IEEE P802.11  
Wireless LANs

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| Minutes 802.11 be PHY ad hoc Telephone Conferences,  May - July 2020 | | | | |
| Date: 2020-05-19 | | | | |
| Author(s): | | | | |
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|  |  |  |  |  |

Abstract

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

* May 18th, 2020
* May 21st, 2020
* June 1st, 2020
* June 4th, 2020
* June 8th, 2020
* June 15th, 2020
* June 22nd, 2020

**Monday May 18th, 2020 10:00 – 13:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 10:00am ET.
2. The Chair follows the agenda in 11-20/0735r7
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:
   * [608r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0608-00-00be-consideration-on-eht-ltf.pptx) Consideration on EHT LTF (Jinyoung Chun) [2 SPs]
   * [651r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0651-01-00be-further-thoughts-on-eht-ltf-papr-in-802-11be.pptx) Further Thoughts on EHT-LTF PAPR in 802.11be (Genadiy Tsodik) [2 SPs]
   * [666r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0666-02-00be-80mhz-ofdma-tone-plan.pptx) 80MHz OFDMA Tone Plan (Ron Porat) [1 SP]
   * [609r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0609-02-00be-further-discussion-on-ru-allocation-subfield-in-eht-sig.pptx) Further discussion on RU allocation subfield in EHT-SIG (Ross J. Yu) [9 SPs]
   * [652r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0652-00-00be-signaling-of-ru-allocation-in-11be.pptx) Signaling of RU allocation in 11be (Dongguk Lim)
   * [738r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0738-00-00be-evaluation-of-signaling-overhead-for-eht-sig.pptx) Evaluation of signalling overhead for eht sig (Dongguk Lim) [1 SP]
   * [674r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0674-00-00be-forward-compatible-ofdma.pptx) Forward compatible OFDMA (Xiaogang Chen)
   * [767r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0767-00-00be-number-of-users-in-mu-mimo.pptx) Number of users in MU-MIMO (Ron Porat)

* + [773r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0773-00-00be-bcc-interleaver-parameters-for-multiple-ru.pptx) BCC Interleaver Parameters for Multiple RU (Ross Jian Yu)

1. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Sigurd Schelstraete (Quantenna/ON Semiconductor) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

* Abhishek Agrawal (On Semiconductor)
* Song-Haur An (Independent)
* Carol Ansley (Commscope)
* Rui Cao (Nxp Semiconductors)
* Xiaogang Chen (Intel)
* Jinsoo Choi (Lg Electronics)
* Roya Doostnejad (Intel Corporation)
* Ruchen Duan (Samsung)
* Ahmed Elsherif (Qualcomm Incorporated)
* Ming Gan (Huawei Technologies Co., Ltd)
* Lili Hervieu (Cable Television Laboratories Inc. (Cablelabs))
* Lei Huang (Panasonic Asia Pacific Pte Ltd.)
* Chenhe Ji (Huawei Technologies Co. Ltd)
* Feng Jiang (Intel Corporation)
* Oren Kedem (Huawei Technologies Co. Ltd)
* Myeong-Jin Kim (Samsung)
* Sanghyun Kim (Wilus Inc)
* Youhan Kim (Qualcomm Incorporated)
* Wookbong Lee (Samsung)
* Dandan Liang (Huawei Technologies Co., Ltd)
* Dong Guk Lim (Lg Electronics)
* Jianhan Liu (Mediatek Inc.)
* Miguel Lopez (Ericsson Ab)
* Hanqing Lou (Interdigital, Inc.)
* Liuming Lu (Zte Corporation)
* Khashayar Mirfakhraei (Cisco Systems, Inc.)
* Dignus-Jan Moelker (Broadcom Corporation)
* Leo Montreuil (Broadcom Corporation)
* Yujin Noh (Newracom Inc.)
* Stephen Palm (Broadcom Corporation)
* Eunsung Park (Lg Electronics)
* Ron Porat (Broadcom Corporation)
* Srinath Puducheri (Broadcom Corporation)
* Oded Redlich (Huawei)
* Sigurd Schelstraete (Quantenna Communications, Inc.)
* Prashant Sharma (Marvell Semiconductor, Inc.)
* Stephen Shellhammer (Qualcomm Incorporated)
* Shimi Shilo (Huawei)
* Paul Strauch (Qualcomm Incorporated)
* Jung Hoon Suh (Huawei Technologies Co. Ltd)
* Bo Sun (Zte Corporation)
* Bin Tian (Qualcomm Incorporated)
* Genadiy Tsodik (Huawei Technologies Co. Ltd)
* Allert Van Zelst (Qualcomm Incorporated)
* Lisa Ward (Rohde & Schwarz)
* Yan Xin (Huawei Technologies Co., Ltd)
* Aiguo Yan (Oppo)
* Rui Yang (Interdigital, Inc.)
* Steve Ts Yang (Mediatek Inc.)
* Yongjiang Yi (Futurewei Technologies)
* Christopher Young (Broadcom Corporation)
* Jian Yu (Huawei Technologies Co., Ltd)
* Mao Yu (Nxp Semiconductors)
* Yan Zhang (Nxp Semiconductors)

**Strawpolls**

**608r0 Consideration on EHT LTF (Jinyoung Chun)**

SP1:

Do you support to reuse 1/2/4x HE-LTF sequences for 1/2/4x EHT-LTF sequences in 80+80/160MHz?

Discussion:

* Does this impact the length of the sequence?
* A: same tones are used, reuse of existing LTF sequence.

Result:

Y/N/A: 41/0/4

SP2:

Do you support to use a unified sequence for each 1/2/4x EHT-LTF in full bandwidth transmission as well as preamble punctured or RU aggregated transmission in each 20/40/80/80+80/160/240/320MHz?

SP2 is deferred to reconsider support of 240 and 320 MHz

Deferred

**666r2 80MHz OFDMA Tone Plan (Ron Porat)**

SP:

Do you support the following toneplan for 11be 80 MHz OFDMA?   
80 MHz OFDMA = 40 MHz DUP, Table 27-8 in 11ax D6 right/left shifted by 256 tones.  
Notes: refer to 666r2

Discussion:

* Q: Location of the pilot tones is not specified
* A: same as in HE-40, with shift
* Q: Do the 5 DC tones in HE40 become a guard band?
* A: With the duplication it ends up being a guard band. Easiest way is to duplicate the design of 40.

Result:

Y/N/A: 44/1/5

**609r3 Further discussion on RU allocation subfield in EHT-SIG (Ross J. Yu)**

SP1:

Do you agree to add the following to the 11be SFD:

* 1. An RU Allocation subfield that is present in the Common field of the EHT-SIG field of an EHT PPDU sent to multiple users (except EHT TB PPDU), indicates RU assignment, including the size of the RU(s) and their placement in the frequency domain, to be used in the EHT modulated fields of the PPDU in the frequency domain.
     1. Compressed modes are TBD.

Results:

Y/N/A: 37/0/8

SP2:

Do you agree that the mapping from the TBD-bit RU Allocation subfield to the RU assignment, contains the following entries:

(see 609r3, slide 18)

Discussion:

* Comment: this depends on compression mode. Some modes may have to be removed.
* A: special entries not included here, only small RUs, singe RUs, small RU combinations, other things TBD.
* There is a request to defer after a separate, similar SP is run first
* Comment: more discussion needed on details. Would prefer to also run SP in 373r1 first.
* Several people agree with the “table” approach but want to see further details deferred.

SP2 from 609r3 is deferred

[20/0373r1] SP2:

Do you agree to use RU allocation subfield defined in 11ax to indicate RU to be assigned to each STA for MU PDDU when only one RU per a STA is assigned and the number of multiplexed users in each RU is supported in 11ax?

