IEEE P802.11  
Wireless LANs

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| Minutes 802.11 be PHY ad hoc Telephone Conferences,  July - Sept 2020 | | | | |
| Date: 2020-07-27 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Tianyu Wu | Apple |  |  | tianyu@apple.com |
| Feng Jiang | Apple |  |  |  |

Abstract

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

* July 13, 2020
* July 20, 2020
* July 23, 2020
* July 27, 2020

**Monday July 13th, 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 11-20/0927r1
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. Discussions on the agenda.
   * [960r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0960-01-00be-consideration-on-240mhz.pptx) Consideration on 240MHz (Eunsung Park) [SPs]
   * [930r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0930-03-00be-consideration-on-user-specific-field-in-eht-sig.pptx) Consideration on user specific field in EHT-SIG field (Dongguk Lim) [SPs]
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| TGbe (PHY) | 7/13 | Agrawal, abhishek | ON Semiconductor |
| TGbe (PHY) | 7/13 | Aio, Kosuke | Sony Corporation |
| TGbe (PHY) | 7/13 | Allegue Martinez, Michel | Aerial Technologies Inc. |
| TGbe (PHY) | 7/13 | An, Song-Haur | INDEPENDENT |
| TGbe (PHY) | 7/13 | Ansley, Carol | CommScope |
| TGbe (PHY) | 7/13 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 7/13 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Batra, Anuj | Apple Inc. |
| TGbe (PHY) | 7/13 | Bei, Jianwei | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Ben Arie, Yaron | toga networks(a huawei company) |
| TGbe (PHY) | 7/13 | Berger, Christian | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Boldy, David | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Cepni, Gurkan | Apple Inc. |
| TGbe (PHY) | 7/13 | Chen, Evelyn | Ericsson AB |
| TGbe (PHY) | 7/13 | Chen, Xiaogang | Intel |
| TGbe (PHY) | 7/13 | Cho, Hangyu | LG ELECTRONICS |
| TGbe (PHY) | 7/13 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 7/13 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 7/13 | Costa, D.Nelson | Peraso Technologies Incorporated |
| TGbe (PHY) | 7/13 | Dash, Debashis | Apple Inc. |
| TGbe (PHY) | 7/13 | Dauphinee, Leonard | MaxLinear Inc |
| TGbe (PHY) | 7/13 | Ding, Yanyi | Panasonic Corporation |
| TGbe (PHY) | 7/13 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 7/13 | ElSherif, Ahmed | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Erceg, Vinko | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Feng, Xiang | Keysight Technologies |
| TGbe (PHY) | 7/13 | Furuichi, Sho | Sony Corporation |
| TGbe (PHY) | 7/13 | Gardner, James | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Grandhe, Niranjan | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Haider, Muhammad Kumail | Facebook |
| TGbe (PHY) | 7/13 | Hall, Robert | CONSULTANT |
| TGbe (PHY) | 7/13 | Hansen, Christopher | Covariant Corporation |
| TGbe (PHY) | 7/13 | Harrison, Edward | Anritsu Company |
| TGbe (PHY) | 7/13 | Hsiao, Ching-Wen | MediaTek Inc. |
| TGbe (PHY) | 7/13 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 7/13 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 7/13 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 7/13 | Hurtarte, Jeorge | Teradyne, Inc. |
| TGbe (PHY) | 7/13 | Ibrahim, Mostafa | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 7/13 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 7/13 | Jia, Jia | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 7/13 | Kadampot, Ishaque Ashar | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 7/13 | KANG, Kyu-Min | ETRI |
| TGbe (PHY) | 7/13 | Kim, Eunhee | Electronics and Telecommunications Research Institute (ETRI) |
| TGbe (PHY) | 7/13 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 7/13 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Kitazawa, Shoichi | Muroran IT |
| TGbe (PHY) | 7/13 | Lansford, James | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 7/13 | Levitsky, Ilya | IITP RAS |
| TGbe (PHY) | 7/13 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Li, Qinghua | Intel Corporation |
| TGbe (PHY) | 7/14 | Liang, dandan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 7/13 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Liu, Der-Zheng | Realtek Semiconductor Corp. |
| TGbe (PHY) | 7/13 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 7/13 | Lopez, Miguel | Ericsson AB |
| TGbe (PHY) | 7/13 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 7/13 | Lou, Hui-Ling | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Mano, Hiroshi | Koden Techno Info K.K. |
| TGbe (PHY) | 7/13 | Mehrnoush, Morteza | Facebook |
| TGbe (PHY) | 7/13 | MELZER, Ezer | Toga Networks, a Huawei company |
| TGbe (PHY) | 7/13 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 7/13 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 7/13 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Murphy, Rick | vLogic, Inc. |
| TGbe (PHY) | 7/13 | Nakano, Takayuki | Panasonic Corporation |
| TGbe (PHY) | 7/13 | Nam, Junyoung | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 7/13 | Oh, Hyun Seo | Electronics and Telecommunications Research Institute (ETRI) |
| TGbe (PHY) | 7/13 | Ozbakis, Basak | VESTEL |
| TGbe (PHY) | 7/13 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 7/13 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 7/13 | Perahia, Eldad | Hewlett Packard Enterprise |
| TGbe (PHY) | 7/13 | Pirhonen, Riku | Self |
| TGbe (PHY) | 7/13 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Prabhakaran, Dinakar | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Pulikkoonattu, Rethnakaran | Broadcom Corporation |
| TGbe (PHY) | 7/13 | QIU, WEI | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Ramesh, Sridhar | Maxlinear |
| TGbe (PHY) | 7/13 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 7/13 | Regev, Dror | Toga Networks (a Huawei Company) |
| TGbe (PHY) | 7/13 | REICH, MOR | Togan Networks, a Huawei Company |
| TGbe (PHY) | 7/13 | Rezk, Meriam | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Roy, Sayak | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Sato, Naotaka | Sony Corporation |
| TGbe (PHY) | 7/13 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 7/13 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 7/13 | Srinivasa, Sudhir | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Stavridis, Athanasios | Ericsson AB |
| TGbe (PHY) | 7/13 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | SU, HONGJIA | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 7/13 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/13 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 7/13 | Tan, Danny | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Tian, Tao | Unisoc Comm. |
| TGbe (PHY) | 7/13 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/13 | Uln, Kiran | Cypress Semiconductor Corporation |
| TGbe (PHY) | 7/13 | Urabe, Yoshio | Panasonic Corporation |
| TGbe (PHY) | 7/13 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 7/13 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Ward, Lisa | Rohde & Schwarz |
| TGbe (PHY) | 7/13 | Wendt, Matthias | Signify |
| TGbe (PHY) | 7/13 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | Wu, Tianyu | Apple Inc. |
| TGbe (PHY) | 7/13 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Xue, Ruifeng | Cisco Systems, Inc. |
| TGbe (PHY) | 7/13 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 7/13 | Yang, Lin | Qualcomm Incorporated |
| TGbe (PHY) | 7/13 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 7/13 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 7/13 | Yang, Xun | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 7/13 | Yu, Heejung | Korea University |
| TGbe (PHY) | 7/13 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/13 | Yu, Mao | NXP Semiconductors |
| TGbe (PHY) | 7/13 | ZEGRAR, Salah Eddine | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 7/13 | Zeng, Ruochen | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Zhang, Hongyuan | NXP Semiconductors |
| TGbe (PHY) | 7/13 | ZHANG, JIAYIN | HUAWEI |
| TGbe (PHY) | 7/13 | Zhang, Yan | NXP Semiconductors |
| TGbe (PHY) | 7/13 | Zheng, Xiayu | NXP Semiconductors |

