IEEE P802.11
Wireless LANs

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| Comment Resolution on PHY Miscellaneous  |
| Date: 2018-11-08 |
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Abstract

This submission shows

* Resolution for a comment received from TGax comment collection (TGax Draft D3.0)
* The proposed changes are based on 11ax D3.0.

The submission provides resolutions to comments related to HE PHY Miscellaneous.

* The submission provides resolutions to 12 CIDs:
15596, 15599, 16189, 16336, 16418,

16838, 16669, 15954, 17102, 16043,

15665, 15980

Revisions:

* Rev 0: Initial version of the document.

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15596 | 545.37 | 350 Hz requirement corresponds to either 0.145 ppm (in 2.412 GHz) or 0.0491 ppm (in 7.125 GHz). It is better to quantify residual CFO error in terms of ppm rather than Hz. | Please state the 350 Hz number in terms of ppm | Reject—350 Hz can be easily translated into ppm value based on carrier frequency. The current text is reasonable. Also, as commenter pointed out, if using ppm to represent tracking error, different requirements have to be used for different carrier frequence.  |

***Discussion***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15599 | 545.52 | For STAs that do not compensate for the RTD, a distance greater than 60m between AP and STA causes the +-0.4us requirement in 28.3.14.3 to fail. We should add clarifying language to the spec that indicates this. | Replace the following sentence: "The STA is not expected to measure or compensate for the RTD when transmitting the HE TB PPDU." with "For STAs that are less than or equal to 60 m apart from the AP, the STA is not expected to measure or compensate for the RTD when transmitting the HE TB PPDU. For STAs that are more than 60 m apart from the AP, the STA is expected to measure and compensate for the RTD when transmitting the HE TB PPDU." | Reject—The requirement is written for verification of TB PPDU synchronization requirements against test equipment. Such tests are cabled tests with equal cable length for each STA.  |

***Discussion***

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| CID | P.L | Comment | Proposed Change | Resolution |
| 16189 | 409.01 | 28.3.4 is fairly clear that the only HE PPDU fromats are SU, MU, ER and TB, but some other parts of the spec seem to think HE NDP and HE NDP short feedback are (HE) PPDU formats too | Change F28-44, F28-45 to not refer to an HE (TB) NDP (feedback) PPDU format | RevisedThe HE NDP PPDU is a variant of the HE SU PPDU and HE TB NDP feedback PPDU is a variant of the HE TB PPDU. These two PPDU variants are not new PPDU format. TGax Editor: please make changes for CID 16189 according to 11-18-1842-02-00ax |

Discussion

From D3.1 to D3.2, the 28.3.16 HE sounding NDP PPDU and 28.3.17 HE TB NDP feedback are merged into the 28.3.4 HE PPDU formats. This change is not preferred since HE sounding NDP PPDU and HE TB NDP are not PPDU formats. Instead, they are just special variants of HE SU PPDU and HE TB PPDU. It’s better to have separated sections to discussion HE sounding NDP PPDU and HE TB NDP PPDU, similar to clause 21 has a separated section 21.3.12 for sounding NDPs. Some of the mandatory/optional support (e.g. GI and LTF) discussions also better be put in separated sections 28.3.16 and 28.3.17 instead of 28.3.4

***------------- Begin Text Changes ---------------***

***TGax Editor: Please make the redline change in 283.4 HE PPDU formats of D3.2 for CID 16189***

* HE PPDU formats

In HE PHY four HE PPDU formats are defined: HE SU PPDU, HE MU PPDU, HE ER SU PPDU and HE TB PPDU. The HE NDP PPDU is a variant of the HE SU PPDU and the HE TB NDP feedback PPDU is a variant of the HE TB PPDU. These two PPDU variants are defined in 28.3.16 (HE sounding NDP PPDU) and 28.3.17 (HE TB NDP feedback PPDU).The format of the HE SU PPDU is defined as in Figure 28-8 (HE SU PPDU format). This PPDU format is used for SU transmission and, in this format, the HE-SIG-A field is not repeated.

