IEEE P802.11  
Wireless LANs

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| Minutes 802.11 be PHY ad hoc Telephone Conferences,  July - Sept 2020 | | | | |
| Date: 2020-08-24 | | | | |
| 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
* Aug 3, 2020
* Aug 6, 2020
* Aug 17, 2020
* Aug 24, 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

**Monday Aug 3rd, 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 11-20/0927r16
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. Technical Submissions:
   1. [965r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0965-03-00be-6ghz-lpi-range-extension.pptx) 6GHz LPI Range Extension (Ron Porat, 3SPs)
   2. [1100r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1100-00-00be-discussions-on-eht-non-contigeous-ppdu.pptx) Discussions on EHT non-contigeous PPDU (Rui Cao)
   3. [954r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0954-02-00be-240mhz-transmission.pptx) 240MHz transmission (Xiaogang Chen)
   4. 1138 Large M-RU Table (Ron Porat)
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) | 8/3 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 8/3 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 8/3 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 8/3 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 8/3 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 8/3 | Dong, Xiandong | Xiaomi Inc. |
| TGbe (PHY) | 8/3 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 8/3 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 8/3 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 8/3 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 8/3 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 8/3 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 8/3 | Ji, Chenhe | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/3 | Jiang, Jinjing | Apple, Inc. |
| TGbe (PHY) | 8/3 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 8/3 | Lansford, James | Qualcomm Incorporated |
| TGbe (PHY) | 8/3 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 8/3 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 8/3 | Lindskog, Erik | SAMSUNG |
| TGbe (PHY) | 8/3 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/3 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 8/3 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 8/3 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 8/3 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 8/3 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 8/3 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 8/3 | Roy, Sayak | NXP Semiconductors |
| TGbe (PHY) | 8/3 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 8/3 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 8/3 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/3 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 8/3 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 8/3 | Uln, Kiran | Cypress Semiconductor Corporation |
| TGbe (PHY) | 8/3 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 8/3 | Verenzuela, Daniel | Sony Corporation |
| TGbe (PHY) | 8/3 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 8/3 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 8/3 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 8/3 | Xin, Yan | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/3 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 8/3 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 8/3 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/3 | Yu, Mao | NXP Semiconductors |

**Straw Polls**

1. **SPs from 965r3 – Ron Porat (Broadcom)**

SP#1: SP1 in 965r3.

**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 (RU 484) duplicated**
* **160 DUP = 80 (RU 996) duplicated**
* **320 DUP = 160 (RU 2x996) duplicated**
* **PAPR reduction scheme is TBD**
* **Additional Diversity scheme is TBD.**
* **For rel. 1**

SP result: Y/N/A: 36/0/8

**Discussions on SP:**

C: I have proposal to further improve this problem. Can you wait until I present?

A: We can add “additional diversity TBD”

C: Add (RU484) to first sub bullet.

C: Is the DUP mode limited to MCS0? The concept can be applied to other MCSs.

A: In my mind it’s limited to MCS0. We only define one lower rate.

C: Clarify the text with “(RU996)” and “(2xRU996)”

SP#: SP2 in 965r3.

**Do you agree that duplication in the mode defined in SP #1 is done only on the data tones of the payload portion and that EHT-STF/LTF are based on the total BW?**

* **For 80MHz the ~~80MHz OFDMA~~ STF/LTF sequence ~~is~~ used for 80MHz OFDMA is used**
* **For 160/320MHz the non-OFDMA 160/320 STF/LTF sequence is used**
* **Pilots are the same as pilots for the non-DUP mode of the same BW and using**
* **OFDMA tone plan for 80MHz (16x2 pilots)**
* **Non-OFDMA tone plan for 160/320MHz**
* **Note: pre-EHT modulated fields are TBD**

SP deferred to next meeting.

**Discussions on SP:**

C: Can you add “Note: Pre-EHT modulated fields are TBD”

C: We don’t have OFDMA LTF and non-OFDMA LTF.

A: Change to “for 80MHz LTF sequence used for 80Mhz OFDMA”

C: Why the pilots are same as non-dup mode?

A: It’s easier for the Rx with same pilot location. There is no need to dup the pilot for tracking.

C: Clarify 80MHz Dup.

A: Dup of RU484 with 16pilots. We can add 16x2 pilots.

C: Then the pilots are dup right? Can you wait till next meeting for the SP?

A: Ok.

C: Add STF to the first 2 bullets.

A: Updated.

SP#2: SP3 in 965r3.

**Do you agree that the mode defined in SP #1 is limited to 6GHz?**

* **Note: Whether to further limit this to LPI mode is TBD.**

SP result: Y/N/A: 41/0/9

**Discussions on SP:**

C: In 6GHz, there are two modes, low power mode (LPI mode) and normal power 6GHz. Without low power limitation, this mode may affect incumbent users.

A: For first step we do not want to limit beyond 6GHz. We can further discuss other limitations. There can be different regulatory to define LPI.

C: Can you make a few more options in your SP to include other limits?

A: Opt1 6GHz, Opt2 6GHz LPI.

C: Suggest making LPI limitation in another SP.

C: Add a note that whether to further limit this to LPI mode is TBD.

1. **SPs from 1138r1 – Ron Porat (Broadcom)**

SPs deferred.

**New Submissions**

1. **11-20-1100r0 – Discussions on EHT Non-contiguous PPDU –** Rui Cao (NXP)

**Summary:** Propose that EHT does NOT define PPDU with non-contiguous BW and remove 80+80, 160+80 and 160+160 modes. Leave all non-contiguous cases to MLO.

**Discussion:**

C: Slide 5, I agree with 2 LO, throughput issue. But for 240/160+80 within 320, you can use all antenna and we don’t have LO/throughput issue. We already have some agreements for 160+80.

A: We don’t want to delete 160+80 within 320MHz. Single link 320 with 80MHz punctured is ok.

C: Can you clarify in the SP that 160+80 within 320 is TBD?

A: Yes.

C: Slide 6 text need to clarify to avoid misleading MAC people. “Support different modes” sound like these modes already supported.

C: It’s hard to support 320MHz more SSs with single radio. MLO can’t replace PHY non-contiguous mode.

A: In most common cases, non-contiguous PHY mode is not very useful. Also, it does not achieve radio diversity.

C: With puncturing, you don’t need to have whole P80 available. For STR mode in MLO, some people are still having concerns on it. So, we don’t want to remove PHY non-contiguous mode.

C: Non-contiguous mode is beneficial to the cases where the channel condition is not good and it’s hard to transmit 2SS (or more SSs).

A: We don’t see the operation in 11ac time. And in 11be, we can rely on MLO.

C: Similar concern for 160+80MHz mode. Need to clarify SP text.

A: Will modify SP text.

C: For multi-radio diversity gain on slide 3. If P80 is available, the diversity gain can be achieved.

A: This is from channel access point of view. For non-contiguous PHY, whether S80 can be used rely on status of P80.

