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 11/30 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 11/30 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 11/30 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 11/30 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 11/30 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 11/30 | Du, Zhenguo | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 11/30 | Gao, Zhigang | Cisco Systems, Inc. |
| TGbe (PHY) | 11/30 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 11/30 | Gong, Bo | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/30 | Grandhe, Niranjan | NXP Semiconductors |
| TGbe (PHY) | 11/30 | Hart, Brian | Cisco Systems, Inc. |
| TGbe (PHY) | 11/30 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 11/30 | Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| TGbe (PHY) | 11/30 | Jamalabdollahi, Mohsen | Cisco Systems, Inc. |
| TGbe (PHY) | 11/30 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 11/30 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 11/30 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Lansford, James | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Li, Jianhui | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 11/30 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 11/30 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 11/30 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 11/30 | Nakano, Takayuki | Panasonic Corporation |
| TGbe (PHY) | 11/30 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 11/30 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 11/30 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 11/30 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 11/30 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 11/30 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 11/30 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 11/30 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 11/30 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/30 | Thompson, Tom | IEEE STAFF |
| TGbe (PHY) | 11/30 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Tian, Tao | Unisoc Comm. |
| TGbe (PHY) | 11/30 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 11/30 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 11/30 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 11/30 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 11/30 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/30 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 11/30 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 11/30 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 11/30 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 11/30 | Zhang, Yan | NXP Semiconductors |

**PDT Contributions**

1. **11-20-1876r5 – Update on PDT-PHY-Pilot –** Jinyoung Chun (LG)

**Discussion:**

SP#1: Do you agree to accept the proposed text in 1876r5 for 11be D0.2?

Accepted unanimously.

1. **11-20-1868r3 – PDT-PHY-OFDM-modulation –** Rui Cao (NXP)

**Discussion:**

C: MRU 26+52 is not aligned with other places of 26+52 tone MRU. Suggest making consistent.

A: Editor already fixed the term and make it consistent.

SP#2: Do you agree to accept the proposed text in 1868r3 for 11be D0.2?

Accepted unanimously.

**Technical Submissions**

1. **11-20-1842r0 – Duplication in time domain for LPI –** Yan Xin (Huawei)

**Discussion:**

C: Don’t see benefit for introducing new time domain duplication mode. Freq DUP can imcrease Tx power, time DUP don’t bring any additional gain.

A: Each part of data has Dup 4 times, so no sacrifice of gain. In addition to that, time domain DUP mode can support MRU.

C: Need to process 2 symbols to get the data similar to STBC, that brings extra complexity. Need to buffer the symbol and need to calculate the padding.

C: Requires even number of symbols.

SP#3: SP in 1842r0.

**Do you agree to add the DUP mode in time domain as described in slide 4 of 11-20/1842r0 with MCS0+DCM and Nss=1 to the 11be SFD?**

* **This is for an R1 feature.**

Yes/No/Abstain: 18/34/6

1. **11-20-1845r4 – RU Alloc. Subfield Design for EHT Trigger Frame Follow up** **–** Myeongjin Kim(Samsung)

**Discussion:**

C: Is there any differences besides the 2xRU996 + RU484 case comparing to 1703?

A: We have more clear mapping to absolute RU index in slide 25.

A: Not clear why indexing based on primary/ secondary channel is better than absolute index.

C: Understand you have concern on X1 and X0, what about X2-X8?

A: The meaning of X2-X8 will also be different if definition of X1 and X0 are different.

SPs deferred.

1. **11-20-1703r1 – IEEE 802.11ax Backward Compatible Trigger Frame RU Allocation Table –** Steve Shellhammer(Qualcomm)

**Discussion:**

C: Option B is much better than Option A. Need more discussion with interested people.

C: Our idea is similar with different entry IDs. Targeting to work offline and bring back next week.

SPs deferred.

1. **11-20-1847r0 – EHT PPE Thresholds Field –** Mengshi Hu(Huawei)

**Discussion:**

C: Why we need 996x3 entry?

A: The gap is large between 2x996 and 4x996 so we add this. We are open to it.

C: Slide 10 opt2, do you need one bit to indicate omission or not?

A: Omit by default. For the RU and Nss combination exist in 11ax, use HE capabilities.

