IEEE P802.11  
Wireless LANs

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| Remaining PHY Math comment resolutions | | | | |
| Date: 2019-10-31 | | | | |
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Abstract: This document contains proposed resolutions for comments from 11ax D5.0 with the CIDs below.

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| ***Clause 9.3.1.22.1***   * 22036   ***Clause 27.3.8***   * 22462   ***Clause 27.3.9***   * 22044   ***Clause 27.3.10.10***   * 22043,22045   ***Clause 27.3.11.5.4***   * 22455   ***Clause 27.3.11.5.5***   * 22072, 22037, 22450 | |  |
| ***Clause 27.3.11.10***   * 22451   ***Clause 27.3.11.11***   * 22033, 22034, 22035 | |  |

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| 22036 | 116.40 | 9.3.1.22.1 | For TX of HETB, the logic on setting PE Disambiguity is incomplete. From P116L40, PE Disambiguity is set according to (27-118). From P629L63, (27-118), PE Disambiguity = f(TXTIME) where it is indicated P630L5 that TXTIME is defined in 27.4.3. In 27.4.3, at P674L43, TXTIME = g(nSym). From P675L1, it is indicated that the calculation for nSym is found in 27.3.11.5.5. In 27.3.11.5.5, BUT this only defines how non-AP STAs may obtain nSym, not APs. There is a NOTE that an AP is free to calculate any value for Pre-FEC Padding factor and LDPC Extra Symbol Segment fields, but this note is silent re nSym. | Perhaps include nSym in the note of the parameters that the AP is free to select? But does this ever create a situation where the client might calculate a 20us PE (for instance?) | **Rejected.**  Nsym can be derived by UL\_Length using Equation (27-119). Although AP is free to choose pre-FEC padding and LPDC Extra Symbol Segment fields, those values will reflect in UL length value in Trigger frame common info field. AP and non-AP STA will get the same Nsym number using Equation (27-119). I don’t think TPE will be more than 16us using Equation (27-120). |

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| 22037 | 609.38 | 27.3.11.5.5 | "For an HE TB PPDU sent in   response to a Trigger frame, the AP indicates the UL Length, Pre-FEC   Padding     Factor, UL STBC and LDPC Extra Symbol Segment fields in the Trigger   frame." is incomplete since other critcal parameters for the PHY calculations   are GI & HELTF type, PE Disambiguity, number of HE LTFs and the presence   of any midambles: | List all parameters that the PHY   needs | **Revised.**  Change to as in the resolution of CID22037 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.11.5.5*

* On P609L38 (CID #22037):

For an HE TB PPDU sent in response to a Trigger frame, the AP indicates the UL Length, GI and LTF Type, Number of HE-LTF symbols and Midamble Periodicity, Pre-FEC Padding Factor, UL STBC, LDPC Extra Symbol Segment, PE Disambiguity and Doppler fields in the Trigger frame.

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| 22043 | 598.42 | 27.3.10.10 | Figures 27-32 and 27-33 and do not align with equation (27-58) nor (27-59). E.g. for HESU/MU/TB, Q is Q\_{iTx,,Mr,u+m} (i.e. with iTx) and A is [A]\_{Mr,u+m,n+1} not n. Similar for HETB | Change n to n+1 (in both figures). After [Q], insert 1:N\_TX (or 1:N\_{TX}) as a subscript (in both figures). BTW, N\_TX is defined in TXVECTOR but N\_{TX} is used in multiple figures (search on "chain" then look around). | **Revised.**  Change to as in the resolution of CID22043 in doc IEEE802.11-19/1983r0. |

Discussion:

The commentor is right that column index of is (n+1) in Equation (27-58) and (27-59). However, based on the Matrix notational conventions defined in 27.3.9 Mathematical description of signals, [Q]m:n indicates a matrix consisting of columns m to n of matrix Q, the suggestion of inserting 1: after [Q] is not defined in the Matrix notational conventions. In Figure 27-28, indicates multiplying the entire matrix. To eliminate confusion, we can explicitly multiply each row of Q matrix for each transmit antenna.

ax editor: please make the following change in D5.0 *Clause 27.3.10.10*

* On P598L42 (CID #22043):

Please replace Figure 27-32 with the following figure.