**Straw Polls**

1. **SPs from 960r1 – Eunsung Park (LG Electronics)**

SP#1: SP3 in 960r1

* **Which option do you agree with for the BW field?**
  + Option 1: no 240/160+80MHz entry
  + Option 2: one 240/160+80MHz entry
  + Note: It is not intended for SFD

Op1/Op2/A: 31/40/13

**Discussions on SP:**

C: Prefer option 1. 240MHz can be punctured from 320MHz. There are three different punctured cases for 240MHz. For option 2 how to indicate the punctured case for 320MHz?

A: Agree that 240MHz can be punctured from 320MHz and can be indicated by the puncturing pattern.

C: Several concerns. One is how to design signaling puncture pattern?

A: Puncture pattern field is needed and before design the puncture pattern, the BW field need to be determined.

C: Prefer Option 2. It’s dedicated for static case. In SFD, there are already some definitions related to 240MHz.

C: Prefer Option 2. People prefer Option 1 need to bring up detailed design.

C: For option 2, is 160+80 within 320MHz?

A: it includes three cases possible and the puncture pattern can be indicated.

C: 160+80MHz can be used as enhancement to 11ax, when there is no 320MHz. Do we want to have the 160+80MHz mode?

A: In 11ax we have 80+80MHz, but in 11be maybe MLO will handle it.

C: Not sure whether MLO will support 80+80MHz and need to think about it.

SP#2: SP6 in 960r1

* **Do you agree that a separate phase rotation / EHT-STF / EHT-LTF sequence is defined in each 240/160+80 MHz and 320/160+160 MHz transmission?**
  + It is not intended for SFD

SP result: Y/N/A: 24/47/16

C: Unless we define the 240 transmission, the separate sequence definition is not reasonable.

C: The existing 320MHz can be reused, and the 80MHz segment can be punctured.

A: The PAPR can be optimized for 240MHz, and separated sequences may have some advantage.

C: Prefer to see some results for PAPR.

1. **SPs from 930r3 – Dongguk Lim (LG Electronics)**

SP#3: SP3 in 930r3

* **Do you agree that the user field in EHT PPDU that is sent to multiple user includes the subfield that indicates the number of spatial streams for each user.** 
  + For MU-MIMO allocation
    - Spatial Configuration
      * Indicates the number of spatial streams for a user in MU-MIMO allocation
  + For non-MU-MIMO allocation
    - NSTS

SP result: Y/N/A: 71/1/12

SP#4: SP4 in 930r3

* **Do you agree that the Nsts subfield of user field for non-MU-MIMO allocation consist of four bits and can indicate 1 to 16 streams consists of 4bits?**

SP result: Y/N/A: 72/0/11

SP#5: SP5 in 930r3

* **Do you agree that the spatial configuration subfield of user field for MU-MIMO allocation consists of 6bits?**

C: Have we agreed how this 6bits are encoded?

A: The details are on slides 17-19.

C: Could you please defer it and it may relate with RU allocation?

A: This table is not related with signalling of RU allocation field and would like to run it.

SP result: Y/N/A: 59/10/11

SP#6: SP6 in 930r3

* **Do you agree that the spatial configuration subfield is defined as described in slide 17~19 of 20/0930r3?**

SP result: Y/N/A: 46/0/30

**Adjourn**

The meeting is adjourned at 21:00 PM ET

**Monday July 20th, 2020 10:00 – 13:00 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 11-20/0927r10
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. Discussions on the agenda.
   * [970r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0970-00-00be-multi-ru-indication-in-ru-allocation-subfield.pptx) Multi-RU indication in RU allocation subfield (Ross Jian Yu)
   * [985r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0985-00-00be-ru-allocation-subfield-design-in-eht-sig-follow-up.pptx) RU Allocation Subfield Design in EHT-SIG Follow up (Myeongjin Kim)
   * [971r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0971-00-00be-spoofing-indication-in-eht-sig.pptx) Spoofing indication in EHT-SIG (Mengshi Hu)
   * [1027r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1027-00-00be-indication-of-large-size-ru-combinations.pptx) Indication of large-size RU combinations (Lei Huang)
   * [1102r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1102-00-00be-zero-user-rus-for-per-80mhz-resource-unit-allocation-signaling.pptx) Zero User RUs for Per-80MHz Resource Unit Allocation Signaling. (Jianhan Liu)
   * [798r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0798-04-00be-signaling-of-ru-allocation-follow-up.pptx) Signaling of RU allocation follow-up (Dongguk Lim) [4 SPs]
   * [839r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0839-02-00be-management-of-ru-allocation-field.pptx) Management of RU allocation field (Dongguk Lim) [3 SPs]
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| TGbe (PHY) | 7/20 | Abushattal, Abdelrahman | Istanbul Medipol university ;Vestel |
| TGbe (PHY) | 7/20 | An, Song-Haur | INDEPENDENT |
| TGbe (PHY) | 7/20 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 7/20 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 7/20 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 7/20 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 7/20 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 7/20 | Dogukan, Ali | Vestel |
| TGbe (PHY) | 7/20 | Doostnejad, Roya | Intel Corporation |
| TGbe (PHY) | 7/20 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 7/20 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 7/20 | Handte, Thomas | Sony Corporation |
| TGbe (PHY) | 7/20 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 7/20 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 7/20 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 7/20 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 7/20 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 7/20 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 7/20 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 7/20 | Koc, Onur | VESTEL ELEKTRONIK SANAYI VE TICARET ANONIM SIRKETI |
| TGbe (PHY) | 7/20 | Levitsky, Ilya | IITP RAS |
| TGbe (PHY) | 7/20 | Liang, dandan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/20 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 7/20 | Lindskog, Erik | SAMSUNG |
| TGbe (PHY) | 7/20 | Liu, Jianfei | HUAWEI |
| TGbe (PHY) | 7/20 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 7/20 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 7/20 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 7/20 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 7/20 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 7/20 | Ozbakis, Basak | VESTEL |
| TGbe (PHY) | 7/20 | OZDEN ZENGIN, OZLEM | VESTEL |
| TGbe (PHY) | 7/20 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 7/20 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 7/20 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 7/20 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 7/20 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 7/20 | Roy, Sayak | NXP Semiconductors |
| TGbe (PHY) | 7/20 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 7/20 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 7/20 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 7/20 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 7/20 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/20 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 7/20 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 7/20 | Tian, Tao | Unisoc Comm. |
| TGbe (PHY) | 7/20 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 7/20 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 7/20 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 7/20 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 7/20 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 7/20 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 7/20 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/20 | Yu, Mao | NXP Semiconductors |
| TGbe (PHY) | 7/20 | ZEGRAR, Salah Eddine | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 7/20 | Zhang, Yan | NXP Semiconductors |

