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 |
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Abstract

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

* May 18th, 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