IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D1.0 CR for Section 36.3.19.4 | | | | |
| Date: 2021-7-20 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Wook Bong Lee | Samsung |  |  | wookbong.lee@samusng.com |
|  |  |  |  |  |

Abstract

This submission proposes resolutions for the following comments on section 36.3.19.4 of TGbe D1.0:

* 4555, 4556, 4616, 6445, 7263, 7264, 7265, 7266, 7267, 7268, 7661

Baseline documents: TGbe D1.01.

Revisions:

* Rev 0: Initial version of the document. Use D1.01 as baseline spec text.
* Rev 1: Update resolution (same resolution but not in the resolution box but in main text).

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbe Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 4555 | 36.3.19.4 | 531 | "In this case, transmit modulation accuracy of each segment shall meet the required value in Table 36-64 (Allowed relative constellation error versus constellation size and coding rate) using only the occupied data subcarriers within the corresponding segment.". Since 11be only has one frequency segment, need to rephrase this sentence to remove the reference to the segment | as in the comment. | **Revised**:  *Adopt change #4 in 11-21/1213r2* |
| 4616 | 36.3.19.4 | 531 | For the narrow subcarriers of EHT, with a frequency offset between transmitter and receiver, especially for wider bandwidth PPDUs, ICI is a problem. It is often mitigated by resampling the signal before the FFT; yet it is challenging to perform such resampling without an oversampling ratio well above unity (e.g. 1.25-2x oversampled). However the 20+ year old EVM language (dating back to 20 MHz and 312.5 kHz subcarriers) still says "The transmit modulation accuracy test shall be performed by instrumentation capable of converting the transmitted signals into a stream of complex samples at sampling rate greater than or equal to the bandwidth of the signal being transmitted." | Preferred: change "sampling rate greater than or equal to" to "a sampling rate at least twice". Fallback: delete "or equal" | **Rejected**:  Subcarrier spacing for EHT is same as HE. If current sentence is problematic, then it would be better to fix it in TGme. |
| 7263 | 36.3.19.4.4 | 533 | Change "average across PPDUs of the RMS" to "average the RMS across PPDUs" | See comment | **Accepted** |
| 6445 | 36.3.19 | 534 | When defining an occupied RU bandwidth of r in units of a 26-tone RU, 26-tone RUs not defined such as 26-tone RU19 in 80MHz could be included since this is related to a range in units of a 26-tone RU. | Modify the numbers for r as follows. - Change 27 to 28 if 484+242-tone MRU - Change 36 to 37 if 996-tone RU - Change 54 to 55 if 996+484-tone MRU - Change 72 to 74 if 2x996-tone RU´, - Change 90 to 92 if 2x996+484-tone MRU - Change 108 to 111 if 3x996-tone MRU´, - Change 126 to 129 if 3x996+484-tone MRU | **Revised:**  Agreed.    *Adopt change #1 in 11-21/1213r2* |