Discussion

Request to defer.

SP2 from 373r1 is deferred

SP3 (609r3):

Do you agree that when small MRU exists within a 242-tone RU range, MU-MIMO shall not be supported within the 242-tone RU range?

Discussion

* Request to remove MRU
* A: that changes the meaning of the SP
* Q: do you support MU-MIMO on RU106?
* A: same as 11ax
* Q: propose to just poll support of MU-MIMO for RU 242 and above.

SP3 is modified as follows:

SP3a:

* Do you agree that the minimum RU size for EHT to support MU-MIMO shall be 242-tone RU?

Results:

Y/N/A: 31/6/13

SP5 (609r3):

* **Do you agree that for RU484 or RU996, in the RU allocation table, 9 entries per RU size will be used to indicate: contributes 0~8 User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield?**

Discussion:

* Comment: more time to think about it. Not ready for details. Need to see whole picture.

All remaining SPs in 609r3 are deferred.

Proposal to run high-level SP related to this topic:

[20/0652r0] SP1:

* **Do you agree that the RU allocation subfield in the EHT-SIG field of an EHT-PPDU sent to multiple users includes the RU allocation for Multiple RUs as well as Single RU?**

Discussion:

* Q: does this mean that MRU is indicated by single entry in table?
* A: yes

Result:

Y/N/A: 38/0/10

**738r2 Evaluation of signalling overhead for eht sig (Dongguk Lim)**

SP1:

Do you agree that N RU allocation subfields are present in an EHT-SIG content channel?

Where, N is the number of RU allocation subfield in common field of EHT-SIG content channel.

N = 1 if a 20MHz or 40MHz EHT PPDU sent to multiple users is used.

N = 2 if a 80MHz EHT PPDU sent to multiple users is used.

N = TBD for other cases.

The compressed modes are TBD.

Discussion:

* Q: why not for all BWs?
* A: leave room for discussion for wider BW

Result:

Y/N/A: 38/1/10

**New Submissions**

**674r1 Forward compatible OFDMA (Xiaogang Chen)**

Discussion:

* Comment: this can be naturally supported. No requirement on future generations is necessary.
* Q: How long is time between frames (slide 5)?
* Several people comment that this should also be presented in the MAC or joint session. Presenter will ask for time in the joint session.
* Q: For UL OFDMA, could HE be outside of the P80?
* A: should be transparent to 11ax
* Q: is this for both UL and DL OFDMA?
* A: yes
* Q: need to consider all implications. Moving the LO per-packet could have consequences. Should not be an R1 feature.
* Q: what BW would be signalled for this?
* A: implementation specific.

SP is deferred

**767r0 Number of users in MU-MIMO (Ron Porat)**

Proposes that support of 8 MU-MIMO users is sufficient

Discussion:

* Q: any limits on N\_STS?
* A: already agreed to have a max of 4
* Q: should there be a minimum limit for N\_STS?
* A: no limit needed in spec.

SP:

* ~~Do you support that max 8 users can be scheduled in DL MU-MIMO group per RU/MRU?~~
* Do you agree that the max number of users that can be spatially multiplexed in EHT for DL transmissions is 8 per RU/MRU?
  + Applicable to all transmission modes in 11be ~~single AP MU-MIMO, as well as AP coordination mode~~

Results:

Y/N/A: 45/1/6

**773r0 BCC Interleaver Parameters for Multiple RU (Ross Jian Yu)**

Discussion:

* Q: in other cases, Ncol is N\_SD/DTM. Want to double check.
* A: OK to defer SP

SP deferred

**693 Aggregated PPDU for Large BW**

SP:

* **Do you agree to define frequency domain aggregation of ~~aggregated~~ PPDUs for EHT?**
  + Aggregated PPDU consists of multiple ~~sub-~~PPDUs.
    - The ~~sub-~~PPDU format combination limits to EHT and HE.
    - Other combinations are TBD.
    - For the ~~sub-~~PPDU using HE format, the PPDU BW TBD.
    - The number of ~~sub-~~PPDUs is TBD.
  + A-PPDU will be R2 feature.

Discussion:

* Q: sub-PPDU is level lower than PPDU. Is this terminology correct? “sub” should be removed
* Comment: 11ad has a definition for aggregated PPDU. Should use different term. “Frequency aggregation of PPDUs” is proposed

Results:

Y/N/A: 31/0/7

**Adjourn**

The meeting is adjourned at 12:56 PM ET

**Thursday May 21th, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 10:00am ET.
2. The Chair follows the agenda in 11-20/0735r11
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:  
   * [608r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0608-00-00be-consideration-on-eht-ltf.pptx) Consideration on EHT LTF (Jinyoung Chun) [SPs]
   * [651r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0651-01-00be-further-thoughts-on-eht-ltf-papr-in-802-11be.pptx) Further Thoughts on EHT-LTF PAPR in 802.11be (Genadiy Tsodik) [2 SPs]
   * [782r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0782-00-00be-eht-stf-sequences.pptx) EHT-STF Sequences (Eunsung Park)
   * [778r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0778-00-00be-mu-mimo-simplifications-for-eht.pptx) MU-MIMO Simplifications for EHT (Sameer Vermani)
   * [783r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0783-00-00be-eht-sig-compression-format.pptx) EHT-SIG Compression Format (Ross Jian Yu)
   * [699r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0699-01-00be-phase-rotation-proposal-follow-up.pptx) Phase Rotation Proposal Follow-up (Eunsung Park) [SPs]
   * [796r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0796-00-00be-mandatory-larger-bw-support.pptx) Mandatory larger BW support for PHY (Ron Porat)
   * [768r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0768-00-00be-further-discussion-about-preamble-puncturing.pptx) Further Discussion about Preamble Puncturing (Oded Redlich)
   * [789r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0789-00-00be-on-tbd-segment-parser-and-tone-interleaver-for-specific-mru.pptx) On TBD segment parser and tone interleaver for specific MRU (Jianhan Liu)
   * [791r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0791-01-00be-mandatory-m-ru-support.pptx) Mandatory M-RU (Ron Porat)
   * [793r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0793-00-00be-mru-support-in-11be.pptx) MRU support in 11be (Jianhan Liu)
   * 798r0 Signaling of RU allocation follow-up (Dongguk Lim)
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Sigurd Schelstraete (Quantenna/ON Semiconductor) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

* Song-Haur An (Independent)
* Jianwei Bei (Nxp Semiconductors)
* Rui Cao (Nxp Semiconductors)
* Xiaogang Chen (Intel)
* Jinyoung Chun (Lg Electronics)
* Rolf De Vegt (Qualcomm Incorporated)
* Roya Doostnejad (Intel Corporation)
* Ahmed Elsherif (Qualcomm Incorporated)
* Vinko Erceg (Broadcom Corporation)
* Hung-Tao Hsieh (Mediatek Inc.)
* Lei Huang (Panasonic Asia Pacific Pte Ltd.)
* Wookbong Lee (Samsung)
* Jialing Li (Qualcomm Incorporated)
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* Chenchen Liu (Huawei Technologies Co., Ltd)
* Hanqing Lou (Interdigital, Inc.)
* Jun Minotani (Panasonic Corporation)
* Khashayar Mirfakhraei (Cisco Systems, Inc.)
* Leo Montreuil (Broadcom Corporation)
* Takayuki Nakano (Panasonic Corporation)
* Eunsung Park (Lg Electronics)
* Ron Porat (Broadcom Corporation)
* Srinath Puducheri (Broadcom Corporation)
* Rethnakaran Pulikkoonattu (Broadcom Corporation)
* Sigurd Schelstraete (Quantenna Communications, Inc.)
* Shimi Shilo (Huawei)
* Paul Strauch (Qualcomm Incorporated)
* Jung Hoon Suh (Huawei Technologies Co. Ltd)
* Bo Sun (Zte Corporation)
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* Steve Ts Yang (Mediatek Inc.)
* Yongjiang Yi (Futurewei Technologies)
* Christopher Young (Broadcom Corporation)
* Jian Yu (Huawei Technologies Co., Ltd)
* Yan Zhang (Nxp Semiconductors)

**Strawpolls**

SPs in 608r0 and 651r1 are deferred

**New presentations**

**782r0 EHT-STF Sequences (Eunsung Park)**

Several new proposals for EHT-STF:

* 240/160+80 MHz EHT-STF sequence
* 320/160+160 MHz EHT-STF sequence
  + Two options

Discussion

Most of the discussion is around the question of whether 320 MHz phases can be reused for 240 MHz (seen as 320 MHz with punctured 80 MHz). The presenter indicates this is possible, although it is not his preference.