SP#3: SP1 in 1100r0

* **Do you agree that 11be does NOT define PPDU with non-contiguous signal bandwidth?**
  + **Non-contiguous signal bandwidth includes 80+80MHz, 160+80MHz or 160+160MHz.**
  + **This does not include punctured modes within 160, 240 or 320MHz BW. ~~160+80 MHz within 320MHz BW~~**
  + **160+80 MHz PPDU is TBD within 320MHz.**

SP result: Y/N/A: 32/16/7

**Discussions on SP:**

C: Update the SP text following the earlier discussions.

C: There are long discussions on MLO in MAC and does not reach many consensuses. MLO may not be mature enough as a proper replacement for non-contiguous PHY.

C: Since this is related to MLO, can you run it in joint session?

A: The earlier comment is not saying this is depend on MLO. This is a pure PHY SP.

C: 80+80 within 240MHz (Punctured 80Mhz in 240) is similar to 160+80 within 320MHz. Should be more general in SP to exclude all punctured modes.

C: We support this SP. 80+80 is proved by 2 generations that it is not very useful. This is not even related to MLO. Also, this SP is not intended to change punctured modes.

C: I think 160+80 is an exception. I prefer previous clarification to specifically emphasis 160+80.

1. **11-20-0954r3 – 240MHz transmission –** Xiaogang Chen (Intel)

**Summary:** Proposed not to define 240MHz PPDU in 11be.

**Discussion:**

C: For 996x2-1 and 996x2-2 are already in our RU allocation table.

A: Yes, it’s still allowed in OFDMA. Here I am disallow it for non-OFDMA.

C: Slide 13, need to clarify that for 240MHz, it should be just one mode for 240 from PHY layer just same as other PPDU sizes. Here it shows multiple modes for 240MHz.

A: For 240, it’s new and people may create more definitions.

C: How to signal the modes in slide 13? You need to read all the RU combinations, right?

A: Should be similar to other punctured modes.

C: Prefer to have 240MHz BW. At least to keep the modes such as the right cases in slide 13.

SP#4: SP2b in 954r3

* **Do you agree that MRU 996x2 shall not straddle two 160MHz channels?**
  + **~~Note: The three options below are now allowed for MRU 996x2.~~**

 (Figure removed)

SP result: Y/N/A: 24/4/11

**Discussions on SP:**

C: Is this for OFDMA or non-OFDMA.

A: For non-OFDMA. It’s already not allowed in OFDMA.

SP#5: SP2d in 954r3

**Which table defines the options for MRU 996x2+484 in 320MHz BSS?**

* **240/160+80 MHz BW entry is TBD**
* **Note: Shaded area in pictures is punctured.**

**Tab.I: 12 options.  
**

**Tab.II: 24 options.**

****

SP result: Tab1/Tab2/A: 21/5/8

**Discussions on SP:**

C: Add “240MHz PPDU TBD”

C: The shaded area in the plot is punctured right?

A: We can clarify.

SP#6: SP1 in 954r3

* **Do you agree that no 240/160+80MHz PPDU BW entry is included in the BW field of U-SIG ~~defined~~ in 11be.** 
  + **The 240Mhz transmission is defined as 320MHz PPDU with 80Mhz punctured.**
    - **~~The punctured 80MHz is either the left 80MHz or the right 80MHz in the 320MHz PPDU~~**

SP result: Y/N/A: 21/7/8

Include one Yes vote from bridge.

**Discussions on SP:**

C: What do you call 160+80Mhz (RU996x3) transmission in 320?

A: These modes are supported in 320Mhz PPDU.

C: What is definition of 240MHz PPDU in SP text?

A: Clarify as “PPDU BW entry”

C: Why do you remove the last sub bullet? It’s better to keep it for clarification.

C: Do we still need the concept of 240MHz transmission?

C: Do we delete all the puncturing modes for 240MHz?

A: We already have passed the puncturing modes in the first SP for both OFDMA and non-OFDMA cases.

**Adjourn**

The meeting is adjourned at 13:00 ET

**Monday Aug 6rd, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple, Inc) calls the meeting to order at 7:00pm ET.
2. The Chair follows the agenda in 11-20/0927r20
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 [~10 mins] – [997r11](https://mentor.ieee.org/802.11/dcn/20/11-20-0997-11-00be-tgbe-spec-text-volunteers-and-status.docx)
   1. Reminder: Send updates (if any) to motions list for each topic/row
   2. Check if there is any difficulties/need for guidance from POCs/TTTs in any topic
   3. Complete any pending R1 vs R2 categorizations (none identified in PHY)
5. Technical Submissions:
   1. [965r4](https://mentor.ieee.org/802.11/dcn/20/11-20-0965-04-00be-6ghz-lpi-range-extension.pptx) 6GHz LPI Range Extension (Ron Porat)
   2. [985r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0985-01-00be-ru-allocation-subfield-design-in-eht-sig-follow-up.pptx) RU Alloc. Subfield Design in EHT-SIG Follow up (Myeongjin Kim) [4 SPs]
   3. [1138r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1138-01-00be-large-m-ru-table.pptx) Large M-RU Table (Ron Porat)
   4. [1005r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1005-01-00be-yet-another-fast-link-adaptation-attempt.pptx) Yet Another Fast Link Adaptation Attempt (Jinjing Jiang)
   5. [1035r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1035-00-00be-follow-up-on-feedback-enhancement.pptx) follow-up-feedback-enhancement (Ruchen Duan)
6. The Chair reminds everyone to report their attendance by sending an e-mail to the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

|  |  |  |  |
| --- | --- | --- | --- |
| TGbe (PHY) | 8/6 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 8/6 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 8/6 | Baik, Eugene | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 8/6 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 8/6 | Doostnejad, Roya | Intel Corporation |
| TGbe (PHY) | 8/6 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 8/6 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 8/6 | Grandhe, Niranjan | NXP Semiconductors |
| TGbe (PHY) | 8/6 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 8/6 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 8/6 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 8/6 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 8/6 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 8/6 | Jiang, Jinjing | Apple, Inc. |
| TGbe (PHY) | 8/6 | Kang, Sugbong | Apple, Inc. |
| TGbe (PHY) | 8/6 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 8/6 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 8/6 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 8/6 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 8/6 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 8/6 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 8/6 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 8/6 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 8/6 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/6 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 8/6 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | Tian, Tao | Unisoc Comm. |
| TGbe (PHY) | 8/6 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/6 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 8/6 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 8/6 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 8/6 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 8/6 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 8/6 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 8/6 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/6 | Yu, Mao | NXP Semiconductors |
| TGbe (PHY) | 8/6 | Zeng, Ruochen | NXP Semiconductors |
| TGbe (PHY) | 8/6 | Zeng, Yan | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 8/6 | Zhang, Yan | NXP Semiconductors |

**Straw Polls**

1. **SPs from 965r4 – Ron Porat (Broadcom)**

SP#1: SP2a in 965r4.