C: For 4k QAM, the capability may be different. Need to check.

C: Similar comment as last commenter. It will be helpful if you can provide some example.

C: You have 3x996 but you don’t have other MRUs.

A: 3x996 is follow 80MHz granularity, not considered as MRU here.

C: This topic is pretty complex in 11ax. Should we simplify it instead of bringing the 11ax design to 11be?

A: This brings flexibility to different vendors.

C: 11ax signaling is over complicated. Suggest just use 2 bits for common PPE for all the modes.

A: It’s a tradeoff of optimization and complexity.

SP#4: SP1 in 1847r0.

**Do you agree to define PPE Thresholds field in EHT Capabilities element?**

* The existence of the PPET Thresholds field is indicated by the PPET Thresholds Present subfield in EHT PHY Capabilities Information field.

Yes/No/Abstain: 29/8/17

SP#5: SP2 in 1847r0.

**Do you agree with the following changes in EHT PPE Thresholds field?**

* NSTS subfield is extended to 4 bits to support 1-16 SS.
* RU Index Bitmask subfield is extended to ~~6~~ 5 bits to support ~~3\*996 and~~ 4\*996.
* Use Constellation Index = 6 to indicate 4096-QAM.

**Discussion:**

C: Can you remove 3x996?

A: We are ok with it.

C: What about the capability for the MRUs?

A: Use next higher BW to represent the MRUs.

C: Can we defer this SP to think about how to simplify it? It seems too complex for 11ax design.

A: Ok. We can defer this SP.

C: We don’t want to have a fixed PE value for all PPDUs.

SPs deferred.

1. **11-20-1879r0 – MU-MIMO over MCS15 –** Ron Porat(Broadcom)

**Discussion:**

No discussions.

SP#6: SP1 in 1879r0.

**Do you agree to disallow DL and UL MU-MIMO over MCS15?**

Yes/No/Abstain: 36/1/8

1. **11-20-1880r0 – SR Field in TB PPDU –** Ron Porat(Broadcom)

**Discussion:**

C: Do you assume PSR over TB PPDU is in R1 and for other PPDU to be discussed in R2?

A: Open to discuss in R2. Support only for TB PPDU is like just half of the solution. Prefer to have discussion for PSR on EHT MU PPDU.

C: OBSS PD is used a lot but PSR is not. Suggest to present this in the joint meeting.

A: Are you against putting the field in the U-SIG of EHT TB PPDU?

C: Need to see further discussion.

A: Will run the SP to collect opinion from PHY group.

SP#7: SP1 in 1880r0.

**Do you support to have two SR fields (4 bits each, total 8 bits), with granularity of half PPDU BW, but no smaller than 20MHz, in the U-SIG of TB PPDU?**

Yes/No/Abstain: 19/18/10

Skip SP2 in 1880.

1. **11-20-1896r0 – Two LOs for 320 MHz Transmission –** Ross Jian Yu(Huawei)

**Discussion:**

C: 11ax and 11ac already allow two LOs for 160MHz operation. This contribution is to ask keeping two CFO trackers.

C: My impression is the two LO is for non-contiguous 80+80 case. What is the benefit of using two LOs?

A: The spec text clearly allows two LOs for contiguous 160MHz. Making 320MHz front end is difficulty. Allowing two LOs will make it faster to have 320MHz in the field. I don’t want to make 4 LOs and 4 trackers, just keep same as 11ax.

A: Two LOs is a low-cost solution to achieve 320MHz.

C: Slide 3 on SNR degradation: In 11ax, the two LOs will comes from same reference oscillator, will you really saw the SNR loss?

A: If there are two paths, the phase will be different.

C: Phase difference I agree, but I am not sure about the CFO difference. I don’t think we should give Rx burden to mandate two trackers.

C: Definition of CFO tracker: Common phase error tracking is not the biggest concern. ICI is missing from the slides.

C: As long as EVM requirement can be satisfied, not need to worry about how many LOs Tx use.

A: CFO may not be a problem, but CPE is. Need a warning just as 11ax and ac that common phase on upper and lower 160MHz can be un-correlated.

SPs deferred.

**Adjourn**

The meeting is adjourned at 21:45 PM ET