Q: some cases for 2x EHT-LTS show higher PAPR. Do these higher PAPR correspond to higher PAPR for data as well.

A: yes

SP2 (782r0)

* **Do you agree to add the following text to the TGbe SFD?**
  1. 1x and 2x 320/160+160MHz EHT-STF sequences are designed by repeating 1x and 2x 160MHz HE-STF sequences, respectively
     1. Additional coefficients for phase rotation are TBD

Discussion

Some people believe it’s too early to decide. There also remains the question of harmonizing with 240 MHz.

Deferred

SP3 (782r0)

* **Do you agree to unify the EHT-STF sequence between contiguous and non-contiguous modes for one given BW indicated in BW subfield in U-SIG?**
  1. It is not intended for SFD

Q: Does this mean that same sequence would be used for 240 and 160+80?

A: yes

Q: is it the intention to have one sequence per BW field value

A: yes

Q: not clear whether 240 MHz is a separate PPDU or punctured PPDU

SP is modified to capture that the sequence is based on BW field.

Results

Y/N/A: 34/1/5

**778r0 MU-MIMO Simplifications for EHT (Sameer Vermani)**

11ax allows a lot of flexibility in MU-MIMO. Many of these modes are not implemented.

Proposed simplifications:

* Min PPDU BW for hybrid transmissions is 80 MHz
* Min RU size for MU-MIMO in 80 MHz: RU 242
* Min RU size for MU-MIMO in 160 MHz: RU 242
* Min RU size for MU-MIMO > 160MHz: RU 484

Discussion:

Q: 20 MHz device cannot do MU-MIMO?

A: it can, as part of 80 MHz transmission.

Q: the size of the minimum RU should be up to the AP. Not clear how this simplifies things.

A: number of combinations grow exponentially with # RUs

SP1 (778r0)

* **Do you agree that for EHT PPDUs where MU-MIMO is happening on part of the PPDU BW 80MHz is the minimum PPDU BW ?**
  1. The limitation is also applicable to the case where the PPDU has multiple MU-MIMO RUs which collectively span the entire PPDU BW

Result:

Y/N/A: 25/12/10

Other SPs deferred

**783r0 EHT-SIG Compression Format (Ross Jian Yu)**

In 11ax: compression mode has no common field.

11be: 2 modes proposed

* Full BW MU-MIMO
* Punctures SU or MU-MIMO

Enable compression mode for aggregated PPDU and multi-segment EHT-SIG

SPs deferred

**699r1 Phase Rotation Proposal Follow-up (Eunsung Park)**

Main change: option 4 with alternative phase rotation method (only +/- 1 phase rotation)

SP#7

* **Which phase rotation do you prefer for 320/160+160 MHz PPDU?**
  1. Option 2: repeating conventional 11ax phase rotation and applying an additional binary coefficient to each 80MHz segment
  2. Option 4: alternative phase rotation with binary coefficients
  3. None
  4. Abstains

Note: This is not intended for SFD

Discussion:

Q: focus on 240 and 320 only?

A: phase rotation for 40/80/160 already agreed

Q: Option 2 preferred. Otherwise, legacy devices could be confused.

A: prefer option 2 or 4.

Q: not clear how this affects legacy devices.

Q: It may be necessary to keep the 80 MHz sequence for FTM

Q: is this applied to whole PPDU?

A: only legacy and EHT preamble

Results:

Option2/Option4/None/Abstain: 15/11/2/12

**Monday June 1st, 2020 10:00 – 13:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 10:00am ET.
2. The Chair follows the agenda in 11-20/0735r14
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:
   * [798r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0798-01-00be-signaling-of-ru-allocation-follow-up.pptx) Signaling of RU allocation follow-up (Dongguk Lim)
   * 829r0 EHT SIG Structure for Multi-user Support (Myeongjin Kim)
   * [609r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0609-01-00be-further-discussion-on-ru-allocation-subfield-in-eht-sig.pptx) Further discussion on RU allocation subfield in EHT-SIG (Ross Jian Yu) [6 SPs]
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   * [835r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0835-00-00be-pilot-locations-in-996-ru.pptx) Pilot locations in 996 RU (Ron Porat)
   * [789r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0789-00-00be-on-tbd-segment-parser-and-tone-interleaver-for-specific-mru.pptx) On TBD segment parser and tone interleaver for specific MRU (Jianhan Liu)
   * 838 Pilot
   * [768r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0768-00-00be-further-discussion-about-preamble-puncturing.pptx) Further Discussion about Preamble Puncturing (Oded Redlich)
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   * 829r0 EHT SIG Structure for Multi-user Support (Myeongjin Kim)
   * 825 EHT follow up
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* John Coffey (Realtek Semiconductor Corp.)
* Xiandong Dong (Xiaomi Inc.)
* Roya Doostnejad (Intel Corporation)
* Ruchen Duan (Samsung)
* Lili Hervieu (Cable Television Laboratories Inc. (Cablelabs))
* Hung-Tao Hsieh (Mediatek Inc.)
* Mengshi Hu (Huawei)
* Lei Huang (Panasonic Asia Pacific Pte Ltd.)
* Po-Kai Huang (Intel Corporation)
* Assaf Kasher (Qualcomm Incorporated)
* Sanghyun Kim (Wilus Inc)
* Youhan Kim (Qualcomm Incorporated)
* James Lansford (Qualcomm Incorporated)
* Wookbong Lee (Samsung)
* Dandan Liang (Huawei Technologies Co., Ltd)
* Dong Guk Lim (Lg Electronics)
* Chenchen Liu (Huawei Technologies Co., Ltd)
* Jeff Liu (Broadcom Corporation)
* Jianhan Liu (Mediatek Inc.)
* Yong Liu (Apple, Inc.)
* Miguel Lopez (Ericsson Ab)
* Hanqing Lou (Interdigital, Inc.)
* Liuming Lu (Zte Corporation)
* Lily Lv (Huawei Technologies Co. Ltd)
* Ebubekir Memisoglu (Imu)
* Khashayar Mirfakhraei (Cisco Systems, Inc.)
* Yujin Noh (Newracom Inc.)
* Eunsung Park (Lg Electronics)
* Sung-Jin Park (Lg Electronics)
* Ron Porat (Broadcom Corporation)
* Srinath Puducheri (Broadcom Corporation)
* Rethnakaran Pulikkoonattu (Broadcom Corporation)
* Oded Redlich (Huawei)
* Stephen Shellhammer (Qualcomm Incorporated)
* Shimi Shilo (Huawei)
* Paul Strauch (Qualcomm Incorporated)
* Jung Hoon Suh (Huawei Technologies Co. Ltd)
* Bo Sun (Zte Corporation)
* Bin Tian (Qualcomm Incorporated)
* Genadiy Tsodik (Huawei Technologies Co. Ltd)
* Kiran Uln (Cypress Semiconductor Corporation)
* Prabodh Varshney (Nokia)
* Leif Wilhelmsson (Ericsson Ab)
* Tianyu Wu (Apple, Inc.)
* Yan Xin (Huawei Technologies Co., Ltd)
* Aiguo Yan (Oppo)
* Jay Yang (Nokia)
* Rui Yang (Interdigital, Inc.)
* Steve Ts Yang (Mediatek Inc.)
* Yongjiang Yi (Futurewei Technologies)
* Christopher Young (Broadcom Corporation)
* Jian Yu (Huawei Technologies Co., Ltd)
* Mao Yu (Nxp Semiconductors)
* Yan Zhang (Nxp Semiconductors)