**Do you agree that duplication in the mode defined in SP #1 is done only on the data tones of the payload portion and that EHT-STF/LTF are based on the total BW?**

**In this mode,**

* **For 80MHz PPDU, the EHT-STF, EHT-LTF and pilot are same as transmitting both RU1 and RU2 of 484-tone RU**
* **For 160/320MHz PPDU, the EHT-STF, EHT-LTF and pilot are same as the non-OFDMA 160/320MHz PPDU.**
* **PAPR reduction scheme is TBD**

**Note: pre-EHT modulated fields are TBD**

SP result: Y/N/A: 36/3/5

**Discussions on SP:**

C: Add EHT-STF and EHT-LTF in SP text.

C: The pilot tone is kept the same and it will be used the same way as processing the non-duplicate packet and simplify implementation.

C: There is no conclusion yet for the duplication for 80MHz PPDU.

A: The SP #162 for duplication of 80MHz PPDU is already passed.

C: From the SP#162 in 0566r52, it indicates the pilots of RU 484 are duplicated.

C: Request to defer this SP and there is a related contribution for PAPR reduction and it may contradict with this SP for the pilot tone setting.

A: Add a sub bullet to the SP text “PAPR reduction scheme is TBD”.

1. **SPs from 0985r2 – Myeongjin Kim (Samsung)**

SP#2: SP3 in 985r2

* **Do you agree to:**
  + Add an entry in the RU Allocation subfield table to indicate that 242-tone RU is punctured
  + Modify the existing entry “242-tone RU empty (with zero users)” to “242-tone RU; 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”
  + Modify the existing entry “484-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield” to “484-tone RU; 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”
  + Modify the existing entry “996-tone RU; 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” to “996-tone RU; 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”

**Discussions**

C: Two entries are proposed for the 242 tone RU, punctured or zero user, and is that the intention?

A: Yes

C: For transmission don’t puncture 242 RU but just not assign it, which entry should be used, puncturing or zero user field?

A: Use puncture entry

C: This scheme is complicated and not provide benefit.

C: If punctured, the preamble and data portion is punctured, but for empty RU, the preamble is still there

C: In 11ax, two empty 242 RU indicate punctured 484 RU, and in the proposal, the puncturing is explicitly indicated. If the RU has zero user filed and not punctured, does the pilot of this RU still exist?

A: Yes.

C: Why is the pilot of empty RU useful?

A: It will be helpful for compensate phase error.

C: No implementation prefers to only transmit pilot.

C: Puncturing can be indicated in U-SIG.

A: Yes

C: Defer the SP and more discussions are needed.

1. **SPs from 1138r2 – Ron Porat (Broadcom)**

SP#3: SP1 in 1138r2

* + Do you agree to add the following entries to the RU Allocation table?

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 242 | 484 | |  |  |  |  |  |  |  |  |  |  |  |  | 8 |
| 242 |  | 484 | |  |  |  |  |  |  |  |  |  |  |  |  | 8 |
| 484 | |  | 242 |  |  |  |  |  |  |  |  |  |  |  |  | 8 |
| 484 | | 242 |  |  |  |  |  |  |  |  |  |  |  |  |  | 8 |
|  |  | 484 | | 996 | | | |  |  |  |  |  |  |  |  | 8 |
| 484 | |  |  | 996 | | | |  |  |  |  |  |  |  |  | 8 |
| 996 | | | |  |  | 484 | |  |  |  |  |  |  |  |  | 8 |
| 996 | | | | 484 | |  |  |  |  |  |  |  |  |  |  | 8 |
|  |  | 484 | | 996 | | | | 996 | | | |  |  |  |  | 8 |
| 484 | |  |  | 996 | | | | 996 | | | |  |  |  |  | 8 |
| 996 | | | |  |  | 484 | | 996 | | | |  |  |  |  | 8 |
| 996 | | | | 484 | |  |  | 996 | | | |  |  |  |  | 8 |
| 996 | | | | 996 | | | |  |  | 484 | |  |  |  |  | 8 |
| 996 | | | | 996 | | | | 484 | |  |  |  |  |  |  | 8 |
|  |  |  |  | 996 | | | | 996 | | | | 996 | | | | 8 |
| 996 | | | |  |  |  |  | 996 | | | | 996 | | | | 8 |
| 996 | | | | 996 | | | |  |  |  |  | 996 | | | | 8 |
| 996 | | | | 996 | | | | 996 | | | |  |  |  |  | 8 |
|  |  | 484 | | 996 | | | | 996 | | | | 996 | | | | 8 |
| 484 | |  |  | 996 | | | | 996 | | | | 996 | | | | 8 |
| 996 | | | |  |  | 484 | | 996 | | | | 996 | | | | 8 |
| 996 | | | | 484 | |  |  | 996 | | | | 996 | | | | 8 |
| 996 | | | | 996 | | | |  |  | 484 | | 996 | | | | 8 |
| 996 | | | | 996 | | | | 484 | |  |  | 996 | | | | 8 |
| 996 | | | | 996 | | | | 996 | | | |  |  | 484 | | 8 |
| 996 | | | | 996 | | | | 996 | | | | 484 | |  |  | 8 |

C: Zero energy indication is enough and no need to differentiate punctured and non-punctured cases?

A: For punctured case, the punctured spectrum mask needs to be met, but for the non-punctured empty RU, there is no need to meet spectrum mask and there is difference.

C: For each 2\*996+484 entry, how to differentiate the two cases of RU combination?

A: The puncture information can be utilized for differentiation.

C: If exclude Punctured RU242, it’s fine.

SP result: Y/N/A: 25/5/12

SP#4: SP3 in 1138r2

**Do you agree to the proposed RU table ordering as attached**

****

C: It’s not easy to understand the table and it’s better to make a table the same as 11ax.

C: Why not put all the small RU together in the table?

A: The logic of current table is to simplify receiver parser and will take a look of it.

C: Suggest to take more offline discussions and come back.

**New Submissions**

1. **11-20-1005r1** **Yet Another Fast Link Adaptation Attempt -** Jinjing Jiang (Apple Inc.)

Summary: proposed negotiation based immediate feedback of PHY measurement for link adaptation

C: For link adaptation, maybe we need more than one entry and also relates with whether introduce more MCS or the design of HARQ. We need more discussions.

A: Agree and we want to trigger the related discussions.

C: Does this contribution focus on the immediate feedback?

A: Yes.

C: What does code word error rate mean?

A: It’s similar to the definition in HARQ, and for AMPDU there could be multiple code words.

C: Do you propose a MAC container to send feedback? Do you think this is the key problem?

A: Yes, and we think this is the tool to enable link adaptation.

C: Will this bring significant improvement or minor improvement?

A: try to find a way simpler to improve performance.

C: Why consider measurements instead of MCS?