| 4556 | 36.3.19.4 | 534 | r=36 for 996-tone RU. While I understand there are only 36 RU26 in 996-tone RU in the new EHT tone plan, however, the unoccupied EVM decay is more related to the occupied BW of 996-tone RU instead of the number of RU26 within its tone plan. So I suggest to use r=[RU occupied BW/2MHz) or set r=37 for RU996 to be aligned with the HE requirement. Also need to make the same adjustments for RU size>996. Note, if the r value is indeed changeed based on this comment, we also need to update the i\_RU26,end definition in L24P537 | as in the comment. | **Revised:**  Agree to use r=37 for 996-tone RU. Now RU19 is empty and total number of 26-tone RUs in 996-tone RU is 37.  However, we don’t need to update i\_RU26,end definition.  *Adopt change #1 in 11-21/1213r2*  *Note to editor: Same resolution as in #6445* |
| 7265 | 36.3.19.4.4 | 535 | Check column 2x996+484 tone MRU in Table 36-65. There are only 12 i\_RU values defined for this MRU in 320 MHz (see Table 36-15), yet in Table 36-65, i\_RU runs from 1 to 18. | Correct values may be (i\_RU, i\_RU26,start) = (1, 20), (6,1), (7, 57), (12,38). Other values N/A | **Revised:**  Agreed.  *Adopt change #2 in 11-21/1213r2.* |
| 7264 | 36.3.19.4.4 | 537 | The valid range shown on line 35 can not be correct for i\_RU26,start = 1. This gives 0<= m <=-1. Add that formula only applies for i\_RU26,start > 1. | See comment | **Revised:**  Agreed that equation (36-106) is only valid for i\_RU26,start > 1.  Also, likewise equation (36-107) is only valid for i\_RU26,end < N\_RU26.  *Adopt change #3 in 11-21/1213r2.* |
| 7266 | 36.3.19.4.4 | 537 | "N\_RU26 is the maximum number of 26-tone RUs for the given bandwidth of the EHT TB PPDU". Better to have an explicit table with values here. | Add Table | **Revised:**  *Add following sentence at the end of P559L28 of D1.01.*  “*NRU26* is 9, 18, 37, 74 and 148 for a 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz PPDU, respectively.” |
| 7267 | 36.3.19.4.4 | 537 | Clarify "treat noncontiguous MRU as a large RU/MRU that does not have an unmodulated portion in between multiple RUs". For instance: I suppose it's implied that this should be the large RU/MRU that is closest in size and location to the noncontiguous MRU. | See comment | **Rejected:**  I think the sentence is clear. The large RU is noncontiguous MRU which does not have unmodulated portion in between RUs which does imply exact size and location of the large RU. |
| 7268 | 36.3.19.4.4 | 537 | Change "For example, 2x996+484-tone MRU is treated as 3x996-tone MRU" to "For example, a non-contiguous 2x996+484-tone MRU is treated as a 3x996-tone MRU" | See comment | **Revised:**  *Adopt change #5 in 11-21/1213r2.* |
| 7661 | 36.3.19.4.4 | 537 | Testing unused tone EVM beyond a device's operating bandwidth will be too much. Waveform of a certain RU transmission in different PPDU bandwidth is same while it has different requirement. | Adopt a proposal in 11-21/763r0 or its latest version. | **Need discussion**  For each RU size and position, the modulated waveform will be same for different TB PPDU bandwidth (except the contents in U-SIG). However, the requirement for unused tone EVM test is different. Moreover, 11be mandates participating larger bandwidth which increases number of test. So, either testing only for 320 MHz PPDU or limiting it to the operating bandwidth. |