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| * HE SU PPDU format
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The format of the HE MU PPDU is defined as in Figure 28-9 (HE MU PPDU format). This format is used for transmission to one or more users if(#15468) the PPDU is not a response of a Trigger frame. The HE-SIG-B field is present in this format.

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| * HE MU PPDU format
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The format of the HE ER SU PPDU is defined as in Figure 28-10 (HE ER SU PPDU format). This format is used for SU transmission and, in this format, the HE-SIG-A field is twice as long as the HE-SIG-A field in other HE PPDU formats(#16732).

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| * HE ER SU PPDU format
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The format of the HE TB PPDU is defined as in Figure 28-11 (HE TB PPDU format). This format is used for a transmission that is a response to a Trigger frame or a frame carrying a TRS Control subfield from an AP(#16534). The HE TB PPDU format is identical to the HE SU PPDU format for the L-STF, L-LTF, L-SIG, RL-SIG, HE-SIG-A fields. The duration of the HE-STF field is 8 µs.

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| * HE TB PPDU format
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***TGax Editor: Please add two new sections 28.3.16 HE NDP PPDU and 28.3.17 HE TB NDP PPDU to D3.2 for CID 16189***

* HE NDP PPDU

The HE NDP PPDU is a variant of the HE SU PPDU. Its structure is shown in Figure 28-44 (HE NDP PPDU).

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| * HE NDP PPDU
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NOTE—The number of HE-LTF symbols in the HE NDP is indicated in the NSTS And Midamble Periodicity field in the HE-SIG-A field

The HE NDP PPDU has the following properties:

* Uses the HE SU PPDU format but without the Data field
* Has a Packet Extension field that is 4 s in duration

It is mandatory to support the 2x HE-LTF with 0.8 µs GI and 2x HE-LTF with 1.6 µs GI. It is optional to support the 4x HE-LTF with 3.2 µs GI(#15970). The other combinations of HE-LTF modes and GI durations are disallowed.

If the Beamformed field(#16038) in HE-SIG-A of an HE NDP PPDU is 1, then the receiver of the HE NDP PPDU shall not perform channel smoothing when generating the compressed beamforming feedback report.

* HE TB NDP feedback PPDU

The HE TB NDP feedback PPDU is used to carry the NDP feedback report information as introduced in 27.5.6 (NDP feedback report procedure). The HE TB NDP feedback PPDU is a variant of the HE TB PPDU. The structure of an HE TB NDP feedback PPDU is shown in Figure 28-45 (HE TB NDP feedback PPDU).

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| * HE TB NDP feedback PPDU
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The HE TB NDP feedback PPDU has the following properties:

* Uses the HE TB PPDU format but without the Data field and PE field
* Has two 4x HE-LTF symbols
* 4x HE-LTF with 3.2 µs GI is the only HE-LTF mode and GI duration combination for the HE-LTF
* The generation of HE-LTF symbols for the HE TB NDP feedback PPDU is defined in 28.3.10.10 (HE-LTF)
* The HE-STF and the pre-HE modulated fields are only transmitted on the 20 MHz channel where the STA is assigned

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16336 | 546.51 | "The number of bits for quantization, tone grouping factor, and the number of col-umns in the HE compressed beamforming feedback are determined by the beamformee only if the HE NDPAnnouncement frame contains a single STA Info field. " -- the "only" is not clear and adds nothing | Delete "only" in the cited text at the referenced location | RejectedThe word “only” highlights that this is the only condition that BFee determines these parameters. This sentence and the one before it should be read together to get the full picture. |