A: Change from MCS to measurements will save turnaround time.

C: Need to check whether the measurement can be fed back within SIFS.

C: This method is simple and effective.

C: The fast link adaptation means the transmitter need to react fast and in your example, since the transmitter may lost the medium, how to achieve the fast link adaptation? If can’t guarantee the next transmission is in the same TXOP, it’s not easy to achieve fast link adaptation

A: The wifi channel changes slowly, and the information from previous TXOP is still meaningful.

C: The codeword error rate may not reliable and it needs long run for calculation. But this is a good direction.

1. **1035r1 Follow up on Feedback Enhancement -** Ruchen Duan (Samsung)

Summary: Presents simulation results for non-beamformed and beamformed cases to show the throughput gain of LA feedback.

**Discussion:**

C: What is the doppler applied in the channel?

A: Based on 11ax channel model.

C: Is the channel coherent time around 100ms?

A: Yes.

C: How to select MCS at receiver side?

A: Calculate effective SNR and map with MCS.

C: Does this only work for SU?

A: It also works for MU.

C: On last bullet of slide 3, it states transmitter will increase Nss and decrease MCS if feedback is suggesting Nss=1 and high MCS for a certain duration and what is the motivation to increase Nss and reduce MCS?

A: If STA suggests high MCS for long time, then it’s beneficial to increase Nss to achieve high throughput.

C: How could the receiver select the correct MCS?

A: The receiver can calculate the effective SNR and based on the effective SNR to select the right MCS. The mapping between the effective SNR and PER is quite accurate.

C: The actual SNR at receiver side depends on the PA back off and Tx EVM at transmitter side, and how could the receiver know such information?

A: The receiver doesn’t know such information of the transmitter side, and the transmitter will further adjust the MCS based on its own Tx parameter and the MCS feedback from receiver.

C: On slide 2, in practice the first packet could be lost and how could the transmitter select the MCS for first packet?

A: The link adaptation should drop fast and if one MCS fails, the transmitter will try lower one.

C: What does the periodicity of in the beamformed simulation case?

A: It’s the periodicity of channel sounding.

C: It’s difficult to use the MCS feedback information in MU case when the user set are different for two transmissions.

**Adjourn**

The meeting is adjourned at 22:00 ET

**Monday Aug 17th, 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 11-20/0927r21
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.
   * 1138r3 Large M-RU Table Ron Porat [SP]
   * [1107r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1107-00-00be-remaining-issues-with-new-11be-scrambler.pptx) Remaining Issues with new 11be Scrambler Bin Tian
   * [975r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0975-00-00be-discussion-on-11be-phy-capabilities.pptx) Discussion on 11be PHY Capabilities Bin Tian
   * [1064r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1064-00-00be-consideration-on-compressed-mode-in-11be.pptx) Consideration on compressed mode in 11be Dongguk Lim
   * [1065r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1065-00-00be-2x-eht-ltf-sequence.pptx) 2x EHT-LTF sequence Jinyoung Chun
   * [1066r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1066-00-00be-4x-eht-ltf-sequence.pptx) 4x EHT-LTF sequence Jinyoung Chun
   * [1072r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1072-00-00be-2x-eht-ltf-sequences-design.pptx) 2x EHT-LTF sequence Dandan Liang
   * [1073r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1073-00-00be-4x-eht-ltf-sequences-design.pptx) 4x EHT-LTF sequence Dandan Liang
   * ~~737r0 Supported EHE-MCSs and spatial streams signaling Yongho Seok\*~~
   * [~~1150r0~~](https://mentor.ieee.org/802.11/dcn/20/11-20-1150-00-00be-preamble-puncture-discussion-in-eht-ppdu.pptx) ~~Preamble Puncture Discussion in EHT PPDU Ross Jian Yu~~
   * Remaining SPs on M-RU: *TBD*
   * [1161r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1161-00-00be-eht-punctured-ndp-and-partial-bandwidth-feedback.pptx) EHT Punctured NDP and Partial bandwidth feedback. Bin Tian
   * [1159r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1159-00-00be-11be-spectral-mask.pptx) 11be spectral mask Bin Tian
   * [1165r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1165-00-00be-spectrum-mask-for-puncturing.pptx) Spectrum mask for puncturing Xiaogang Chen
   * [1180r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1180-00-00be-spectrum-mask-requirement-for-punctured-transmission.pptx) Spectrum mask requirement for punctured Transmission. Wookbong Lee
   * [1174r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1174-00-00be-e-sig-with-different-puncturing-patterns.pptx) E-SIG Detection with Different Puncturing Patterns Junghoon Suh
   * [1191r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1191-00-00be-dup-mode-papr-reduction.pptx) DUP mode PAPR reduction Ron Porat
   * [1178r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1178-00-00be-discussions-on-mu-mimo-signaling.pptx) Discussions on MU-MIMO Signaling Mengshi Hu

[1180r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1180-00-00be-spectrum-mask-requirement-for-punctured-transmission.pptx) Spectrum Mask Requirement for Punctured Transmission Wook Bong Lee

1. 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) | 8/17 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 8/17 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 8/17 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 8/17 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 8/17 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 8/17 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 8/17 | de Vegt, Rolf | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | Dogukan, Ali | Vestel |
| TGbe (PHY) | 8/17 | Doostnejad, Roya | Intel Corporation |
| TGbe (PHY) | 8/17 | feng, Shuling | MediaTek Inc. |
| TGbe (PHY) | 8/17 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 8/17 | Grandhe, Niranjan | NXP Semiconductors |
| TGbe (PHY) | 8/17 | Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| TGbe (PHY) | 8/17 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 8/17 | Hu, Mengshi | HUAWEI |
| TGbe (PHY) | 8/17 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 8/17 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 8/17 | Ji, Chenhe | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/17 | jiang, feng | Apple Inc. |
| TGbe (PHY) | 8/17 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 8/17 | Kang, Sugbong | Apple, Inc. |
| TGbe (PHY) | 8/17 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 8/17 | Kim, Youhan | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | Koc, Onur | VESTEL ELEKTRONIK SANAYI VE TICARET ANONIM SIRKETI |
| TGbe (PHY) | 8/17 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 8/17 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 8/17 | Liu, Jianhan | MediaTek Inc. |
| TGbe (PHY) | 8/17 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 8/17 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 8/17 | Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 8/17 | Minotani, Jun | Panasonic Corporation |
| TGbe (PHY) | 8/17 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 8/17 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 8/17 | Nakano, Takayuki | Panasonic Corporation |
| TGbe (PHY) | 8/17 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 8/17 | Pare, Thomas | MediaTek Inc. |
| TGbe (PHY) | 8/17 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 8/17 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 8/17 | Pulikkoonattu, Rethnakaran | Broadcom Corporation |
| TGbe (PHY) | 8/17 | Rai, Kapil | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | Roy, Sayak | NXP Semiconductors |
| TGbe (PHY) | 8/17 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 8/17 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 8/17 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 8/17 | Strauch, Paul | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/17 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | Tian, Tao | Unisoc Comm. |
| TGbe (PHY) | 8/17 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/17 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 8/17 | Vermani, Sameer | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | Wang, Yi-Hsiu | Zeku |
| TGbe (PHY) | 8/17 | Ward, Lisa | Rohde & Schwarz |
| TGbe (PHY) | 8/17 | Wu, Tianyu | Apple Inc. |
| TGbe (PHY) | 8/17 | Yang, Lin | Qualcomm Incorporated |
| TGbe (PHY) | 8/17 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 8/17 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 8/17 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 8/17 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/17 | Yu, Mao | NXP Semiconductors |
| TGbe (PHY) | 8/17 | Zeng, Yan | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 8/17 | Zhang, Yan | NXP Semiconductors |