**Proposed Changes**

**Change #1**

*Modify equation (36-105) as follows*

28, if 484+242-tone RU

37, if 996-tone RU

55, if 996+484-tone RU

74, if 2x996-tone RU

92, if 2x996+484-tone RU

111, if 3x996-tone RU

129, if 3x996+484-tone RU

**Change #2**

*Modify table (36-65) as follows*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***iRU*** | **52-**  **tone RU** | **52+**  **26-**  **tone MRU** | **106-**  **tone RU** | **106+**  **26-**  **tone MRU** | **242-**  **tone RU** | **484-**  **tone RU** | **484+**  **242-**  **tone MRU** | **996-**  **tone RU** | **996+**  **484-**  **tone MRU** | **2****996**  **-tone RU** | **2****996**  **+484-**  **tone MRU** | **3****996**  **-tone MRU** | **3****996**  **+484-**  **tone MRU** |
| 1 | 1 | 2 | 1 | 1 | 1 | 1 | 10 | 1 | 20 | 1 | 20 | 38 | 20 |
| 2 | 3 | 3 | 6 | 5 | 10 | 20 | N/A | 38 | N/A | 75 | N/A | N/A | N/A |
| 3 | 6 | 6 | 10 | 10 | 20 | 38 | N/A | 75 | N/A |  | N/A | N/A | N/A |
| 4 | 8 | 11 | 15 | 14 | 29 | 57 | 1 | 112 | 1 |  | N/A | 1 | N/A |
| 5 | 10 | 12 | 20 | 20 | 38 | 75 | 47 |  | 94 |  | N/A |  | N/A |
| 6 | 12 | 15 | 25 | 24 | 47 | 94 | N/A |  | N/A |  | 1 |  | N/A |
| 7 | 15 | 21 | 29 | 29 | 57 | 112 | N/A |  | N/A |  | 57 |  | N/A |
| 8 | 17 | 22 | 34 | 33 | 66 | 131 | 38 |  | 75 |  | N/A |  | 1 |
| 9 | 20 | 25 | 38 | 38 | 75 |  | 84 |  |  |  | N/A |  |  |
| 10 | 22 | 30 | 43 | 42 | 84 |  | N/A |  |  |  | N/A |  |  |
| 11 | 25 | 31 | 47 | 47 | 94 |  | N/A |  |  |  | N/A |  |  |
| 12 | 27 | 34 | 52 | 51 | 103 |  | 75 |  |  |  | 38 |  |  |
| 13 | 29 | 39 | 57 | 57 | 112 |  | 121 |  |  |  |  |  |  |
| 14 | 31 | 40 | 62 | 61 | 121 |  | N/A |  |  |  |  |  |  |
| 15 | 34 | 43 | 66 | 66 | 131 |  | N/A |  |  |  |  |  |  |
| 16 | 36 | 48 | 71 | 70 | 140 |  | 112 |  |  |  |  |  |  |
| 17 | 38 | 49 | 75 | 75 |  |  |  |  |  |  |  |  |  |
| 18 | 40 | 52 | 80 | 79 |  |  |  |  |  |  |  |  |  |
| 19 | 43 | 58 | 84 | 84 |  |  |  |  |  |  |  |  |  |
| 20 | 45 | 59 | 89 | 88 |  |  |  |  |  |  |  |  |  |
| 21 | 47 | 62 | 94 | 94 |  |  |  |  |  |  |  |  |  |
| 22 | 49 | 67 | 99 | 98 |  |  |  |  |  |  |  |  |  |
| 23 | 52 | 68 | 103 | 103 |  |  |  |  |  |  |  |  |  |
| 24 | 54 | 71 | 108 | 107 |  |  |  |  |  |  |  |  |  |
| 25 | 57 | 76 | 112 | 112 |  |  |  |  |  |  |  |  |  |
| 26 | 59 | 77 | 117 | 116 |  |  |  |  |  |  |  |  |  |
| 27 | 62 | 80 | 121 | 121 |  |  |  |  |  |  |  |  |  |

**Change #3**

*Modify P559L34-L40 of D1.01 as follows:*

The valid range for *m* for [Equation (36-106)](#bookmark309) is as follows:

* *-iRU*26 *start* + 1  *m*  –1 for a 20 MHz, 40 MHz, 80 MHz, 160 MHz, or 320 MHz PPDU when *iRU*26 *start* > 1, otherwise there is no valid *m*.

The valid range for *m* for [Equation (36-107)](#bookmark310) is as follows:

* 1  *m*  *NRU*26 – *iRU*26 *end* for a 20 MHz, 40 MHz, 80 MHz, 160 MHz, or 320 MHz PPDU when *iRU*26 *end* < *NRU*26, otherwise there is no valid *m*.

**Change #4**

*Modify P553L42-L44 of D1.01 as follows.*

“In this case, transmit modulation accuracy ~~of each segment~~ shall meet the required value in [Table 36-64](#bookmark303) [(Allowed relative constellation error versus constellation size and coding rate)](#bookmark303) using only the occupied data subcarriers ~~within the corresponding segment~~.”

**Change #5**

*Modify following sentence (P559L52-54 of D1.01).*

“For example, a noncontiguous 2x996+484-tone MRU is treated as a 3x996-tone MRU, and find the average unused subcarrier error vector magnitude for each unoccupied 26-tone RU based on the large RU/MRU.”