**Straw Polls**

[609r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0609-01-00be-further-discussion-on-ru-allocation-subfield-in-eht-sig.pptx) Further discussion on RU allocation subfield in EHT-SIG (Ross Jian Yu) [6 SPs]

**SP2 [609r7]**

* Do you agree that the mapping from the TBD-bit RU Allocation subfield to the RU assignment, contains the entries as shown in the Tables in SP2 of 609r7:
  1. The RUs highlighted in orange means combination.
  2. Other entries TBD
  3. Compressed mode TBD

Note: not all the 106+26 and 52+26 tone MRU are applicable when PPDU BW is greater than or equal to 80 MHz

Discussion:

It is suggested to remove some entries, pending different proposals.

One attendee points out that not all 40 MHz combinations are allowed and that current SFD limitations should also be respected.

Results

Y/N/A: 37/0/8

**SP3 [609r7]**

Do you agree that for RU242, RU484 or RU996, in the RU allocation table, 9 entries per RU size will be used to indicate:

* Contributes 0-8 User fields to the User Specific field in the sane EHT-SIG content channel as the RU allocation subfield
* Compressed modes are TBD

Results:

Y/N/A: 24/10/13

SP4 and SP5 in 609r7 are deferred.

[651r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0651-01-00be-further-thoughts-on-eht-ltf-papr-in-802-11be.pptx) Further Thoughts on EHT-LTF PAPR in 802.11be (Genadiy Tsodik) [2 SPs]

SP is intended for information collection only:

**SP1 [651r1]**

Do you support that 802.11be will define a solution which minimizes PAPR of the EHT-LTF field in the following scenarios:

* For BW <= 80 MHz cases mentioned on slide 10
* For BW > 80 MHz TBD

Results:

Y/N/A: 15/17/16

[782r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0782-02-00be-eht-stf-sequences.pptx) EHT-STF Sequences (Eunsung Park)

Discussion

Is it felt that 240 MHz BW signaling should be clarified first.

SP1 is deferred

**SP3 [782r2]**

Do you agree to add the following text to the TGbe SFD:

“1x and 2x 320/160+160 MHz EHT-STF sequences are designed by repeating 1x and 2x 80 MHz HE-STF sequences respectively.

Additional coefficients for phase rotation are TBD.

Results:

Y/N/A: 27/0/14

**New Submissions**

[798r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0798-01-00be-signaling-of-ru-allocation-follow-up.pptx) Signaling of RU allocation follow-up (Dongguk Lim)

**SP1 [798r1]**

Do you agreed that the RU allocation subfield includes large size of RU aggregation for OFDMA transmission defined in 11be SFD?

* For 80MHz : 484 + 242
* For 160MHz: 484 + 996
* For 320MHz: 3x996

Other cases are TBD.

Note: Specific RU allocation indication is TBD

Results:

Y/N/A: 30/5/8

Other SPs in 798r1 deferred

829r0 EHT SIG Structure for Multi-user Support (Myeongjin Kim)

After discussion, SPs in 829r0 are deferred.

**Adjourn**

The meeting is adjourned at 12:56 PM ET

**Thursday June 4th, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 19:00 ET.
2. The Chair follows the agenda in 11-20/0735r18
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:
   * [773r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0773-01-00be-bcc-interleaver-parameters-for-multiple-ru.pptx) BCC Interleaver Parameters for Multiple RU (Ross Jian Yu) [4 SPs]
   * [789r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0789-00-00be-on-tbd-segment-parser-and-tone-interleaver-for-specific-mru.pptx) On TBD segment parser and tone interleaver for specific MRU (Jianhan Liu)
   * [768r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0768-00-00be-further-discussion-about-preamble-puncturing.pptx) Further Discussion about Preamble Puncturing (Oded Redlich)
   * [791r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0791-01-00be-mandatory-m-ru-support.pptx) Mandatory M-RU (Ron Porat)
   * [793r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0793-00-00be-mru-support-in-11be.pptx) MRU support in 11be (Jianhan Liu)
   * [796r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0796-00-00be-mandatory-larger-bw-support.pptx) Mandatory larger BW support for PHY (Ron Porat)
   * [835r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0835-00-00be-pilot-locations-in-996-ru.pptx) Pilot locations in 996 RU (Ron Porat)
   * [838r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0838-00-00be-pilot-subcarriers-for-new-tone-plan.pptx) Pilot subcarriers considering new tone plan (Jinyoung Chun)
   * [825r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0825-00-00be-eht-ltf-sequences-in-new-tone-plan.pptx) EHT-LTF sequences in new tone plan (Jinyoung Chun)
   * [778r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0778-00-00be-mu-mimo-simplifications-for-eht.pptx) MU-MIMO Simplifications for EHT (Sameer Vermani)
   * [699r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0699-01-00be-phase-rotation-proposal-follow-up.pptx) Phase Rotation Proposal Follow-up (Eunsung Park) [1 SP]
   * [782r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0782-00-00be-eht-stf-sequences.pptx) EHT-STF Sequences (Eunsung Park) [2 SPs]
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Sigurd Schelstraete (Quantenna/ON Semiconductor) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

* Rui Cao (Nxp Semiconductors)
* Jinsoo Choi (Lg Electronics)
* Jinyoung Chun (Lg Electronics)
* Rolf De Vegt (Qualcomm Incorporated)
* Roya Doostnejad (Intel Corporation)
* Ruchen Duan (Samsung)
* Vinko Erceg (Broadcom Corporation)
* Mark Hamilton (Ruckus/Commscope)
* Hung-Tao Hsieh (Mediatek Inc.)
* Lei Huang (Panasonic Asia Pacific Pte Ltd.)
* Vincent Knowles IV Jones (Qualcomm Incorporated)
* Naveen Kakani (Qualcomm Incorporated)
* Myeong-Jin Kim (Samsung)
* Youhan Kim (Qualcomm Incorporated)
* Massinissa Lalam (Sagemcom Broadband Sas)
* Wookbong Lee (Samsung)
* Jialing Li (Qualcomm Incorporated)
* Qinghua Li (Intel Corporation)
* Dandan Liang (Huawei Technologies Co., Ltd)
* Dong Guk Lim (Lg Electronics)
* Chenchen Liu (Huawei Technologies Co., Ltd)
* Jianhan Liu (Mediatek Inc.)
* Hanqing Lou (Interdigital, Inc.)
* Jun Minotani (Panasonic Corporation)
* Khashayar Mirfakhraei (Cisco Systems, Inc.)
* Leo Montreuil (Broadcom Corporation)
* Takayuki Nakano (Panasonic Corporation)
* Yujin Noh (Newracom Inc.)
* Eunsung Park (Lg Electronics)
* Srinath Puducheri (Broadcom Corporation)
* Stephen Shellhammer (Qualcomm Incorporated)
* Shimi Shilo (Huawei)
* Muhammad Sohaib Solaija (Istanbul Medipol University; Vestel)
* Paul Strauch (Qualcomm Incorporated)
* Jung Hoon Suh (Huawei Technologies Co. Ltd)
* Bo Sun (Zte Corporation)
* Bin Tian (Qualcomm Incorporated)
* Genadiy Tsodik (Huawei Technologies Co. Ltd)
* Prabodh Varshney (Nokia)
* Sameer Vermani (Qualcomm Incorporated)
* Tianyu Wu (Apple, Inc.)
* Yan Xin (Huawei Technologies Co., Ltd)
* Aiguo Yan (Oppo)
* Rui Yang (Interdigital, Inc.)
* Steve Ts Yang (Mediatek Inc.)
* Yongjiang Yi (Futurewei Technologies)
* Jian Yu (Huawei Technologies Co., Ltd)
* Mao Yu (Nxp Semiconductors)
* Yan Zhang (Nxp Semiconductors)