**Straw Polls**

1. **SPs from 1138r3 – Ron Porat (Broadcom)**

SP#1: SP3 in 1138r4

**Do you agree to the proposed RU table ~~ordering~~ as attached on slide 5 of 1138r4?**

****

SP result: Y/N/A: 30/9/8

**Discussions on SP:**

C: There are some typo and mistake in the table.

A: Will update the table to RU Table Order r2 in 1138r4.

C: How to handle the punctured 242/zero user entries?

A: Leave to TBD wait for some further discussion.

C: Update the slides and table and come back for SP later today.

**New Submissions**

1. **11-20-1107r0 – Remaining Issues with new 11be Scrambler –** Lin Yang (Qualcomm)

**Summary:** Propose to clarify the definition of 11 LSB bit in service field as scrambling seed. Also solve the scrambling seed problem for MU-RTS and CTS to make sure simultaneous CTSs will define same scrambling seed.

**Discussion:**

C: Before scrambling is all 0 for initialization?

A: Yes.

SP#2: SP1 in 1107r0

**Do you support using the first 11 LSB bits in SERVICE field for 11be scrambling seed initialization and keeping the remaining 5 bits as reserved?**

0

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

s0

s1

s2

s3

s4

s5

s6

legacy 7-bit scrambling seed

Reserved

s7

s8

s9

s10

SERVICE field in EHT PPDU

11be 11-bit scrambling seed

SP result: Y/N/A: 47/0/4

**Discussions on SP:**

C: This was already covered in earlier motion?

A: No, I think this part is missing.

C: Clarify the SP text by adding “initialization”.

SP#3: SP2 in 1107r0

**Do you support using the first 7 LSB bits of the SERVICE field in MU-RTS to scramble the CTS data and fill in the first 7 LSB bits of the SERVICE field of the CTS, when MU-RTS is transmitted using an EHT PPDU?**

SP result: Y/N/A: 36/0/9

**Discussions on SP:**

C: This is same as 11ax?

A: Yes.

C: The last 4 bits you can fill any value?

A: Yes, any value can be choose. CTS is legacy format and only have 7 bits seed and other bits are already defined.

SP#4: SP3 in 1107r0

**Do you support in 11be to disallow the 7 LSB bits of the SERVICE field in MU-RTS transmitted using an EHT PPDU to be all zeros**?

SP result: Y/N/A: 35/1/14

**Discussions on SP:**

C: Clarification by adding “transmitted using an EHT PPDU”

1. **11-20-975r0 – Discussion on 11be PHY Capabilities –** Bin Tian (Qualcomm)

**Summary:** Proposal of PHY capabilities for MCS and encoding, BW modes and MIMO and sounding.

**Discussion:**

C: Slide 5, need to clarify this if for OFDMA case or non-OFDMA case. Should separate capability for NSS and number of LTFs.

A: We can add clarification text in SP. But this is another capability for MU-MIMO. Not for OFDMA and not for SU MIMO.

SP#5: SP1 in 975r0

* **Do you agree that 11be device shall mandatorily support the following modulation order**
  + Up to 64 QAM for 20MHz only ~~device~~ non-AP STA (if defined in EHT)
  + Up to 256QAM for all other devices

SP result: Y/N/A: 44/0/3

**Discussions on SP:**

C: We didn’t define 20MHz only devices in EHT yet.

A: Add “if defined in EHT”

C: Clarify the 20MHz only device is non-AP STA.

A: Update the SP text.

SP#6: SP2 in 975r0

* **SP2: Do you agree that the mandatory support requirement of LDPC in 11be is the same as in 11ax?**
  + ~~Mandatory support if STA declares support for BW>20MHz or >4ss or >MCS9~~

SP result: Y/N/A: 45/0/1

**Discussions on SP:**

No discussion.

SP#7: SP3 in 975r0

* **Do you agree in 11be AP is mandatory to support** 
  + **160 MHz operating channel width in 6GHz band**
  + **80MHz operating channel width ~~otherwise~~ in 5GHz band**
  + **20MHz operating channel width in 2.4GHz band**

**Note: “Soft AP” is TBD.**

SP result: Y/N/A: 42/1/0

**Discussions on SP:**

C: Can you clarify 80MHz is for 2.4 and 5GHz band?

A: Ok. But there is no 80MHz channel in 2.4.

C: AP mandatory support 160 does not mean BSS BW is always 160 right?

A: Correct, AP can choose the BW for a BSS. We want to setup a higher bar for EHT AP.

C: What about soft-AP?

A: Add “soft-AP TBD”.

C: Suggest some text clarification.

C: Add support for 2.4 GHz to be more complete.

SP#8: SP4 in 975r0

* **Do you agree in 11be it is mandatory for a non-AP STA to support 80MHz operating channel width in 5 and 6GHz bands?**
  + **Except for 20 MHz only client (if defined in EHT)**

SP result: Y/N/A: 47/0/0

**Discussions on SP:**

C: Some SP text update similar to previous SPs.

SP#9: SP5 in 975r0

* **Do you agree that 11be defines 20MHz only client in 2.4/5GHz band only?**

SP result: Y/N/A: 29/1/15

**Discussions on SP:**

C: Can you clarify the motivation for defining 20MHz only client for 11be?

A: There may be some potential use cases for 20MHz only devices. This SP is a compromise to limit the 20MHz only device to 2.4 and 5GHz band.

C: If 6GHz band has some left-over channel, it will be more flexible to allow 20MHz only device on 6GHz band, right?

A: From big picture, we are trying to promote 6GHz band as high throughput wide BW traffic band.

C: 11ax 20MHz only device can still use in 6GHz band, right?

A: Correct.

C: So, if you want to keep the flexibility, you can use 11ax 20MHz only in 6GHz.

C: Is there difference between 11ax and 11be 20MHz only mode?

A: I think they are almost same. But tone plan is different and multi-RU support is different.

C: In R2, there could be HARQ and other features that can improve 11be 20MHz only device.

