IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Minutes 802.11 be PHY ad hoc Telephone Conferences,  Nov 2020 - Jan 2021 | | | | |
| Date: 2020-11-12 | | | | |
| 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

**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