**New Submissions**

1. **11-20-0970r0 – Multi-RU indication in RU allocation subfield –** Ross Jian Yu (Huawei)

**Summary:** Proposal on indication methods for single RU zero user field cases and large multi-RU cases.

**Discussion:**

C: Slide 2, in 240MHz transmission, for 2x996, there are 2 locations (80MHz 1&2 or 2&3). May need more entries to signal.

A: Need more discussion for this case.

C: Slide 8, there can be multiple options to signal one case, treat it as single RU or multi-RU. Prefer to only have one signaling.

A: Consider making one option mandatory.

C: Slide 5, the cons for opt 2 are also there for opt1. Don’t seem extra benefits from opt 1.

A: There are some additional information provided with entries of 484/996/2x996(0) such as pilot tone locations.

SP deferred till other related contributions discussed.

1. **11-20-0985r0 – RU Allocation Subfield Design in EHT-SIG Follow up –** Myeongjin Kim (Samsung)

**Summary:** Proposal on indication of MRU combinations and entries to signal zeros users.

**Discussion:**

C: Slide 5, are you propose to use different RU allocation table for different BW?

A: As shown in the appendix, we can use one table.

C: The content of some entries are different for different BWs.

A: Yes, what is the problem with two tables?

C: Efficiency is affected by two tables.

A: One table need 9 bits, two tables conditioned on BW has same number of total entries but only need 8 bits.

SP deferred till other related contributions discussed.

1. **11-20-0971r0 – Spoofing Indication in EHT-SIG –** Mengshi Hu (Huawei)

**Summary:** Proposed spoofing signaling methods to save EHT-SIG overhead.

**Discussion:**

C: Slide 7, spoofing signaling may have different number of pilot tones. For example RU996 has different pilot tones from two RU484.

SP deferred till other related contributions discussed.

1. **11-20-1027r1 – Indication of Large-Size RU Combinations –** Lei Huang (Panasonic)

**Summary:** Proposed some change in RU allocation table for large size RU combination.

**Discussion:**

C: Do you consider load balancing in your design?

A: Load balancing can be supported. For example: 242+484 with 2 users on CC1 and 242+484 with another 2 users on CC2.

C: HE SIG B design is over complicated. Processing of the RU allocation is time sensitive and processed by hardware. Prefer to have simple logic for RU assignment. With 9 bits table we can simply include all the possible cases.

SP deferred till other related contributions discussed.

1. **11-20-1102r0 – Zero User RUs for Per-80MHz Resource Unit Allocation Signaling –** Jianhan Liu (Mediatek)

**Summary:** Proposed use zero user RU allocation to signal frequency segments that the intended user is not parked on to save EHT-SIG overhead.

**Discussion:**

C: For MU-MIMO case, the user field and dummy user field need to keep the order?

A: Yes.

C: May not need dummy users.

A: Do not want to exclude this implementation choice.

SP deferred till other related contributions discussed.

**Straw Polls**

1. **SPs from 798r4 – Dongguk Lim (LG Electronics)**

SP#1: SP1 in 798r4 (Updated SP text in 798r5)

* **Do you agree that no entry in the RU allocation subfield table is defined for 4x996 RU? ~~if a Common field is present in a 320 MHz or 160+160 MHz PPDU sent to multiple users, a 4×996 tone RU is not permitted.~~**
  + **~~none are defined in RU allocation subfield for 4x996 tone RU.~~**

SP result: Y/N/A: 40/0/6

**Discussions on SP:**

C: I don’t think we need to run this SP for not permitting a RU allocation. It is not in the baseline table. If anyone want to add an allocation, a SP is needed.

C: 4x996 is full BW transmission, do you refer to compression mode or non-compressed mode?

C: Suggest SP text: “Do you agree that the non-OFDMA PPDU shall only be transmitted using the compressed mode”

A: We did not define compressed mode in 11be yet.

C: Suggest “No entry is defined in the RU allocation table for 4x996 RU”.

SP#2: SP2 in 798r4

* **Do you agree that the RU allocation subfield includes entries to indicate the ‘Zero user field’ for RUs larger than 242 tone RU?** 
  + **The size of RU for the zero user field is TBD.**

SP withdrawn.

**Discussions on SP:**

C: We have a number of proposals on this topic today. How about we go to the detailed proposals.

A: Withdraw the SP.

SP#3: SP3 in 798r4

* **Do you agree with applying the following to the 11be SFD?**
  + **the RUs equal to or larger than 996-tone RU are referred to by two consecutive RU Allocation subfields per EHT-SIG content channel.**
  + **For the RUs equal to or larger than 996-tone RU, first RU allocation subfield in each EHT-SIG content channel indicates the number of User fields signaled in the corresponding content channel, while the second RU Allocation subfield in the same EHT-SIG content channel indicates the zero additional User fields in the User Specific field.**

SP deferred.

**Discussions on SP:**

C: For 2x996RU, how can it be indicated by 2 RU allocation subfield? If SST is not used, how many RU allocation subfield is needed for 320MHz?

A: Need to generalize the SP text. We can defer the SP to work on the text offline.