SP#10: SP6 in 975r0

* **Do you agree with the following MU-MIMO support in  11be**
  + **DL MU-MIMO**
    - **Mandatory support for AP with >=4 antennas**
    - **Mandatory support for client**
    - **At least for full BW.  RU/M-RU support TBD**
  + **UL MU-MIMO**
    - **Mandatory support for AP with >=4 antennas**
    - **Mandatory support for client**
    - **At least for full BW.  RU/M-RU support TBD**

SP result: Y/N/A: 35/1/4

**Discussions on SP:**

No discussion.

SP#11: SP7 in 975r0

* **Do you agree the support of Nss\_total=4 ~~EHT-LTFs~~ is mandatory for 11be ~~client~~ STA in receiving both sounding NDP and DL MU-MIMO, i..e Beamformee STS capability?**
* **~~Note: #EHT-LTF symbols support as a separate TBD capability.~~**

SP result: Y/N/A: 39/2/3

**Discussions on SP:**

C: Can you remove “in OFDMA” in the notes.

A: Ok.

C: Change “Client” to “STA”.

C: Remove the note since without EHT-LTF in the SP text, it’s clear.

C: Add “receiving”

C: Number of EHT-LTF to support need to define ASAP.

1. **11-20-1064r1 – Consideration on compression mode in 11be –** Dongguk Lim (LG)

**Summary:** Proposal on compression mode and the signaling.

**Discussion:**

C: The SP is similar to earlier SP. What is new in the SP? We have PPDU type, in addition to PPDU type, you want to define a separate bit for compressed mode?

A: We are open to mix with PPDU Type or use a separate bit.

C: What is your opinion on PPDU type? 1 bit or more bits?

A: We originally propose 1 bit but there could be more potential PPDU types. We are open for more PPDU types.

SP#12: SP1 in 1064r1

* **Do you agree that a subfield for indication of compressed mode is included in U-SIG as version dependent field?** 
  + **~~A subfield for the indication of compressed mode consists of 1bit.~~**

SP result: Y/N/A: 35/4/6

**Discussions on SP:**

C: Suggest using PPDU type to signal compress mode. Number of bits and definition of PPDU type can be TBD.

A: We disagree to use PPDU type to signal compressed mode. Compress mode can be applied to different PPDU types.

A: How about remove the sub bullet in the SP?

SP#13: SP2 in 1064r1

* **Do you agree that a 3-bit subfield for the indication of the number of ~~MU-MIMO~~ non-OFDMA users is included in EHT-SIG common field of an EHT MU PPDU for the compressed mode?** 
  + **~~Note : For the non-compressed mode, this field can be replaced with other information.~~**

SP result: Y/N/A: 30/1/5

**Discussions on SP:**

C: The note is strange, suggest to remove it.

C: Add “3-bit” for the subfield for the number of MU-MIMO users.

C: MU-MIMO change to non-OFDMA users to avoid confusion with 1 user.

C: Need a better name for EHT MU PPDU (can be sent to one user).

C: Will this field be duplicated in content channels?

A: It should be.

SP3 in 1064r1 is deferred.

1. **11-20-1065r1 – 2x EHT-LTF sequence –** Jinyoung Chun (LG)

**Summary:** Since 80MHz OFDMA tone plan is changed and the PAPR of RUs in new 11be tone plan are not optimized. The proposal suggests to define 2x EHT-LTF sequence based on modified 2x HE-LTF sequence.

**Discussion:**

C: We feel that many changes need to be made to HE-LTF sequence. Maybe we can define a new sequence.

C: For the RU and RU combinations, some of them could be more important than others. So not sure what should be the optimization metric. May need to prioritize some RU/MRUs.

A: It’s important to optimize for the worst case PAPR.

C: We are still thinking what good metric is. Sometime a few RUs have slightly higher PAPR but other RUs are lower.

C: We don’t know what MRU is more important so we should support and optimize all of them.

C: We disagree.

C: Based on 11ax experience, a “good enough design” is good enough. We should move on.