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16418 | 545.12 | I issued the following comment in D2.0 which was rejected in the may meeting I missed:"the minimum requirement for absolute transmit power accuracy of class B device being +/- 9dB is extremely loose. I could understand +/- 6 dB, but here we are talking about almost 10 dB of tolerance in both directions. What kind of device would pass any certification/regulation (coexistence) tests with such loose requirements? I think the purpose of the specifications is to give reasonable targets and not low-end values."I'm sorry but the answer provided does not seem to address my concern."REJECTED (PHY: 2018-05-16 02:03:23Z)Defining Class B device is for low-cost devices which may not be a good choice to group Class B device with Class A device for MU transmissions. Thereofer +/-9dB is defined for such purpose."It is clear that you don't want to group class A and B devices together in an MU transmission, but my comment was on the values of the class B itself. So a class B STA which says to transmit to 20dBm may in fact be transmitting at 11dBm ...or worst, the STA is saying it transmits at 11dBm while it is actually transmitting at 20dBm ... I'm sure you do not even want to consider such device for OFDMA / MU MIMO operation . or even SU | Define Class B to have no more than -/+ 6dB of accuracy in terms of "absolute transmit power accuracy" in Table 28-44 | Reject—To achieve good Tx power accuracy, RF calibration is required. For low end device, RF calibration can be a cost burden. +/-9dB range is chosen based on the feedbacks from many vendors on the uncalibrated implementations. It should be clarified that Tx power inaccuracy is mostly a bias instead of random error. Although such class B device initial Tx power may be off, AP may conspensate such bias in the following schedueling by adjusting target RSSI. It is possible class B devices can still be used for UL OFDMA and MU-MIMO transmission, let alone SU transmission.  |

***Discussion***



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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16838 | 466.62 | Does N\_RU include the RU that has no user (e.g., STA ID=2046)? | Please clarify because the implication is different depending on the answer. | Reject—The tex is clear: ‘For HE modulated fields, *NRU* represents the number of occupied RUs in the transmission.” So N\_RU doesn’t include the RU that is not coccupied, i.e RU has no user.  |

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16669 | 288.40 | This statement does not make sense. TXTIME gives the PPDU duration in us. How does this get converted into an L\_LENGTH value? The PLME SAP for TRS Control is broken. | Fix the PLME SAP for HT TB PPDUs sent in response to a TRS Control field. Define how L\_LENGTH is obtained from the HE TB PPDU Length and other fields. | Revised—There are two steps to compute the L-LENGTH. 1) Compute TXTIME using Eq 28-135 in which Nsym is set to to Fval+12) Compute the L-LENGTH from TXTIME using eq 28-11. The current text is correct but minor text clean up is helpful.TGax Editor: make changes for CID 16669 according to 11-18-1842-02-00ax |

Discussion







***------------- Begin Text Changes ---------------***

***TGax Editor: Please make the redline change in 27.5.3.2.4 (AP access procedures for UL MU Operation) for CID 16669***

The L\_LENGTH parameter is computed as described in Equation (28-11) using the TXTIME value. The TXTIME is defined by Equation (28-135), in which the variable *NSYM* is set to *FVAL* + 1, where *FVAL* is the value of the HE TB PPDU Length subfield of the TRS Control subfield.

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 17102 | 98.51 | make it clear the text "pilots are not used in the LTF mode of the UL MU-MIMO HE TB PPDU response". Then what is the responding STA's behavior? |  | Revised—Text is improved for clarity.TGax Editor: make changes for CID 17102 according to 11-18-1842-02-00ax |
| 15954 | 98.23 | "the MU-MIMO LTF Mode subfield isset to one of the following:--- If a Trigger frame allocates an RU that spans the entire HE TB PPDU bandwidth and the RU is assigned to more than one STA, then the MU-MIMO LTF Mode subfield is set to indicate either HE single stream pilot HE-LTF mode or HE masked HE-LTF sequence mode." -- this is behaviour not format and should not be in Clause 9. In fact it's already in 27.5.3.2.3: "If an AP transmits a Trigger frame that allocates an RU that spans the entire HE TB PPDU bandwidth and assigns the RU to more than one STA (i.e., for UL MU-MIMO) and with the GI And LTF Type subfield of the Common Info field set to indicate [...]" | Change lines 23 to 54 of page 98 to "The MU-MIMO LTF Mode subfield of the Common Info field indicates the LTF mode of the UL MU-MIMO non-OFDMA HE TB PPDU response when the GI And LTF Type subfield of the Common Info field is set to indicate either 2x LTF + 1.6 us GI or 4x LTF + 3.2 us GI, as defined in Table 9-25e. Otherwise, this subfield is reserved." | Revised—In OFDMA UL-MU-MIMO HE TB PPDU and OFDMA HE TB PPDU, MU-MIMO LTF Mode is not reserved as proposed in the resolution. However, there is a need to improve the language for clarity.TGax Editor: make changes for CID 15954 according to 11-18-1842-02-00ax |