SP#4: SP4 in 798r4

* **Do you agree that the RU allocation subfield of EHT-SIG field consists of 9bits?** 
  + **Detail for construction of RU allocation subfield is TBD.**

SP deferred.

**Discussions on SP:**

C: In today’s contributions, there are proposals to use 8 or even 7 bits. It’s better to decide the signaling method first.

A: I will defer the SP.

C: How about you provide two options of 9 and 8 bits for RU allocation subfield.

C: I think it is still premature to make the decision.

1. **SPs from 839r2 – Dongguk Lim (LG Electronics)**

SP#5: SP1 in 839r2

* **Do you agree that the specific 80MHz segment on which a STA is parked using SST operation includes the STA’s allocated RU?** 
  + **Other scenarios are TBD**

SP deferred.

**Discussions on SP:**

C: Does AP always need to include the STA parked on the 80MHz segment? I think it’s not always scheduled.

A: Add some text like “when scheduled”

C: This SP is too restricted for STAs allocated on wide BW such as 996+484. SST may not be mandatory.

C: Are you saying if STA park on one 80MHz segment, STA must have one RU on this 80MHz segment or only have RU allocated on this 80MHz segment?

A: Intention is at least one RU is allocated on the parked 80MHz segment.

A: I will defer this SP.

SP2 in 839r2 withdrawn.

SP#6: SP3 in 839r2

* **Do you agree that the number of RU allocation subfields, when present, in a common field in the EHT-SIG field of EHT PPDU sent to multiple users is 4 and 8 in each content channel for 160MHz and 320MHz PPDU, respectively?**

SP result: Y/N/A: 42/0/4

**Discussions on SP:**

C: Add “when present” after “RU allocation subfields”

C: Add “in each content channel”

C: 160MHz transmission can be done in different way. Should connect to BW. Add BW or PPDU.

1. **SPs from 1102r0 – Jianhan Liu (Mediatek)**

SP#7: SP1 in 1102r0

* + **Do you agree to add zero user RU484 and zero user RU996 to 11be RU allocation subfield table?**
    - **~~Note use zero user RU can be used in the RU allocation field for the users operates on other 80MHz sub-channels in OFDMA.~~**

SP deferred.

**Discussions on SP:**

C: I have concern on the note.

A: Remove the note.

C: Need to clarify zero user RU and empty RU. If zero user and empty are different, we need 242/484 zero user.

**Adjourn**

The meeting is adjourned at 13:00 PM ET

**Thursday July 23rd, 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 11-20/0927r12
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. Discussions on the agenda.
   1. [970r4](https://mentor.ieee.org/802.11/dcn/19/11-19-0970-04-00az-pasn-state1a-related-text.docx) Multi-RU indication in RU allocation subfield (Ross Jian Yu) [6 SPs]
   2. [985r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0985-00-00be-ru-allocation-subfield-design-in-eht-sig-follow-up.pptx) RU Allocation Subfield Design in EHT-SIG Follow up (Myeongjin Kim) [4 SPs]
   3. [971r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0971-00-00be-spoofing-indication-in-eht-sig.pptx) Spoofing indication in EHT-SIG (Mengshi Hu) [1 SP]
   4. [1027r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1027-00-00be-indication-of-large-size-ru-combinations.pptx) Indication of large-size RU combinations (Lei Huang) [3 SPs]
   5. [1102r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1102-00-00be-zero-user-rus-for-per-80mhz-resource-unit-allocation-signaling.pptx) Zero User RUs for Per-80MHz RU Allocation Signaling (Jianhan Liu) [1 SP]
   6. [783r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0783-02-00be-eht-sig-compression-format.pptx) EHT sig compression format (Yujian Ross) [SP2]
   7. [959r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0959-00-00be-thoughts-on-u-sig-contents.pptx) Thoughts on U-SIG Contents (Wook Bong Lee)
   8. [969r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0969-01-00be-bandwidth-indication-for-eht-ppdu.pptx) Bandwidth Indication for EHT PPDU (Ross Jian Yu)
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| TGbe (PHY) | 7/23 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 7/23 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 7/23 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 7/23 | Chen, Xiaogang | Intel |
| TGbe (PHY) | 7/23 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 7/23 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 7/23 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 7/23 | Erceg, Vinko | Broadcom Corporation |
| TGbe (PHY) | 7/23 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 7/23 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| TGbe (PHY) | 7/23 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 7/23 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 7/23 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 7/23 | Jia, Jia | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/23 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 7/23 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 7/23 | Kedem, Oren | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/23 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 7/23 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Koc, Onur | VESTEL ELEKTRONIK SANAYI VE TICARET ANONIM SIRKETI |
| TGbe (PHY) | 7/23 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 7/23 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 7/23 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 7/23 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 7/23 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 7/23 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 7/23 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 7/23 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 7/23 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 7/23 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 7/23 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 7/23 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 7/23 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 7/23 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 7/23 | Shellhammer, Stephen | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 7/23 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/23 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 7/23 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/23 | Uln, Kiran | Cypress Semiconductor Corporation |
| TGbe (PHY) | 7/23 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 7/23 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Wang, Yi-Hsiu | Zeku |
| TGbe (PHY) | 7/23 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 7/23 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 7/23 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/23 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 7/23 | yi, yongjiang | Futurewei Technologies |
| TGbe (PHY) | 7/23 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 7/23 | Zhang, John | GuangDong OPPO Mobile Telecommunications Corp., Ltd. |
| TGbe (PHY) | 7/23 | Zhang, Yan | NXP Semiconductors |

**Straw Polls**

1. **SPs from 1102r0 – Jianhan Liu (Mediatek)**

SP#1: Modified SP1 in 1102r0. Refer to 1102r1.

* + **Do you agree to add ~~zero user RU484 and~~ zero user RU996 to 11be RU allocation subfield?**
    - **~~Note use zero user RU can be used in the RU allocation field for the users operates on other 80MHz sub-channels in OFDMA.~~**

SP result: Y/N/A: 39/0/3

**Discussions on SP:**

C: The SP1 in 970r0 and SP3 in 985r3 are similar should discuss together.

A: Prefer to run one by one.

C: Can you separately run 484 and 996 cases?

A: Run 996 first then 484.

SP#2: Modified SP1 in 1102r0. Refer to 1102r1.

* + **Do you agree to add zero user RU484 to 11be RU allocation subfield?**
    - **Note: Multi-RU case is TBD**

SP result: Y/N/A: 39/1/1

**Discussions on SP:**

C: Can you add MRU case TBD?

A: This is not related to MRU. But I can add it.