**Straw Polls**

[773r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0773-01-00be-bcc-interleaver-parameters-for-multiple-ru.pptx) BCC Interleaver Parameters for Multiple RU (Ross Jian Yu) [4 SPs]

**SP1 [733r1]**

Do you support the following BCC interleaver parameters for RU78:

(see 773r1)

Note: the parameters are for w/o DCM case

Results:

Y/N/A: 37/0/9

**SP2 [773r1]**

Do you support the following BCC interleaver parameters for RU132:

Note: the parameters are for w/o DCM case

Ncol = 21

Results:

Y/N/A:40/0/N

**SP3 [773r1]**

Do you support the following BCC interleaver parameters for RU52+RU26:

Note: the parameters are for w/o DCM case

Nrot = 18

Results:

Y/N/A: 43/0/5

**SP4 [773r1]**

Do you support the following BCC interleaver parameters for RU106+RU26:

Note: the parameters are for w/o DCM case

Nrot = 31

Results:

Y/N/A: 41/0/4

[789r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0789-00-00be-on-tbd-segment-parser-and-tone-interleaver-for-specific-mru.pptx) On TBD segment parser and tone interleaver for specific MRU (Jianhan Liu)

Do you agree that 11be uses 80MHz segment parser with the following parameters for (242+484)+996?

Refer to 789r1 for the table.

Results:

Y/N/A: 43/0/6

**New presentations**

[791r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0791-01-00be-mandatory-m-ru-support.pptx) Mandatory M-RU (Ron Porat)

Q: BW support not clear. 160 MHz mandatory?

A: not part of this submission.

Q: Tx or Rx?

A: intended for both

Q: for OFDMA case, 160 MHz MRU should be able to be used in both P160 and S160.

**SP1 [791r4]**

Do you support the following mandatory RU combinations?

* Small: {26+52, 106+26} for non-AP STA only and in OFDMA only.
* Large: as in the table below

Conditioned on device supporting 80, 160, 240 and 320MHz transmissions

BW support for 11be AP and non-AP STA is TBD.

Refer to SP1 in 791r4 for the table.

Results:

Y/N/A: 42/4/6

Agreed to first look at SPs in 793 and then return to OFDMA cases. The document is updated to 791r5 to capture the update SP text.

**SP2 [791r5]**

Do you support the following mandatory RU combinations?

* Conditioned on device supporting 80, 160, 240 and 320MHz transmissions
* BW support for 11be AP and non-AP STA is TBD
* Note: currently in the SFD under OFDMA 2x996+484 and 3x996+484 are TBD

Refer to 791r5 for the table.

Results:

Y/N/A: 48/4/5

[793r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0793-00-00be-mru-support-in-11be.pptx) MRU support in 11be (Jianhan Liu)

**SP3 [793r2]**

Do you agree that for OFDMA, MRUs allowed in 80MHz PPDU shall be allowed in each 80MHz segment of 160MHz/80MHz+80MHz, 240MHz/160MHz+80MHz and 320MHz/160MHz+160MHz PPDU?

Results:

Y/N/A: 47/1/7

**SP4 [793r2]**

Do you agree that for OFDMA, MRUs (996+484) is allowed in the following cases?

* Contiguous 160MHz in 240MHz/160MHz+80MHz
* Primary 160MHz and secondary 160MHz in 320MHz/160MHz+160MHz

Results:

Y/N/A: 49/0/5

[768r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0768-00-00be-further-discussion-about-preamble-puncturing.pptx) Further Discussion about Preamble Puncturing (Oded Redlich)

**SP1 [768r0]**

Do you agree to allow puncturing structure 1001 in a given 80MHz segment for OFDMA PPDUs transmitted to STAs operating at BW>80MHz?

* Assuming 2 content channels are used.
* Puncturing signaling may be different for different 80MHz channels.

Results:

Y/N/A: 15/10/22

[796r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0796-00-00be-mandatory-larger-bw-support.pptx) Mandatory larger BW support for PHY (Ron Porat)

80 and 160 MHz operating devices shall be able to participate in higher BW OFDMA

**SP1 [769r0]**

Do you support that in 11be, 80MHz and 160MHz operating STA shall be able to participate in a higher BW DL and UL OFDMA transmission?

STA shall be able to decode the preamble and its assigned RU (some restrictions TBD)

No capability bit as in 11ax

Results:

Y/N/A: 46/0/7

[835r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0835-00-00be-pilot-locations-in-996-ru.pptx) Pilot locations in 996 RU (Ron Porat)

SP deferred till after presentation of contribution (838)

[838r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0838-00-00be-pilot-subcarriers-for-new-tone-plan.pptx) Pilot subcarriers considering new tone plan (Jinyoung Chun)

SP1 in 835 deferred to allow for further checking

SP1 in 838 skipped. Not clear if there is a need or this is covered by earlier agreements.

**Adjourn**

The meeting is adjourned at 10:00 PM ET

**Thursday June 8th, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 19:00 ET.
2. The Chair follows the agenda in 11-20/0735r20
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:
   * [835r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0835-00-00be-pilot-locations-in-996-ru.pptx) Pilot locations in 996 RU (Ron Porat) [1 SP]
   * [838r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0838-02-00be-pilot-subcarriers-for-new-tone-plan.pptx) Pilot subcarriers considering new tone plan (Jinyoung Chun) [6 SPs]
   * [778r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0778-00-00be-mu-mimo-simplifications-for-eht.pptx) MU-MIMO Simplifications for EHT (Sameer Vermani)
   * [699r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0699-01-00be-phase-rotation-proposal-follow-up.pptx) Phase Rotation Proposal Follow-up (Eunsung Park) [1 SP]
   * [825r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0825-00-00be-eht-ltf-sequences-in-new-tone-plan.pptx) EHT-LTF sequences in new tone plan (Jinyoung Chun)
   * [782r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0782-00-00be-eht-stf-sequences.pptx) EHT-STF Sequences (Eunsung Park) [2 SPs]
   * [829r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0829-01-00be-eht-sig-structure-for-multi-user-support.pptx) EHT SIG Structure for Multi-user Support (Myeongjin Kim) [2 SPs]
   * [839r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0839-00-00be-management-of-ru-allocation-field.pptx) Management of RU allocation field (Dongguk Lim)
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Sigurd Schelstraete (Quantenna/ON Semiconductor) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

