IEEE P802.11  
Wireless LANs

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| Remaining PHY Math comment resolutions | | | | |
| Date: 2018-9-10 | | | | |
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Abstract: This document contains proposed resolutions for comments from 11ax D3.0 with the CIDs below.

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| ***Clause 28.3.8***   * 16245,16794,16795,16796,16837   ***Clause 28.3.9***   * 15568,16797,16798,16799,16800,16991   ***Clause 28.3.10.3***   * 16801   ***Clause 28.3.10.7.4***   * 16810   ***Clause 28.3.10.9***   * 16814   ***Clause 28.3.11.2***   * 16319 | | | | | | |  | |
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| 16245 | | 28.3.8 | 446.51 | "For an HE MU PPDU, NDBPS is undefined" -- so NDBPS only applies to HE SU PPDUs, so u will always be 0, so there is no point definining NDBPS,u | Delete NDBPS,u from Table 28-15 | **Rejected.**  The definition of NDBPS,u is necessary for STAs participating in HE MU PPDU. The statement of "For an HE MU PPDU, NDBPS is undefined" means that NDBPS does not apply to an HE MU PPDU transmission.  This is the same definition as in Revmd\_D0.4 Table 21-6 Frequently used parameters. | | |

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| 16794 | 28.3.8 | 444.8 | Change "depending on GI used" to "depending on GI used for data", to be consistent with earlier definitions in the same Table (e.g. T\_GI,HE-LTF) | See comment | **Accepted.** |

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| 16795 | 28.3.8 | 446.35 | N\_user,total is only vaguely described in words. Provide an unambiguous formula. | Add definition of N\_user,total, e.g. N\_user,total = sum\_r N\_user,r | **Revised.**  Change to as in the resolution of CID16795 in doc IEEE802.11-18/1492r1. |
| 16796 | 28.3.8 | 447.7 | Change "the r-th RU of the transmission" to "the r-th occupied RU of the transmission" | See comment | **Revised.**  Change to as in the resolution of CID16796 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.8*

* On P446L35 (CID #16795,CID #16796):

Move the definitions of “ “ and “ “ to the first two entries of Table 28-15 (Frequently used parameters), and add the definition of “ “ after it. Remove “where  is the total number of users in all occupied RUs of an HE transmission” in the definition of “ “.

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| **Symbol** | **Explanation** |
|  | For pre-HE modulated fields, = 1. For HE modulated fields, represents the number of occupied RUs in the transmission. |
|  | For pre-HE modulated fields,  = 1. For HE modulated fields, represents the total number of users in the *r*-th occupied RU of the transmission. |
|  | Total number of users in all occupied RUs of an HE transmission, i.e., . |
|  | Number of coded bits per symbol for user *u*, *u* = 0, ..., – 1. |
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| 16837 | 28.3.8 | 445.30 | Table 28-13: N\_DC of CBW160 should be 33 to add up to 2048 with N\_ST, N\_Guard,Left, and N\_Guard,Right. | Please update if agreed. | **Rejected.**  There are 5 unused tones in lower and upper 80MHz channels respectively, but these 10 tones are not DC tones. |

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| 15568 | 28.3.9 | 449.28 | Figure 28-22 and following equation for T\_HE\_PE apply to the case without midamble. May want to add a sentence to clarify that or update the plot and equation. | as in comment | **Revised.**  Change to as in the resolution of CID15568 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.9*

On P449L17 (CID #15568): The timing boundaries for the various fields are shown in Figure 28-22 when midamble is not present (Timing boundaries for HE PPDU fields when midamble is not present), …

Change Figure 28-22 title to ‘Timing boundaries for HE PPDU fields when midamble is not present”.

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| 16797 | 28.3.9 | 450.16 | All three instance of t\_HE-Data can be written as t\_HE-LTF + N\_HE-LTF x T\_HE-LTF-SYM, using the notations from Table 28-12. | Use a single formula instead of three different formulas | **Revised.**  Change to as in the resolution of CID16797 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.9*

* On P450L16 (CID #16797): Replace the equation of  with the following



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| 16798 | 28.3.9 | 450.38 | r\_Subfield should have additional indices r and u as shown in equation (28-4)notations from Table 28-12. | Add indices r and u. | **Revised.**  Change to as in the resolution of CID16798 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.9*

* On P450L38 (CID #16798): In an HE TB PPDU, transmitted by user *u* in the *r*-th RU, each subfield, , is defined in Equation (28-4).

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| 16799 | 28.3.9 | 450.51 | "HE modulated fields refer to the HE-STF, HE-LTF, Data, and PE fields".  This is not consistent with the text on page 426, line 33. There PE is not listed as an HE modulated field. | Is PE an HE-modulated field or not? Given that no waveform is specified it may be better to not include it in the HE modulated fields. | **Revised.**  Change to as in the resolution of CID16799 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.9*

* On P450L51 (CID #16799):

In the remainder of this subclause, pre-HE modulated fields refer to the L-STF, L-LTF, L-SIG, RL-SIG, HE-SIG-A, and HE-SIG-B fields, while HE modulated fields refer to the HE-STF, HE-LTF, and Data fields, as shown in Figure 28-22 (Timing boundaries for HE PPDU fields).