1. **SPs from 970r0 – Ross Yu Jian (Huawei)**

SP#3: SP1 from 970r0. See 970r1, SP1.

* **Do you agree to add the following rows to the RU allocation table?**
  + **484-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield** 
    - **Note: multi-RU is TBD**
  + **996-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield**

|  |  |  |
| --- | --- | --- |
| TBD | 484-tone RU; contributes zero User fields to the User Specific field in the  same EHT-SIG content channel as this RU Allocation subfield | 1 |
| TBD | 996-tone RU; contributes zero User fields to the User Specific field in the  same EHT-SIG content channel as this RU Allocation subfield | 1 |

SP result: Y/N/A: 39/1/2

(Added 4 votes from bridge from people can’t vote in the system.)

**Discussions on SP:**

C: Some modification on SP text. Add same note for multi-RU case for 484-tone RU.

1. **SPs from 985r0 – Myeongjin Kim (Samsung)**

SP1 and SP2 deferred after 240MHz discussions.

SP3 deferred.

SP#4: SP4 from 985r0.

* **~~Do you agree to add the following text to the TGbe SFD?~~**
  + ~~The RU Allocation subfield corresponding to RU484 or RU242 in large-size MRU combinations of 484+242, 996+484, 2×996+484, and 3×996+484 is set to x (TBD) to indicate the zero users.~~ 
    - ~~x is a value corresponding to the entry of ‘242-tone RU or 484-tone RU; contributes zero User fields to the User Specific field’ in RU Allocation subfield table.~~
  + ~~The RU Allocation subfield corresponding to RU996 in large-size MRU combinations of 996+484, 2×996+484, 3×996+484, 3×996, and 2×996 is set to y to indicate the zero users.~~ 
    - ~~y is a value corresponding to the entry of ‘996-tone RU; contributes zero User fields to the User Specific field’ in RU Allocation subfield table.~~

**Do you agree to:**

* **Add an entry in the RU allocation table to indicate that RU242 is punctured**
* **Modify the existing entry “RU242 empty (with zero user)” to “RU242; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield and is not punctured”.**

SP result: Y/N/A: 12/13/18

**Discussions on SP:**

C: Entry of ‘242-tone RU or 484-tone RU’ is not passed yet.

A: We can only run 2nd bullet if this is the only reason.

C: We should decide how to indicate multi-RU first and defer this one.

C: You concern is the pilot, can you just run a high level SP?

A: Good suggestion. Change to “Do you agree that 242 tone RU empty (with zero users) is the only way to indicate no signal is transmitted in the RU?”

C: This SP is confusion. If you want a different entry for punctured case, suggest to be more specific.

C: Change to “Do you agree to add an entry in the RU allocation table to indicate 242RU zero users without puncturing?”

C: Change to:

Do you agree to:

* Add an entry in the RU allocation table to indicate that RU242 is punctured
* Modify the existing entry “RU242 empty (with zero user)” to “RU242; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield and is not punctured”.

C: We should have more discussion on it before adding this entry.

1. **More SPs from 970r0 – Ross Yu Jian (Huawei)**

SP2 deferred.

SP#5: SP3 from 970r0.

* **Which option do you prefer for 240MHz OFDMA transmission?**
  + ~~Opt1: Assuming 1~~~~st~~ ~~80+2~~~~nd~~ ~~80 or 2~~~~nd~~ ~~80+3~~~~rd~~ ~~80 can both support 996+484, then 8 cases~~
  + ~~Opt2: Assuming only one of the two above cases can support 996+484 (within a specific 240MHz transmission), 4 cases~~
  + ~~Opt1: 996+484 is supported in two consecutive 80MHz segment that cross two 160MHz channels~~
  + ~~Opt2: 996+484 is not supported in two consecutive 80MHz segment that cross two 160MHz channels~~
  + ~~Abs~~
  + ~~Note: not for SFD~~
  + 996+484 is not supported in two contiguous 80MHz segments that cross two 160MHz channels

SP result: Y/N/A: 30/4/6

**Discussions on SP:**

C: Support means hardware capability or in one BSS given channel condition?

A: Even for hardware there will be difference.

C: Suggest: “Opt1: 996+484 is supported in two consecutive 80MHz segment that cross two 160MHz channels” and Opt2 not supported.

C: The SFD already agrees with Opt1.

C: SFD also says no mask for 240MHz and seems conflict with opt1. Need to modify SFD.

A: I will just run Opt2 to see the support.

SP#6: SP4 from 970r0.

* **Which option do you prefer for RU 2\*996+484 in a 240MHz OFDMA transmission?**
  + Opt1: Assuming 2\*996 must be contiguous, then 4 cases
  + Opt2: Assuming 2\*996 can also be non-contiguous, 6 cases
  + Abs
  + Note: not for SFD

SP result: Opt1/Opt2/A: 10/21/7

(Include one abstain from bridge.)

**Discussions on SP:**

C: IMO, 2x996 is always 160MHz contiguous. Should be opt1.

C: There are other contributions better cover this topic. Can we defer this SP?

C: There are already in SFD that there are 6 cases for non-OFDMA.

A: Do you assume it should be same for non-OFDMA and OFDMA?

C: 2x996 can be non-contiguous, if it is always contiguous, why not call it RU1992.

Skip SP5 and SP6.

1. **SPs from 971r0 – Mengshi Hu (Huawei)**

SP1 from 971r0.

* **Do you agree that the RU Allocation subfields in different segments corresponding to a same 20MHz can be different?**
* **~~The RU Allocation subfields in each segment only need to reflect the practical allocation of the users parked on that segment~~**
* **~~The RU Allocation subfields may not need to reflect the practical allocation of the whole bandwidth~~**

**Discussions on SP:**

C: We can support if sub-bullets are removed.

C: This SP does not bring us new information. It’s obvious different segment can have different content. Prefer to skip this SP.

SP skipped.

1. **SPs from 1027r1 – Lei Huang (Panasonic)**

SP#7: SP3 from 1027r1.

* **Do you agree to make the following change in the baseline RU allocation table in 11be SFD for RU484+2\*RU996, 3\*RU996 and RU484+3\*RU996?**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **B7….B1B0** | **#1** | **#2** | **#3** | **#4** | **#5** | **#6** | **#7** | **#8** | **#9** | **# of Entries** |
| TBD | 484+2\*996 | | | | | | | | | 8 |
| TBD | 3\*996 | | | | | | | | | 8 |
| TBD | 484+3\*996 | | | | | | | | | 8 |

SP result: Y/N/A: 9/25/2

**Discussions on SP:**

C: The merit of this solution is saving the overhead. Only 8 entries instead of 64 entries for 484+3x996.