* Song-Haur An (Independent)
* Eugene Baik (Qualcomm Incorporated)
* Rui Cao (Nxp Semiconductors)
* Xiaogang Chen (Intel)
* Jinsoo Choi (Lg Electronics)
* Jinyoung Chun (Lg Electronics)
* Rolf De Vegt (Qualcomm Incorporated)
* Xiandong Dong (Xiaomi Inc.)
* Roya Doostnejad (Intel Corporation)
* Ruchen Duan (Samsung)
* Ahmed Elsherif (Qualcomm Incorporated)
* Vinko Erceg (Broadcom Corporation)
* Hung-Tao Hsieh (Mediatek Inc.)
* Mengshi Hu (Huawei)
* Lei Huang (Panasonic Asia Pacific Pte Ltd.)
* Chenhe Ji (Huawei Technologies Co. Ltd)
* Sugbong Kang (Apple, Inc.)
* Myeong-Jin Kim (Samsung)
* Youhan Kim (Qualcomm Incorporated)
* Wookbong Lee (Samsung)
* Jialing Li (Qualcomm Incorporated)
* Qinghua Li (Intel Corporation)
* Dandan Liang (Huawei Technologies Co., Ltd)
* Chenchen Liu (Huawei Technologies Co., Ltd)
* Jianhan Liu (Mediatek Inc.)
* Hanqing Lou (Interdigital, Inc.)
* Ebubekir Memisoglu (Imu)
* Jun Minotani (Panasonic Corporation)
* Khashayar Mirfakhraei (Cisco Systems, Inc.)
* Leo Montreuil (Broadcom Corporation)
* Takayuki Nakano (Panasonic Corporation)
* Thomas Pare (Mediatek Inc.)
* Eunsung Park (Lg Electronics)
* Albert Petrick (Interdigital, Inc.)
* Ron Porat (Broadcom Corporation)
* Srinath Puducheri (Broadcom Corporation)
* Oded Redlich (Huawei)
* Sigurd Schelstraete (Quantenna Communications, Inc.)
* Stephen Shellhammer (Qualcomm Incorporated)
* Shimi Shilo (Huawei)
* Muhammad Sohaib Solaija (Istanbul Medipol University; Vestel)
* Paul Strauch (Qualcomm Incorporated)
* Jung Hoon Suh (Huawei Technologies Co. Ltd)
* Bo Sun (Zte Corporation)
* Bin Tian (Qualcomm Incorporated)
* Genadiy Tsodik (Huawei Technologies Co. Ltd)
* Kiran Uln (Cypress Semiconductor Corporation)
* Prabodh Varshney (Nokia)
* Sameer Vermani (Qualcomm Incorporated)
* Lisa Ward (Rohde & Schwarz)
* Yan Xin (Huawei Technologies Co., Ltd)
* Aiguo Yan (Oppo)
* Rui Yang (Interdigital, Inc.)
* Steve Ts Yang (Mediatek Inc.)
* Xun Yang (Huawei Technologies Co., Ltd)
* Yongjiang Yi (Futurewei Technologies)
* Christopher Young (Broadcom Corporation)
* Jian Yu (Huawei Technologies Co., Ltd)
* Mao Yu (Nxp Semiconductors)
* Yan Zhang (Nxp Semiconductors)

**Straw Polls**

[835r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0835-00-00be-pilot-locations-in-996-ru.pptx) Pilot locations in 996 RU (Ron Porat)

**SP1 [835r0]**

* Do you support aligning the inner 8 pilot locations for 996 RU with the smaller RU pilot locations as shown in the red?

{-468 -400 -334 -266 -220 -152 -86 -18 +18 +86 +152 +220 +266 +334 +400 +468}

During discussion, it is felt that running the similar SP in 838 is preferred.

This SP is discarded.

**SP6 [838r2]**

* Do you support to use the below pilot indices for n\*996RUs (n ≥ 1) in 11be?
  1. In a OFDMA/non-OFDMA 80MHz EHT PPDU
     1. Pilot indices of 996-tone RU: *P*996 = {-468, -400, -334, -266, -220, -152, -86, -18, 18, 86, 152, 220, 266, 334, 400, 468}
  2. In a OFDMA/non-OFDMA 160MHz EHT PPDU
     1. Pilot indices of 996-tone RU: {*P*996 -512}, {*P*996 + 512}
     2. Pilot indices of 2\*996-tone RU:{*P*996 -512, *P*996 + 512}
  3. In a OFDMA/non-OFDMA 320MHz EHT PPDU
     1. Pilot indices of 996-tone RU: {*P*996 -1536}, {*P*996 -512}, {*P*996 + 512}, {*P*996 + 1536}
     2. Pilot indices of 2\*996-tone RU:{*P*996 -1536, *P*996 -512}, {*P*996 + 512, *P*996 + 1536}
     3. Pilot indices of 4\*996-tone RU:{*P*996 -1536, *P*996 -512, *P*996 + 512, *P*996 + 1536}

Discussion

Q: how about 240 MHz?

A: not decided yet. Need to decide on 240 Hz channelization first.

Results:

Y/N/A: 44/0/9

**SP2 [838r2]**

* Do you support the below pilot indices for 26/52/106/242/484RU in 80/160/320MHz PPDU of 11be?
* in a OFDMA/non-OFDMA with puncturing 80MHz EHT PPDU

[Pilot indices in 40MHz]-256, [Pilot indices in 40MHz]+256

* in a OFDMA/non-OFDMA with puncturing 160MHz EHT PPDU

[Pilot indices in 80MHz]-512, [Pilot indices in 80MHz]-512

* in a OFDMA/non-OFDMA with puncturing 320MHz EHT PPDU

[Pilot indices in 160MHz]-1024, [Pilot indices in 160MHz]+1024

Results:

Y/N/A: 49/0/5

**SP3 [838r2]**

* Do you support that pilot subcarriers for small/large RU combinations includes the pilot subcarriers of each RU?

Results:

Y/N/A: 49/0/3

[778r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0778-00-00be-mu-mimo-simplifications-for-eht.pptx) MU-MIMO Simplifications for EHT (Sameer Vermani)

Deferred for further discussion

[699r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0699-01-00be-phase-rotation-proposal-follow-up.pptx) Phase Rotation Proposal Follow-up (Eunsung Park)

**SP8 [699r1]**

* Do you agree to add the following text to the TGbe SFD?
  1. 11be supports the following phase rotation sequence for legacy preamble, RL-SIG, U-SIG and EHT-SIG in 320/160+160 MHz PPDU
     1. [1 -1 -1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 1 1]

Discussion:

Q: clarify where this is to be used (which fields)?

Q: is “phase rotation sequence” clear enough?

Wording of SP is updated to clarify these issues

Results:

Y/N/A: 37/4/14

[825r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0825-00-00be-eht-ltf-sequences-in-new-tone-plan.pptx) EHT-LTF sequences in new tone plan (Jinyoung Chun)

Discussion:

Q: What pilot locations?

A: based on previous SP

Q: PAPR for 1x HE-LTF only considers non-OFDMA. Wonder if 1x LTF works well in OFDMA case.

Q: new sequence was used in r1. Request more time to check before SP.

Ron:

SP deferred

[782r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0782-00-00be-eht-stf-sequences.pptx) EHT-STF Sequences (Eunsung Park)

**SP7 [782r2]**

* Do you agree to add the following text to the TGbe SFD?
  1. *M* = {-1 -1 -1 +1 +1 +1 -1 +1 +1 +1 -1 +1 +1 -1 +1}
  2. Refer to 20/782r2 for detailed sequences.

Results:

Y/N/A: 32/0/13

**SP8 [782r2]**

Do you agree to add the following text to the TGbe SFD?

* 1. *M* = {-1 -1 -1 +1 +1 +1 -1 +1 +1 +1 -1 +1 +1 -1 +1}

Refer to SP8 in 20/782r2 for detailed sequences.