Discussion



***------------- Begin Text Changes ---------------***

***TGax Editor: Please make the redline change in 9.3.1.23 (Trigger frame format)***

The MU-MIMO LTF Mode subfield of the Common Info field indicates the LTF mode of the UL MU-MIMO HE TB PPDU response when the GI And LTF Type subfield of the Common Info field is set to indicate either 2x LTF + 1.6 us GI or 4x LTF + 3.2 us GI, in which case the MU-MIMO LTF Mode subfield is set to one of the following:

* ~~If a Trigger frame allocates an RU that spans the entire HE TB PPDU bandwidth and the RU is assigned to more than one STA,~~ In a non-OFDMA UL MU-MIMO HE TB PPDU (15954) ~~then~~ the MU-MIMO LTF Mode subfield is set to indicate either HE single stream pilot HE-LTF mode or HE masked HE-LTF sequence mode.
* Otherwise, the MU-MIMO LTF Mode subfield is set to indicate HE single stream pilot HE-LTF mode. The MU-MIMO LTF Mode subfield encoding is defined in Table 9-25e (MU-MIMO LTF Mode subfield encoding).

If the GI And LTF Type subfield of the Common Info field is set to indicate 1x LTF + 1.6 us GI, the MU-MIMO LTF Mode subfield of the Common Info field is reserved ~~and pilots are not used in the LTF mode of the UL MU-MIMO HE TB PPDU response~~. When the 1x HE-LTF is used for non-OFDMA UL MU-MIMO HE TB PPDU, neither HE masked HE-LTF sequence mode nor HE single stream pilot HE-LTF mode are used. (17102)

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16043 | 99.27 | There is no specification of how the AP sets the LDPC Extra Symbol Segment subfield in the Trigger frame (except for MU-RTS and NFRP, where it is reserved). There are descriptions of how to determine it for HE SU/ER/TB PPDUs, but not for the Trigger frame itself | Add normative text on how an AP sets the LDPC Extra Symbol Segment subfield | Reject—Section 28.3.11.5.5 describes LDPC Extra Symbol Segment compute.D3.0, P.L 521.22 “ For an HE TB PPDU with LDPC encoding, follow HE SU PPDU padding and encoding process as introduced in 28.3.11.2 (Pre-FEC padding process), 28.3.11.5.2 (LDPC coding), and 28.3.11.5.3 (Post-FEC padding), with the following exceptions..” |

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15665 | 102.43 | At beginning of 28.3.11.10 Space-time block coding, it says that "For an HE PPDU, STBC is applied only with 1 or 2 spatial streams and only if DCM is not applied.", therefore it is better that in trigger frame user info field, we add the resctriction that if UL STBC bit in common info field of trigger frame is 1, then the DCM bit in SIGB per user info field shall be 0. | as comment | Revised—Text is improved to address the comment.Resolution of CID15980 is applicable to this CID. |
| 15980 | 102.47 | There is nothing to prevent STBC being set to 1 in the Common Info field of a Trigger frame, and DCM being set to 1 in one or more of the User Info fields | At the end of the paragraph at the referenced location add "The UL DCM subfield is set to 0 if the UL STBC subfield of the Common field is set to 1." | Revised—TGax Editor: make changes for CID 15980 according to 11-18-1842-02-00ax |

***------------- Begin Text Changes ---------------***

***TGax Editor: Please make the redline change in 9.3.1.23 (Trigger frame format) for CID 15980***

The UL DCM subfield of the User Info field indicates DCM of the HE TB PPDU that is the response to the Trigger frame. The UL DCM subfield is set to 1 indicate that DCM is used in the HE TB PPDU that is the response to the Trigger frame as defined in 28.3.11.15 (Dual carrier modulation). The UL DCM subfield is set to 0 to indicate that DCM is not used. The UL DCM subfield is set to 0 if the UL STBC subfield of the Common Info field is set to 1. (15980)

***------------- End Text Changes ---------------***