C: You need to do analysis to find out the RU allocation location right?

A: Even in 11ax, you need to find where is RU484.

C: In 11ax, it’s easy to find. But for 484+2x996 you don’t know which 484 is missing.

C: Do you have ambiguity for per 80MHz segment signaling?

A: I think it still works.

1. **SPs from 783r3 – Ross Jian Yu (Huawei)**

SP#8: SP2 from 783r3.

* **~~Do you agree that the number of EHT-SIG symbols field always exist in U-SIG of a PPDU transmitted to multiple users?~~**
  + ~~The field is not reinterpreted as the number of MU-MIMO users~~
* **Do you agree that the number of EHT-SIG symbols field always exist in U-SIG of a PPDU that is not a EHT TB PPDU?**
  + The field is not reinterpreted as the number of MU-MIMO users

SP result: Y/N/A: 36/0/3

**Discussions on SP:**

C: There will be another field indicating number of MU-MIMO users?

A: Yes. May change the SP to say use another field to indicate number of MU-MIMO users for compressed mode.

C: What about for single user? Can you delete “to multiple users?”

A: If the group prefer unified format for PPDU to single and multiple STAs.

C: Should exclude TB PPDU.

C: Where to put the number of users in compression mode?

A: EHT SIG common field.

SP#9: SP1 from 783r3.

* **Do you agree that the bitwidth of number of EHT-SIG symbols field is 5 ~~if it exists~~ in U-SIG of a PPDU that is not a EHT TB PPDU?**

SP result: Y/N/A: 34/0/5

**Discussions on SP:**

C: Some SP text modification.

**New Submissions**

1. **11-20-0959r0 – Thoughts on U-SIG Contents –** Wook Bong Lee (Samsung)

**Summary:** Proposal to define a number of U-SIG fields.

**Discussion:**

C: TXOP field in 11ax is hard to use. Put it in version independent field will exist for generations. Better make it more useful (10 bits maybe).

A: I can defer the number bits for TXOP field.

C: We need to consider ER SU PPDU especially for 6GHz LPI channel.

A: The question is do we need a PPDU type U-SIG for it. It will be too late to indicate since it relies on repetition. Repetition of U-SIG itself can indicate this is ER SU PPDU. I can defer the bits for PPDU type field.

SP1, SP2, SP3 deferred.

SP#10: SP4 from 959r0.

* **Do you support to modify SFD text as follows?**
  + **The format of the EHT MU PPDU ~~A PPDU that is sent to multiple user~~ is configured as follow:**
    - **L-STF, L-LTF, L-SIG, RL-SIG, U-SIG, EHT-SIG, EHT-STF, EHT-LTF, DATA, PE**
    - **Additional fields are TBD**

****

* + - **Note: This PPDU format is used for 802.11be PPDU transmitted to a single user or multiple users. There is no EHT SU PPDU.**
    - **There are two modes in the EHT MU PPDU.**
      * **Compressed mode:**
        + **Non-OFDMA**
        + **No RU Allocation subfield in the Common field of the EHT-SIG.**
      * **Non-compressed mode:**
        + **OFDMA**
        + **RU Allocation subfield(s) in the Common field of the EHT-SIG.**

SP result: Y/N/A: 35/0/2

**Discussions on SP:**

C: “MU” PPDU is confusion since it can be sent to single user.

A: How about EHT PPDU since this is a regular PPDU.

C: Strongly suggest put something between EHT and PPDU since EHT PPDU is a more general term.

A: Use EHT MU PPDU for now and think a better name later.

SP#11: SP5 from 959r0.

* **Do you support to modify SFD text as follows?**
  + **The format of the EHT TB PPDU is configured as follow:**
    - **L-STF, L-LTF, L-SIG, RL-SIG, U-SIG, ~~EHT-SIG,~~ EHT-STF, EHT-LTF, DATA, PE**
    - **Additional fields are TBD**

****

* + - **Note: This format is used for a transmission that is a response to a triggering frame from an AP.**

SP result: Y/N/A: 35/1/1

**Discussions on SP:**

C: There should be no EHT-SIG in the first sub bullet.

A: Yes. Should be deleted.

1. **11-20-0969r0 – Bandwidth Indication for EHT PPDU –** Ross Jian Yu (Huawei)

**Summary:** Proposal on how to signal the BW in different frequency segments within one PPDU.

**Discussion:**

C: The BW field is not combined with puncture field right?

A: Right, separate fields.

C: Is it in Version independent or version dependent field?

A: Version independent.

C: Opt2 will has some problem on LTF sequences. How to transmit if BW are different?

A: Not in favor of opt2 but each segment can use 80MHz sequences.

C: Some comments on change the SP text.

SP#12: SP1 from 969r2.

* **~~Do you agree to add the following text in the TGbe SFD:~~**
  + ~~Within one EHT non-TB PPDU, BW field in U-SIG shall be the same across different segments. The BW field indicates the PPDU BW.~~
* **Do you agree to add the following text in the TGbe SFD:**
  + Within one EHT PPDU, BW field in U-SIG shall indicate the same PPDU bandwidth across different 80MHz segments.