**Adjourn**

The meeting is adjourned at 22:00 PM ET

**Monday Aug 24th, 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 11-20/0927r24
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.
   * [1066r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1066-00-00be-4x-eht-ltf-sequence.pptx) 4x EHT-LTF sequence Jinyoung Chun
   * [1072r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1072-00-00be-2x-eht-ltf-sequences-design.pptx) 2x EHT-LTF sequence Dandan Liang
   * [1073r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1073-00-00be-4x-eht-ltf-sequences-design.pptx) 4x EHT-LTF sequence Dandan Liang
   * [1216r2](https://mentor.ieee.org/802.11/dcn/20/11-20-1216-02-00be-4x-320mhz-ltf-design.pptx) 4x LTF Design Ron Porat
   * [1150r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1150-00-00be-preamble-puncture-discussion-in-eht-ppdu.pptx) Preamble Puncture Discussion in EHT PPDU Ross Jian Yu
   * Remaining SPs on M-RU: *TBD (985r4)*
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) | 8/24 | Adhikari, Shubhodeep | Broadcom Corporation |
| TGbe (PHY) | 8/24 | An, Song-Haur | INDEPENDENT |
| TGbe (PHY) | 8/24 | Ansley, Carol | CommScope |
| TGbe (PHY) | 8/24 | Anwyl, Gary | MediaTek Inc. |
| TGbe (PHY) | 8/24 | B, Hari Ram | NXP Semiconductors |
| TGbe (PHY) | 8/24 | Cao, Rui | NXP Semiconductors |
| TGbe (PHY) | 8/24 | Choi, Jinsoo | LG ELECTRONICS |
| TGbe (PHY) | 8/24 | Choo, Seungho | Senscomm Semiconductor Co., Ltd. |
| TGbe (PHY) | 8/24 | CHUN, JINYOUNG | LG ELECTRONICS |
| TGbe (PHY) | 8/24 | Ding, Yanyi | Panasonic Corporation |
| TGbe (PHY) | 8/24 | Dogukan, Ali | Vestel |
| TGbe (PHY) | 8/24 | Doostnejad, Roya | Intel Corporation |
| TGbe (PHY) | 8/24 | Duan, Ruchen | SAMSUNG |
| TGbe (PHY) | 8/24 | Ghaderipoor, Alireza | MediaTek Inc. |
| TGbe (PHY) | 8/24 | Handte, Thomas | Sony Corporation |
| TGbe (PHY) | 8/24 | Hsieh, Hung-Tao | MediaTek Inc. |
| TGbe (PHY) | 8/24 | Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| TGbe (PHY) | 8/24 | Jeon, Eunsung | SAMSUNG ELECTRONICS |
| TGbe (PHY) | 8/24 | Ji, Chenhe | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/24 | Kamel, Mahmoud | InterDigital, Inc. |
| TGbe (PHY) | 8/24 | Kang, Sugbong | Apple, Inc. |
| TGbe (PHY) | 8/24 | Kim, Myeong-Jin | SAMSUNG |
| TGbe (PHY) | 8/24 | Lansford, James | Qualcomm Incorporated |
| TGbe (PHY) | 8/24 | Lee, Wookbong | SAMSUNG |
| TGbe (PHY) | 8/24 | Le Houerou, Brice | Canon Research Centre France |
| TGbe (PHY) | 8/24 | Li, Jialing | Qualcomm Incorporated |
| TGbe (PHY) | 8/24 | Lim, Dong Guk | LG ELECTRONICS |
| TGbe (PHY) | 8/24 | LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/24 | Lopez, Miguel | Ericsson AB |
| TGbe (PHY) | 8/24 | Lorgeoux, Mikael | Canon Research Centre France |
| TGbe (PHY) | 8/24 | Lou, Hanqing | InterDigital, Inc. |
| TGbe (PHY) | 8/24 | Ma, Li | MediaTek Inc. |
| TGbe (PHY) | 8/24 | Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| TGbe (PHY) | 8/24 | Montreuil, Leo | Broadcom Corporation |
| TGbe (PHY) | 8/24 | noh, yujin | Newracom Inc. |
| TGbe (PHY) | 8/24 | Park, Eunsung | LG ELECTRONICS |
| TGbe (PHY) | 8/24 | porat, ron | Broadcom Corporation |
| TGbe (PHY) | 8/24 | Puducheri, Srinath | Broadcom Corporation |
| TGbe (PHY) | 8/24 | Pulikkoonattu, Rethnakaran | Broadcom Corporation |
| TGbe (PHY) | 8/24 | Redlich, Oded | HUAWEI |
| TGbe (PHY) | 8/24 | Schelstraete, Sigurd | Quantenna Communications, Inc. |
| TGbe (PHY) | 8/24 | Sethi, Ankit | NXP Semiconductors |
| TGbe (PHY) | 8/24 | Shilo, Shimi | HUAWEI |
| TGbe (PHY) | 8/24 | SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/24 | Sun, Bo | ZTE Corporation |
| TGbe (PHY) | 8/24 | Tian, Bin | Qualcomm Incorporated |
| TGbe (PHY) | 8/24 | Tsodik, Genadiy | Huawei Technologies Co. Ltd |
| TGbe (PHY) | 8/24 | Van Zelst, Allert | Qualcomm Incorporated |
| TGbe (PHY) | 8/24 | Varshney, Prabodh | Nokia |
| TGbe (PHY) | 8/24 | Verenzuela, Daniel | Sony Corporation |
| TGbe (PHY) | 8/24 | Wang, Yi-Hsiu | Zeku |
| TGbe (PHY) | 8/24 | Wilhelmsson, Leif | Ericsson AB |
| TGbe (PHY) | 8/24 | Wu, Kanke | Qualcomm Incorporated |
| TGbe (PHY) | 8/24 | Wu, Tianyu | Apple, Inc. |
| TGbe (PHY) | 8/24 | Yan, Aiguo | Oppo |
| TGbe (PHY) | 8/24 | YANG, RUI | InterDigital, Inc. |
| TGbe (PHY) | 8/24 | Yang, Steve TS | MediaTek Inc. |
| TGbe (PHY) | 8/24 | yi, yongjiang | Futurewei Technologies |
| TGbe (PHY) | 8/24 | Young, Christopher | Broadcom Corporation |
| TGbe (PHY) | 8/24 | Yu, Jian | Huawei Technologies Co., Ltd |
| TGbe (PHY) | 8/24 | ZEGRAR, Salah Eddine | Istanbul Medipol University; Vestel |
| TGbe (PHY) | 8/24 | Zeng, Ruochen | NXP Semiconductors |
| TGbe (PHY) | 8/24 | Zeng, Yan | Huawei Technologies Co.,  Ltd |
| TGbe (PHY) | 8/24 | Zhang, Yan | NXP Semiconductors |

**Submissions**

1. **11-20-1066r0 – 4x EHT-LTF sequence –** Jinyoung Chun (LG)

**Summary:** Compared PAPR performance of different LTF sequences and proposed 4x EHT-LTF sequence for 320MHz transmission.

**Discussion:**

C: The PAPR number seems too high. Are you comparing to 10% PAPR?

A: Our number is 50% PAPR. We also have the CDF curve and not sure which criteria is the best.

C: We no longer support some combinations of 2x996+484 case. Need to reoptimize the sequence without this mode.

SP1 in 1066r0

* **Do you agree to add the below text in SFD?** 
  + **In 320MHz transmission, 4x EHT-LTF sequence is given as below.**

***EHTLTF*-2036,2036=**

**{*LTF*80MHz\_lower1\_4x, 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\_upper1\_4x, 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\_lower2\_4x, 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\_upper2\_4x}**

**Where**

***LTF*80MHz\_lower1\_4x = {*LTF*80MHz\_left\_4x\_1, -*LTF*80MHz\_left\_4x\_2, 0, *LTF*80MHz\_right\_4x\_1, -*LTF*80MHz\_right\_4x\_2}**

***LTF*80MHz\_upper1\_4x = {*LTF*80MHz\_left\_4x\_1, -*LTF*80MHz\_left\_4x\_2, 0, -*LTF*80MHz\_right\_4x\_1, *LTF*80MHz\_right\_4x\_2}**

***LTF*80MHz\_lower2\_4x = {*LTF*80MHz\_left\_4x\_1, *LTF*80MHz\_left\_4x\_2, 0, -*LTF*80MHz\_right\_4x\_1, -*LTF*80MHz\_right\_4x\_2}**

***LTF*80MHz\_upper2\_4x = {*LTF*80MHz\_left\_4x\_1, *LTF*80MHz\_left\_4x\_2, 0, *LTF*80MHz\_right\_4x\_1, *LTF*80MHz\_right\_4x\_2}**

***LTF*80MHz\_left\_4x\_1 = *LTF*80MHz\_left\_4x{1:250}**

***LTF*80MHz\_left\_4x\_2 = *LTF*80MHz\_left\_4x{251:500}**

***LTF*80MHz\_right\_4x\_1 = *LTF*80MHz\_right\_4x{1:250}**

***LTF*80MHz\_right\_4x\_2 = *LTF*80MHz\_right\_4x{251:500}**

The SP is deferred after presentation of all related contributions.

1. **11-20-1072r2 – 2x EHT-LTF sequence –** Dandan Liang (Huawei) Presented by Chenchen Liu

**Summary:** The 320MHz/160+160MHz 2x EHT-LTF sequences are proposed with considering of punctured 240MHz/160MHz+80MHz transmission

**Discussion:**

C: Similar to our contribution, in your results, you should also remove some of the RU combinations that we no longer support.

A: But in our optimization, the worst case PAPR is not happen in the removed combinations so it will not affect our results.

C: It’s good to check more combinations since we may support more combination later.

C: We should also consider PAPR for preamble punctured patterns in OFDMA.