Results:

Y/N/A: 27/0/12

[829r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0829-01-00be-eht-sig-structure-for-multi-user-support.pptx) EHT SIG Structure for Multi-user Support (Myeongjin Kim)

**SP1 [829r1]**

* Do you agree that 11be defines a large-size RU OFDMA mode for EHT-SIG to indicate the information for multiple users assigned to RUs with size of >= 242 tones?
  1. Detail for large-size RU OFDMA mode are TBD.

Discussion:

Q: no mix of small RU and big RU?

A: could be defined. Can be discussed further.

Q: Why separate operating modes? Need combined RU allocation table.

Q: separate tables for small RU and large RU is too restrictive.

SPs deferred

**New Presentations**

[839r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0839-00-00be-management-of-ru-allocation-field.pptx) Management of RU allocation field (Dongguk Lim)

investigate the number of RU allocation subfields for the efficient signaling and reduction of overhead when the MRU aggregation and BW>80MHz are considered.

**SP1 [839r0]**

* Do you agree that the number of User fields per RU contributed to the user specific field in the same EHT-SIG content channel is indicated by the RU Allocation subfields in 11be OFDMA transmission?
  + - Compressed mode is TBD

Q: why not use wording consistent with 11ax spec?

SP wording changed to be consistent with HE wording.

SP is discarded.

**SP1 [839r1]**

* Do you agree that for non-compressed mode, each RU Allocation subfield in an EHT-SIG content channel corresponding to a 20 MHz frequency segment indicates the RU assignment, including the size of the RU(s) and their placement in the frequency domain, to be used in the EHT modulated fields of the EHT PPDU sent to multiple users in the frequency domain, also indicates information needed to compute the number of users allocated to each RU?

Results:

Y/N/A: 41/0/15

**SP2 [839r1]**

Do you agree that the specific 80MHz segment on which a STA is parked includes the STA’s allocated RU?

Discussion

Q: what about 160 MHz?

A: this SP only covers 80 MHz operating STA

SP Deferred

Remaining SPs to be deferred as well.

**Adjourn**

Meeting is adjourned at 9:47 PM ET.

**Thursday June 15th, 2020 10:00 – 13:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 10:00 ET.
2. The Chair follows the agenda in 11-20/0735r23
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:
   * [778r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0778-00-00be-mu-mimo-simplifications-for-eht.pptx) MU-MIMO Simplifications for EHT (Sameer Vermani) [3 SPs]
   * [825r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0825-00-00be-eht-ltf-sequences-in-new-tone-plan.pptx) EHT-LTF sequences in new tone plan (Jinyoung Chun) [5 SPs]
   * [829r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0829-01-00be-eht-sig-structure-for-multi-user-support.pptx) EHT SIG Structure for Multi-user Support (Myeongjin Kim) [2 SPs]
   * [839r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0839-00-00be-management-of-ru-allocation-field.pptx) Management of RU allocation field (Dongguk Lim) [4 SPs]
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Sigurd Schelstraete (Quantenna/ON Semiconductor) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

* Song-Haur An (Independent)
* Xiaogang Chen (Intel)
* Jinsoo Choi (Lg Electronics)
* Jinyoung Chun (Lg Electronics)
* Xiandong Dong (Xiaomi Inc.)
* Vinko Erceg (Broadcom Corporation)
* Thomas Handte (Sony Corporation)
* Hung-Tao Hsieh (Mediatek Inc.)
* Oren Kedem (Huawei Technologies Co. Ltd)
* Myeongjin Kim (Samsung)
* Youhan Kim (Qualcomm Incorporated)
* Dong Guk Lim (Lg Electronics)
* Chenchen Liu (Huawei Technologies Co., Ltd)
* Hanqing Lou (Interdigital, Inc.)
* Yujin Noh (Newracom Inc.)
* Eunsung Park (Lg Electronics)
* Sigurd Schelstraete (Quantenna Communications, Inc.)
* Stephen Shellhammer (Qualcomm Incorporated)
* Paul Strauch (Qualcomm Incorporated)
* Bo Sun (Zte Corporation)
* Genadiy Tsodik (Huawei Technologies Co. Ltd)
* Prabodh Varshney (Nokia)
* Leif Wilhelmsson (Ericsson Ab)
* Rui Yang (Interdigital, Inc.)
* Steve Ts Yang (Mediatek Inc.)
* Yongjiang Yi (Futurewei Technologies)
* Mao Yu (Nxp Semiconductors)
* Salah Eddine Zegrar ([Nv] Salah Eddine Zegrar (Vestel))
* Yan Zhang (Nxp Semiconductors)

**Straw Polls**

All submissions in the agenda have been presented earlier. The only business is running the associated Strawpolls. All presenters indicate that more time is needed to make progress on the pending straw polls.

Since no SPs can be run at this time, all items in the agenda are deferred till later.

**Other business**

A member asks about when we should get started on spec text. Other members respond that there are remaining items that need to be discussed first. Spec text will be discussed later.

**Adjourn**

The call is adjourned at 10:20 AM EST

**Thursday June 22nd, 2020 19:00 – 22:00 ET**

**Introduction**

1. The Chair (Tianyu Wu, Apple) calls the meeting to order at 19:00 ET.
2. The Chair follows the agenda in 11-20/0735r30
3. The Chair goes through the IPR policy and asks if anyone is aware of any potentially essential patents. Nobody speaks up.
4. The following agenda is approved:
   * [778r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0778-00-00be-mu-mimo-simplifications-for-eht.pptx) MU-MIMO Simplifications for EHT (Sameer Vermani) [3 SPs]
   * [825r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0825-00-00be-eht-ltf-sequences-in-new-tone-plan.pptx) EHT-LTF sequences in new tone plan (Jinyoung Chun) [5 SPs]
   * [829r1](https://mentor.ieee.org/802.11/dcn/20/11-20-0829-01-00be-eht-sig-structure-for-multi-user-support.pptx) EHT SIG Structure for Multi-user Support (Myeongjin Kim) [2 SPs]
   * [839r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0839-00-00be-management-of-ru-allocation-field.pptx) Management of RU allocation field (Dongguk Lim) [4 SPs]
   * [798r2](https://mentor.ieee.org/802.11/dcn/20/11-20-0798-02-00be-signaling-of-ru-allocation-follow-up.pptx) Signaling of RU allocation follow-up (Dongguk Lim) [4 SPs]
   * [922r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0922-00-00be-ru-allocation-subfield-in-eht-sig-follow-up-ii.pptx) RU allocation subfield in EHT-SIG Follow up II (Ross Jian Yu)
   * [925r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0925-00-00be-on-52-plus-26-m-ru.pptx) On 52+26 M-RU (Ron Porat)
   * [926r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0926-00-00be-eht-ltfs-sequences-design.pptx) EHT-LTFs Sequences Design (Dandan Liang)
   * [930r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0930-00-00be-consideration-on-user-specific-field-in-eht-sig.pptx) Consideration on user specific field in EHT-SIG field (Dongguk Lim)
5. The Chair reminds everyone to report their attendance by sending an e-mail to the Co-chair, Sigurd Schelstraete (Quantenna/ON Semiconductor) or the Chair himself.