SP result: Y/N/A: 37/0/4

**Adjourn**

The meeting is adjourned at 22:00 PM ET

**Monday July 27th, 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 11-20/0927r13
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. Towards TGbe D0.1 Draft – Status and Updates [~30 mins]
   1. [997r6](https://mentor.ieee.org/802.11/dcn/20/11-20-0997-04-00be-tgbe-spec-text-volunteers-and-status.docx) TGbe spec text volunteers and status (PHY rows)
5. Technical Submissions:
   1. [961r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0961-00-00be-pilot-mapping-and-sequences-for-data-section-in-11be.pptx) Pilot mapping and sequences for data section in 11be (Jinyoung Chun)
   2. [962r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0962-03-00be-1x-eht-ltf-sequence.pptx) 1x EHT LTF sequence (Jinyoung Chun)
   3. [978r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0978-01-00be-1x-eht-ltf-sequences-design.pptx) 1x EHT-LTF Sequences Design (Dandan Liang)
   4. [986r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0986-00-00be-dcm-for-range-extension-in-6ghz-lpi-band.pptx) DCM for range extension in 6GHz LPI band (Jianhan Liu)
   5. [965r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0965-01-00be-6ghz-lpi-range-extension.pptx) 6GHz LPI Range Extension (Ron Porat)
   6. [1135r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1135-00-00be-papr-issues-for-eht-er-su-ppdu.pptx) PAPR issues for EHT ER SU PPDU (Eunsung Park)
   7. [1119r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1119-00-00be-remaining-tbds-for-dcm.pptx) Remaining TBDs for DCM (Bin Tian)
6. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Tianyu Wu (Apple) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| TGbe (PHY) | 7/27 | An, Song-Haur | INDEPENDENT |
| TGbe (PHY) | 7/27 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 7/27 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 7/27 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | Bims, Harry | Bims Laboratories, Inc. |
| TGbe (PHY) | 7/27 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 7/27 | Cheng, Paul | MediaTek Inc. |
| TGbe (PHY) | 7/27 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 7/27 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 7/27 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 7/27 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 7/27 | Grandhe, Niranjan | NXP Semiconductors |
| TGbe (PHY) | 7/27 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 7/27 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 7/27 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 7/27 | Jia, Jia | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/27 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 7/27 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 7/27 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 7/27 | Lansford, James | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 7/27 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 7/27 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 7/27 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 7/27 | Minotani, Jun | Panasonic Corporation |
| TGbe (PHY) | 7/27 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 7/27 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 7/27 | Nakano, Takayuki | Panasonic Corporation |
| TGbe (PHY) | 7/27 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 7/27 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 7/27 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 7/27 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 7/27 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 7/27 | Pulikkoonattu, Rethnakaran | Broadcom Corporation |
| TGbe (PHY) | 7/27 | Ramesh, Sridhar | Maxlinear |
| TGbe (PHY) | 7/27 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 7/27 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 7/27 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 7/27 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 7/27 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/27 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 7/27 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 7/27 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | Wang, Yi-Hsiu | Zeku |
| TGbe (PHY) | 7/27 | Ward, Lisa | Rohde & Schwarz |
| TGbe (PHY) | 7/27 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 7/27 | Wu, Tianyu | Apple Inc. |
| TGbe (PHY) | 7/27 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/27 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 7/27 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 7/27 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 7/27 | yi, yongjiang | Futurewei Technologies |
| TGbe (PHY) | 7/27 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 7/27 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 7/27 | Yu, Mao | NXP Semiconductors |
| TGbe (PHY) | 7/27 | Zhang, John | GuangDong OPPO Mobile Telecommunications Corp., Ltd. |
| TGbe (PHY) | 7/27 | Zhang, Yan | NXP Semiconductors |

**Towards TGbe D0.1 Draft**

1. [997r6](https://mentor.ieee.org/802.11/dcn/20/11-20-0997-04-00be-tgbe-spec-text-volunteers-and-status.docx) TGbe spec text volunteers and status (PHY rows)

**Discussions**

C: PHY list is mainly based on sections, not features, most of the sections will be needed for R1 features but people can also write R2 features into it.

C: Suggest give PoC of each topic some time to check the motions and determine R1/R2 of the motions. Need a deadline for that.

AI: PoC complete the last column of the motion list and clarify an initial R1/R2 label for each motion (or a set of covered SPs in the motion) before Thursday joint meeting and send to Tianyu Wu.

**New Submissions**

1. **11-20-0961r0 – Pilot mapping and values for data section in 11be –** Jinyoung Chun (LG)

**Summary:** The contribution defines the pilot mapping and values for data section.

**Discussion:**

No discussion.

SP#1: SP1 in 961r0

* **Do you support that all 802.11be PPDUs use single stream pilots in the data section for SU, DL/UL OFDMA as well as DL/UL MU-MIMO transmissions?**

SP result: Y/N/A: 34/0/3

Include one yes vote from bridge.

**Discussions on SP:**

C: There are also multi-stream pilot in ax.

A: Data section only have single stream pilot.

SP#2: SP2 in 961r0

* **Do you support that 11be pilot values are shifted on pilot tones in the data section from symbol to symbol for each RU, same as 11ax?**

SP result: Y/N/A: 41/0/1

**Discussions on SP:**

C: Is the shift of pilot value start from LTF or from data?

A: I can add “in the data section” for clarification.

C: Suggest also add “same as 11ax”.

SP#3: SP3 in 961r0

* **Do you support to define pilot mapping and values as below in 11be?**
  + **For all size of RUs under 2\*996-tone RU, pilot mapping and values of 11ax are reused.**
  + **For 3\*996-tone RU, pilot mapping and values for 996-tone RU are triplicated**
  + **For 4\*996-tone RU, pilot mapping and values for 2\*996-tone RU are duplicated**
  + **Pilot mapping and values of RU combinations follow each RU’s.**

SP result: Y/N/A: 44/0/2

**Discussions on SP:**

No discussion.

1. **11-20-0962r3 – 1x EHT-LTF sequence –** Jinyoung Chun (LG)

**Summary:** Proposed 1xEHT LTF sequence for 320MHz and 240MHz transmission.

**Discussion:**

No discussions.

SP deferred after related contribution presented.

1. **11-20-0978r1 – 1x EHT-LTF Sequences Design –** Dandan Liang (Huawei)

**Summary:** Proposed alternative 1xEHT LTF sequence design.

**Discussion:**

C: Do you apply Q matrix in your multiple stream simulation?

A: No. Not applied.

SP#4: SP1 from 962r3

* **Do you agree to add the below text in 11be SFD?**
  + **In a 320MHz transmission using 1x EHT-LTF, the 1x EHT-LTF sequence is given as below.**

***EHTLTF*-2036,2036= {*LTF*80MHz\_1st\_1x, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, *LTF*80MHz\_2nd\_1x, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, *LTF*80MHz\_3rd\_1x, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, *LTF*80MHz\_4th\_1x}**

***LTF*80MHz\_1st\_1x = { *LTF*80MHz\_left\_1x, 0, *LTF*80MHz\_right\_1x}**

***LTF*80MHz\_2nd\_1x = { *LTF*80MHz\_left\_1x, 0, *LTF*80MHz\_right\_1x}**

***LTF*80MHz\_3rd\_1x = { -*LTF*80MHz\_left\_1x, 0, -*LTF*80MHz\_right\_1x}**

***LTF*80MHz\_4th\_1x = { -*LTF*80MHz\_left\_1x, 0, -*LTF*80MHz\_right\_1x}**

***LTF*80MHz\_left\_1x and *LTF*80MHz\_right\_1x are used as it is in 11ax.**

SP result: Y/N/A: 34/0/14

**Discussions on SP:**

No discussions.