Please exclude PE field in HE modulated fields in figure 28-22.

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| 16800 | 28.3.9 | 451.13 | Delete "excluding DC subcarriers". The Tables already exclude those. | See comment | **Accepted.** |

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| 16991 | 28.3.9 | 453.36 | "For pre-HE modulated fields, T\_CS,HE(l) =0". This is not accurate if BEAM\_CHANGE=0. Change to "For pre-HE modulated fields when BEAM\_CHANGE=1 or not present, T\_CS,HE(l) =0, For pre-HE modulated fields when BEAM\_CHANGE=0, and HE modulated fields, T\_CS,HE(l) represents the cyclic shift per space-time stream,...". | as in comment | **Revised.**  Change to as in the resolution of CID16991 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.9*

On P453L36 (CID #16991):

 For pre-HE modulated fields when the TXVECTOR parameter BEAM\_CHANGE is 1 or not present, . For HE modulated fields, and pre-HE modulated fields when TXVECTOR parameter BEAM\_CHANGE is 0,  represents the cyclic shift per space-time stream, whose value is defined in 28.3.10.2.2 (Cyclic shift for HE modulated fields).

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| 16801 | 28.3.10.3 | 455.59 | Equation (28-6) shows a sum over i\_BW in the set Omega\_20MHz. Similar Equation (28-8) shows the same sum over i\_BW as going from 0 to N\_20MHz-1. Is there a reason for this difference? The notation in (28-6) is more general and covers all PPDU formats (even if BEAM\_CHANGE only applies to SU) | Similar comments on page 456. 62, 458.62, 459.41, 476.13 | **Rejected.**  The commenter is right that “sum over i\_BW in the set Omega\_20MHz” also applies to equation 28-8 when BEAM\_CHANGE is 0. However, the current version of explicitly summing from 0 to N\_20MHz-1 is more concise and clearer to indicate pre-HE modulated fields transmit on all 20MHz channels contained in the transmit bandwidth. |

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| 16810 | 28.3.10.7.4 | 477.4 | (28-18) is a 20 MHz waveform centered around DC. Shouldn't it be shifted to the primary 20? | Correct | **Revised.**  Change to as in the resolution of CID16319 in doc IEEE802.11-18/1492r1. |

Discussion: Equation (28-18) represents a complex baseband signal for HE-SIG-A field of an HE ER SU PPDU. Equation (28-1) includes the frequency shift to primary 20MHz channel. However the definition of  is not accurate to reflect that the baseband signal is shifted to primary 20MHz channel.

ax editor: please make the following change in D3.0 *Clause 28.3.9*

On P449L13 (CID #16810):

 represents the center frequency of the portion of the PPDU transmitted in frequency segment . Table 21-7 (Center frequency of the portion of the PPDU transmitted in frequency segment ) shows  as a function of the channel starting frequency and dot11CurrentChannelWidth (see Table 21-22 (Fields to specify VHT channels)) where ,,, and  are given in Equation (21-4), Equation (21-5), Equation (21-7), and Equation (21-9), respectively.

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| 16814 | 28.3.10.9 | 492.20 | "The HE-STF field is constructed by mapping the M sequence(s) multiplied by (1+j)/sqrt(2) or (-1-j)/sqrt(2)". All multiplications are with (1+j)/sqrt(2), the sign is in the M sequence. | Change sentence to: "The HE-STF field is constructed by mapping the M sequence(s) multiplied by (1+j)/sqrt(2)" | **Rejected.**  As shown in equations (28-23) to (28-27), (28-29) to (28-36), the HES sequences include portion of -M\*(1+j)/sqrt(2), which is equivalent to M sequence multiplied by (-1-j)/sqrt(2). |

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| 16319 | 28.3.11.2 | 513.47 | "In the case of STBC, the FEC output bits and post-FEC padding bits are modulated into the last two OFDM symbols by STBC encoding, each with the same number of effective symbol segments." -- not clear enough how "a" / pre-FEC padding factor works for STBC | As it says in the comment | **Revised.**  Change to as in the resolution of CID16319 in doc IEEE802.11-18/1492r1. |

ax editor: please make the following change in D3.0 *Clause 28.3.11.2*

On P513L86 (CID #16319):

Four pre-FEC padding boundaries partition the last one (in the case of non-STBC), or two (in the case of STBC) OFDM symbols of an HE PPDU into four symbol segments. The pre-FEC padding may pad toward one of the four boundaries. The four pre-FEC padding boundaries are represented by a pre-FEC padding factor parameter.

Figure 28-35 (HE PPDU padding process in the last OFDM symbol (non-STBC) when a = 1) illustrates these four symbol segments in the last OFDM symbol of a non-STBC case, and the general padding process assuming the desired pre-FEC padding boundary, represented by the pre-FEC padding factor, is 1. In the case of STBC, the FEC output bits and post-FEC padding bits are modulated into the last two OFDM symbols by STBC encoding, each with the same pre-FEC padding boundary.