A: Which pattern we don’t support?

C: One hole in each 80MHz channel. There can be multiple holes in 320MHz transmission.

A: PAPR is not a big issue for DL OFDMA.

C: Worst case PAPR study is more important for UL MU, since AP can choose its Tx power but STA has to follow AP’s instruction.

C: AP can determine its Tx power but PAPR affect the total power is still important.

C: I think the PAPR optimization should focus on most common cases. We don’t need to consider all the corner cases.

C: We also have some results with good PAPR. We will upload it soon.

The SPs are deferred after presentation of all related contributions.

1. **11-20-1073r1 – 4x EHT-LTF sequence –** Dandan Liang (Huawei)

**Summary:** Proposes 4x EHT-LTF sequence for 320/160+160MHz transmission.

**Discussion:**

C: Opiton1 is similar to ours. Option 2.2 divided the LTF sequence to 5 parts. Our proposal has 0.2dB higher PAPR but the structure is simpler.

C: We do not have time to check the results since this version is only uploaded today. Need some more time.

A: The version uploaded today is just delete some part, no new contents.

The SPs are deferred after presentation of all related contributions.

1. **11-20-1216r3 – 4x LTF design –** Ron Porat (Broadcom)

**Summary:** Proposal on 4x LTF sequence for 320MHz transmission.

**Discussion:**

C: On slide 5, why you separate the sequence to 245 instead of 256?

A: The partition is to fit to RU boundary and DC.

C: Slide 7, we think it’s more important to consider worst case PAPR for all RUs.

A: Our proposal has good PAPR for all RU sizes.

C: Since the worst case PAPR is just 0.2dB difference, we prefer our simpler scheme.

C: On slide 7, you showed results from Huawei with PAPR>10dB. But we don’t have any PAPR results >10dB. Also, for RU996, the worst PAPR shown in slide 7 and 8 are not consistent.

C: We prefer to reuse the HE LTF sequence.

C: We don’t care using new sequence for 320MHz or reuse HE LTF sequence and extend to 320MHz. Similar complexity and memory.

C: You are using one sequence not different sequences for different RU right? The sequences for all RU sizes are coming from 320MHz sequence?

A: Yes.

C: If PPDU BW is 80MHz or 160MHz transmission, we are reusing the HE LTF sequences, right?

A: We passed the motion to reuse the LTF sequence for 80 and 160MHz. But if we defined a better new sequence for 320MHz, it’s a bit unclear to me whether we should also use the better new sequence for other BWs. We need to test all these cases anyway.   
C: What is the oversampling rate you use in the simulation?

A: 4x oversampling.

C: We don’t need to worry too much for a PAPR difference < 1dB.

A: We need to design a sequence anyway, it’s good to pick a good sequence.

C: 4xLTF is less useful than 2xLTF. We are over design the 4xLTF sequences. The PAPR is way lower than data portion.

**SPs on EHT-LTF**

1. **SPs from 1072r1**

There are requests to defer the SPs waiting for more results and check the results. Suggest running a high-level SP as below:

SP#1: New SP in 1072r1.

**Do you support to limit 2x 320MHz EHT-LTF to sequences that are created based on the 2x 80MHz HE-LTF?**

SP result: Y/N/A: 22/20/18

**Discussions on SP:**

C: This SP provide no information. Any manipulation can be applied to the HE LTF sequence and that will no longer be reusing HE-LTF sequence.

C: This SP seems not useful. Even I vote for this SP, I can and will still vote for a sequence with lower PAPR. Besides, any sequence can be based on any sequence with a special XOR operation.

C: Do you mind adding “This is not intended for SFD”?

A: No, we are intended for SFD.

1. **11-20-1150r2 – Preamble Puncture Discussion in EHT PPDU –** Ross Jian Yu (Huawei)

**Summary:** Proposal on preamble puncture for OFDMA and non-OFDMA modes and the signaling of preamble puncturing.

**Discussion:**

C: Slide 5: why split A field and B field? Why not signal full puncturing information in U-SIG?

A: There are different methods to signal preamble puncture patterns each has pros and cons.

C: 3 bits are enough to signal all preamble puncturing patterns.

A: If the group wants, we can remove the 8 reserved entries and make it 3 bits signaling.

SP#2: New SP 2b added to 1150r2.

* **Do you agree to add the following text in the TGbe SFD:**
  + **The preamble puncture indication field in U-SIG of an OFDMA transmission in an EHT MU PPDU indicates the preamble puncturing patterns of only the 80MHz where the U-SIG is being sent.**

SP result: Y/N/A: 35/0/9

**Discussions on SP:**

C: Why 1xx2 is in the table? This mode was failed before.

A: OFDMA can be more flexible to support this mode. And this mode was very close in the failed SP.

C: Should separate SP for detailed preamble puncture patterns and its signaling.

SP#3: SP5 in 1150r2.

* **Do you agree to add the following text in the TGbe SFD:**
  + **Regarding preamble puncture flexibility for OFDMA, supports up to one hole per 80MHz segments. If punctured, the puncture pattern of each segment shall be one of the following:**
    - **X212**
    - **1X12**
    - **12X2~~1~~**
    - **121X**
    - **XX12**
    - **12XX**
    - **1XX2**
  + **Note: Left-to-right represents low-to-high 20MHz channels.**

SP result: Y/N/A: 34/1/7

**Discussions on SP:**

C: Is the mapping from lower frequency to higher frequency?

A: Yes, we can clarify that.

C: This third one should be 12x2 right?

A: Yes, that’s a typo. Correct it.

1. **Remaining SPs on M-RU in 11-20-985r4 –** Wook Bong Lee (Samsung)

SP#4: SP1 in 985r4.

* **Do you agree to:**
  + Add two entries in the RU Allocation subfield table to indicate that
    - Punctured 242-tone RU
    - Unassigned 242-tone RU
  + Modify the existing entry “242-tone RU empty (with zero users)” to “242-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield and is not unallocated”
  + Modify the existing entry “484-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield” to “484-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield and is not unallocated”
  + Modify the existing entry “996-tone RU; 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” to “996-tone RU; contributes zero User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield and is not unallocated”
  + Add following
    - STA ID 2046 is indicating unallocated RU smaller than 242-tone RU. ~~for 106-tone or smaller RU.~~
    - ~~Note1: For equal or larger than 242-tone RU, STA ID 2046 shall not be used to indicated unallocated RU instead unassigned RU 242 shall be used.~~
    - Note~~2~~: Punctured RU 242 shall be used when the preamble portion of corresponding 20MHz is punctured.

**Discussions on SP:**

C: Remove Note 1.

C: Change “for 106-tone or smaller RU” to “smaller than 242-tone RU”

C: Add TBD for RU242 or larger.

C: Running out of time. Update the SP text in 985r5 and run SP in next meeting.

**Adjourn**

The meeting is adjourned at 13:00 PM ET