**Attendance**

The following people recorded their attendance for this call:

* Song-Haur An (Independent)
* Eugene Baik (Qualcomm Incorporated)
* Jianwei Bei (Nxp Semiconductors)
* Rui Cao (Nxp Semiconductors)
* Xiaogang Chen (Intel)
* Jinsoo Choi (Lg Electronics)
* Jinyoung Chun (Lg Electronics)
* Xiandong Dong (Xiaomi Inc.)
* Roya Doostnejad (Intel Corporation)
* Ruchen Duan (Samsung)
* Ahmed Elsherif (Qualcomm Incorporated)
* Vinko Erceg (Broadcom Corporation)
* Hung-Tao Hsieh (Mediatek Inc.)
* Mengshi Hu (Huawei)
* Lei Huang (Panasonic Asia Pacific Pte Ltd.)
* Chenhe Ji (Huawei Technologies Co. Ltd)
* Jia Jia (Huawei Technologies Co., Ltd)
* Feng Jiang (Apple Inc.)
* Youhan Kim (Qualcomm Incorporated)
* Wookbong Lee (Samsung)
* Jialing Li (Qualcomm Incorporated)
* Qinghua Li (Intel Corporation)
* Dandan Liang (Huawei Technologies Co., Ltd)
* Dong Guk Lim (Lg Electronics)
* Chenchen Liu (Huawei Technologies Co., Ltd)
* Jianhan Liu (Mediatek Inc.)
* Hanqing Lou (Interdigital, Inc.)
* Leo Montreuil (Broadcom Corporation)
* Takayuki Nakano (Panasonic Corporation)
* Yujin Noh (Newracom Inc.)
* Thomas Pare (Mediatek Inc.)
* Eunsung Park (Lg Electronics)
* Ron Porat (Broadcom Corporation)
* Srinath Puducheri (Broadcom Corporation)
* Rethnakaran Pulikkoonattu (Broadcom Corporation)
* Sigurd Schelstraete (Quantenna Communications, Inc.)
* Prashant Sharma (Nxp Semiconductors)
* Stephen Shellhammer (Qualcomm Incorporated)
* Sudhir Srinivasa (Nxp Semiconductors)
* Paul Strauch (Qualcomm Incorporated)
* Jung Hoon Suh (Huawei Technologies Co. Ltd)
* Bo Sun (Zte Corporation)
* Bin Tian (Qualcomm Incorporated)
* Tao Tian (Unisoc Comm.)
* Genadiy Tsodik (Huawei Technologies Co. Ltd)
* Prabodh Varshney (Nokia)
* Sameer Vermani (Qualcomm Incorporated)
* Tianyu Wu (Apple, Inc.)
* Yan Xin (Huawei Technologies Co., Ltd)
* Aiguo Yan (Oppo)
* Lin Yang (Qualcomm Incorporated)
* Rui Yang (Interdigital, Inc.)
* Steve Ts Yang (Mediatek Inc.)
* Yongjiang Yi (Futurewei Technologies)
* Christopher Young (Broadcom Corporation)
* Jian Yu (Huawei Technologies Co., Ltd)
* Mao Yu (Nxp Semiconductors)
* Yan Zhang (Nxp Semiconductors)

**Straw Polls**

SPs in 829r1 are withdrawn

SPs in 778r0 are withdrawn

SPs in 825r0 and 839r0 are deferred till later

**New presentations**

[798r3](https://mentor.ieee.org/802.11/dcn/20/11-20-0798-02-00be-signaling-of-ru-allocation-follow-up.pptx) Signaling of RU allocation follow-up (Dongguk Lim)

Modified RU allocation tables to add certain large-RU MRUs.

**SP2 [20/0798r3]**

Do you agree that the RU allocation subfield includes the following entries to indicate ‘Zero STA’?

* One entry of 2x996 contributes zero user field

Discussion

There are several questions about possible alternative ways of indicating this. More time is needed fr further discussion.

SP2 deferred.

**SP3 [20/0798r3]**

* **Do you agree that for the indication of Multiple RUs, specific entries of allocation subfield that are separately located from that of single RUs are used?** 
  + Note: The RU allocation table in 11ax has hierarchically separate entries for RUs equal to or larger than 242 tones from that of RUs less than 242 tones
  + Note: How to make the entries in detail is TBD

Discussion

Q: this is too generic. Look at specific proposal instead.

Q: depends on how MRU will be indicated. There have been other proposals

SP3 and SP4 deferred

[922r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0922-00-00be-ru-allocation-subfield-in-eht-sig-follow-up-ii.pptx) RU allocation subfield in EHT-SIG Follow up II (Ross Jian Yu)

Discusses compressed vs. non-compressed modes. Adds missing entries in the RU allocation table. The submission proposes to consider baseline non-compressed OFDMA method first.

Discussion:

Q: compression mode 1 and non-compressed are sufficient. MCS also leads to shorter EHT-SIG.

Q: Does this imply separate signaling for SU packet?

A: that’s the preference

**SP1 [20/0922r1]**

Do you agree that for RU242, in the RU allocation table, 8 entries per RU size will be used to indicate: contributes 1~8 User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield?

* Make the following change in the baseline table in the SFD
* Compressed modes are TBD.

Results

Y/N/A: 41/0/9

**SP2 [20/0992r1]**

Do you agree that for RU484 or RU996, in the RU allocation table, 8 entries per RU size will be used to indicate: contributes 1~8 User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield?

-Add the following entries in the baseline table in the SFD

Refer to SP2 in 922r1 for the table.

-Zero user field cases TBD

-Compressed modes are TBD.

Results

Y/N/A: 44/0/7

**SP3 [20/0992r1]**

Do you agree that for RU 2\*996, in the RU allocation table, 8 entries per RU size will be used to indicate: contributes 1~8 User fields to the User Specific field in the same EHT-SIG content channel as this RU Allocation subfield?

-Add the following entries in the baseline table in the SFD

Refer to SP3 of 922r1 for the table.

-Zero user field cases TBD-Compressed modes are TBD.

Results

Y/N/A: 43/0/9

[925r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0925-00-00be-on-52-plus-26-m-ru.pptx) On 52+26 M-RU (Ron Porat)

Proposes one more location for 52+26 MRU.

**SP1 [20/0925r0]:**

Do you support adding the following combination [52,52+26,52,52] to the RU table to be used in 20MHz, 40MHz and 80MHz PPDU?

Results

Y/N/A: 36/1/15

[926r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0926-00-00be-eht-ltfs-sequences-design.pptx) EHT-LTFs Sequences Design (Dandan Liang)

SP deferred to allow for further simulation

[930r0](https://mentor.ieee.org/802.11/dcn/20/11-20-0930-00-00be-consideration-on-user-specific-field-in-eht-sig.pptx) Consideration on user specific field in EHT-SIG field (Dongguk Lim)

Extension of spatial stream configuration field for support of up to 16 SS

Discussion

Alternative ways to signal the Spatial Stream configuration are discussed.

**SP1 [20/0930r1]**

Do you agree that the common field of EHT SIG in EHT PPDU that is sent to multiple user includes the CRC and tail bits?

-The number of bits for CRC is TBD.

-The number of tail bits is 6.

-The configuration of the common field is TBD.

Results

Y/N/A: 41/3/7

**SP2 [20/0930r1]**

Do you agree that the user-specific field of EHT SIG in EHT PPDU that is sent to multiple user consists of the user block field(s) that is made up of 2 user fields except for the last user block?

-The last user block may have one or two user field(s).

-The user block field includes the CRC and tail bits.

The number of bits for CRC is 4.

The number of tail bits is 6.

Results

Y/N/A: 44/0/6

SPs 3, 4, 5, 6 deferred

**Other business**

838 had a typo in one of the passed SPs.838r3 with correction has been uploaded.

**SP:**

Do you support to replace Straw poll #79 in 566r32 with SP2 in 838r3?

Results

Y/N/A: 35/0/2

**Adjourn**

The call is adjourned at 21:44 EST