1. **11-20-0986r0 – DCM for range extension in 6GHz LPI –** Jianhan Liu (Mediatek)

**Summary:** Propose to define DCM+MCS0 for Nss=1 as a MCS in 11be.

**Discussion:**

C: Slide 5, the 3dB for preamble comes from frequency duplication of the preamble. Need extra hardware/complexity for preamble combine.

C: Slide 5: Do you apply DCM to preamble?

A: No, but you may use in EHT SIG.

C: I think DCM can be applied to other PPDU format?

A: Agree. That’s why we put it as a new MCS level. We do not limit that.

C: The proposed format is for SU or can also apply to MU?

A: It’s for SU but DCM+MCS0 can be applied to MU or on a RU. We are open to 1111 structure for EHT-SIG or allow DCM+MCS0 for EHT-SIG.

C: Is it always DCM dup for this PPDU format?

A: Open to it.

C: Is it mandatory or optional?

A: It can be conditional mandatory. If you support 6GHz LPI.

SP#5: SP1 in 986r0

* **Do you agree that DCM+MCS0 for Nss=1 as defined in 11ax is a MCS in 11be?**
* **The detailed MCS # for DCM+MCS0 is TBD.**
* **This is an R1 feature.**

SP result: Y/N/A: 53/0/5

**Discussions on SP:**

C: Clarify this is R1/R2 feature.

1. **11-20-0965r1 – 6GHz LPI Range Extension –** Ron Porat (Broadcom)

**Summary:** Lower SU rate using DUP design is proposed for 11be for improved range of the new LPI spectrum.

**Discussion:**

C: Agree with dup mode PPDU format. May cause some problem on PAPR, need some study.

A: Yes, we are looking into it.

C: Slide 4 the data rate should be 9Mbps instead of 18?

A: It’s duplication of 80MHz with DCM+MCS0. So, it gives half the rate.

SP#: SP1 in 965r1

* **Do you agree to define a DUP mode for non-punctured 80MHz, 160MHz and 320MHz PPDUs transmitted to a single user, limited to {MCS0+DCM, Nss=1}?**
  + **80 DUP = 40 duplicated.**
  + **160 DUP = 80 duplicated.**
  + **320 DUP = 160 duplicated.**
  + **PAPR reduction scheme is TBD.**
  + **For release 1.**

SP Deferred to next week.

**Discussions on SP:**

C: Dup mode in SP is not clear. Can you clarify? There is only one dup mode which is non-HT dup mode. This is not same as you propose right?

A: Updated SP text.

C: Do you mind deferring to next week? There are details such as preamble detection. Need to check.

A: Ok. Also add “PAPR reduction scheme TBD”

C: There are limits to constrained to non-punctured modes. Do you consider that?

A: For LPI mode, it’s allowed to operate and you don’t care about incumbents. So we don’t worry about punctured modes.

C: Do you want to clarify that this mode is limited to LPI? Can you add that in SP?

A: Ok. We can put it in a separate SP. “Do you agree that the mode defined in SP1 is limited to LPI?”

C: This limited to DCM + MCS0 not for other MCS level right?

A: Yes.

1. **11-20-1135r0 – PAPR issues for EHT ER SU PPDU –** Eunsung Park (LG)

**Summary:** The authors propose a method to reduce the PAPR of the data part in EHT ER SU PPDU.Apply phase rotation to half of the duplicated data tones.

**Discussion:**

C: Your simulation shows option 2 is better than BPSK in PAPR, that does not seem correct to me.

A: We can double check the results.

C: We may be more cautious to define a new PPDU format. EHT ER SU PPDU may not be a good name, this name may have some confusion.

C: We also have a contribution with results, can you wait for our contribution before running your SP?

A: Ok.

SP Deferred.

1. **11-20-1119r0 – Remaining TBDs on DCM –** Bin Tian (Qualcomm)

**Summary:** The contributions discussed a number of TBDs for DCM such as RU/MRU size to define DCM, interleaver, BCC per symbol padding etc.

**Discussion:**

C: Slide 4: for RU78, typically we take No DCM case and divide Ncol by 2, then for DCM Ncol will be 18 and DTM will be 2.

A: I don’t have strong opinion.

C: We don’t see any performance difference. It’s nature to have DTM = 2 and Ncol = 18.

C: How about we run both 2 and 3 and see which have more support.

C: We want 3.

SP#6: SP1 in 1119r0.

* **Do you support 11be to define DCM for RU/M-RU size <= 996x2 plus RU 996x3 and 996x4**
  + **This is for R1.**

SP result: Y/N/A: 39/3/5

**Discussions on SP:**

C: Any reason to exclude other MRU such as 996x2+484?

A: This is to cut the number of modes and in LPI channels, puncture is not important.

SP#7: New SP for 1119r1

* + **Which DTM parameter value do you prefer for RU78 with DCM?**
* **DTM = 2**
* **DTM = 3**
* **Abstain**

SP result: Opt1/Opt2/A: 12/18/11

**Discussions on SP:**

C: No performance difference but with DTM=3 we can define one less mode.

SP#8: SP2 in 1119r1

* **Do you agree with the following BCC interleaver and LDPC DTM parameters for DCM**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | NSD | | BCC NCOL | | BCC NROT | | LDPC DTM | |
|  | No DCM | DCM | No DCM | DCM | No DCM | DCM | No DCM | DCM |
| RU78 | 72 | 36 | 18 | **12** | 18 | - | 4 | **3** |
| RU132 | 126 | 63 | 21 | 21 | 31 | - | 6 | 3 |
| RU726 | 702 | 351 | - | - | - | - | 18 | 9 |

* This is for R1.

SP result: Y/N/A: 28/0/12

**Discussions on SP:**

No discussions.

SP#9: SP3 in 1119r1

* **Do you support the following DCM scheme for RU/M-RU size > 80 MHz**
  + **Use segment parser to distribute coded bits to each 80MHz segment**
  + **Within each 80MHz, perform DCM mapping using per 80MHz Nsd\_k, k is the index of 80MHz segment**
  + **This is for R1**

SP result: Y/N/A: 33/0/9

**Discussions on SP:**

No discussions.

SP#10: SP4 in 1119r1

* **Do you support one padding bit is added after 2 x NDBPS coded bit when BCC is used for RU132 with DCM?**
* **This is for R1.**

SP result: Y/N/A: 36/0/6

**Discussions on SP:**

C: Do we start to use RU132 for the MRU?

A: As a group we need to find a name for it. For this SP, we believe everyone understand the meaning.

**Adjourn**

The meeting is adjourned at 22:00 PM ET