* On P599L5 (CID #22043):

Please replace Figure 27-33 with the following figure.



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| 22045 | 585.56 | 27.3.10.10 | Language, being incomplete, is not very clear. | Change to "Single stream pilot in HE-LTF shall be used for SU, DL and UL OFDMA, DL MU-MIMO and partial bandwidth UL MU-MIMO transmission, and is an available mode for full bandwidth HE UL MU-MIMO (when single stream pilot HE-LTF mode is selected)." | **Revised.**  Change to as in the resolution of CID22045 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.10.10*

* On P585L56 (CID #22045):

Single stream pilot in HE-LTF shall be used for SU, DL and UL OFDMA, DL MU-MIMO, partial bandwidth UL MU-MIMO transmission, and full bandwith UL MU-MIMO transmission when HE single stream pilot HE-LTF mode is selected.

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| 22072 | 609.47 | 27.3.11.5.5 | The placement of NOTE after the sentence about responding to TRS control is extremely confusing. The LDPC Extra Symbol and pre-FEC padding factor for a TB-PPDU responding to TRS is hard coded in the spec, not selected by the AP | Move the NOTE before the sentence about HE TB PPDU in response to a frame containing TRS control | **Revised.**  Change to as in the resolution of CID22072 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.11.5.5*

* On P609L47 (CID #22072):

NOTE—The AP might select any value for the pre-FEC padding factor and LDPC Extra Symbol Segment fields for the solicited HE TB PPDU regardless of the respective values derived from the calculations described in the BCC or LDPC encoding process.

For an HE TB PPDU sent in response to a frame containing a TRS Control subfield, the parameters used to derive the common values TPE and NSYM are described in 26.5.2.3.4 (TXVECTOR parameters for HE TB PPDU response to TRS Control subfield).

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| 22450 | 609.29 | 27.3.11.5.5 | It seems missing "u" of the left hand side of equations of 27-88 and 27-89. | Fix it if agreed. | **Revised.**  Change to as in the resolution of CID22450 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.11.5.5*

* On P609L29 (CID #22450):

(28-88)

(28-89)

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| 22451 | 617.30 | 27.3.11.10 | An equal sign seems missing in the if condition, e.g., should be 0<= k <= N\_SD/2-1 instead of 0<= k < N\_SD/2-1 . | Fix it if agreed. | **Revised.**  Change to as in the resolution of CID22451 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.11.10.*

On P617L30 (CID #22451):

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| 22455 | 607.37 | 27.3.11.5.4 | Line 37 says, "mSTBC is the common STBC setting among all the users, as described in 27.3.11.7 (Segment parser)." However, no mention of mSTBC can be found in 27.3.11.7. | Please correct the section number or add more specific illustration. | **Revised.**  Change to as in the resolution of CID22455 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.11.5.4*

* On P607L37 (CID #22455):

is the common STBC setting among all the users, as described in 27.3.10.7 (HE-SIG-A)

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| 22033 | 618.1 | 27.3.11.11 | The inputs and outputs of the HE   STBC section are ill-defined and not clearly mapped to the inputs and outputs   of the references VHT STBC section. Specifically, the "output" of   section 27.3.11.11 is d''. The "input" to section 27.2.11.12 is   also d''! (i.e. STBC in HE must be a null operation!). Meanwhile the input of   the referenced 21.3.10.9.4 is d and the output is dTilde. | Re-introduce an old term to HE,   dTilde. Write something like "If there is no STBC, then dTilde = d''. If   there is STBC, then follow 27.3.11.12 where the (input) VHT d is set to the   HE d'' and HE dTilde is set to the "output" VHT dTilde." Then   use dTilde in place of d'' in section 27.3.11.12. | **Revised.**  Change to as in the resolution of CID22033 in doc IEEE802.11-19/1983r0. |

Discussion:

The issue the commentor raised is due to the wrong order of 27.3.11.12 Segment deparser, it should be before Space-time Block Coding.

ax editor: please make the following change in D5.0 clause 27.3.11

* On P618L1 (CID #22033): Move Segment deparser to 27.3.11.11, and move Space-time Block Coding to 27.3.11.12.

**27.3.11.11 Segment deparser**

**27.3.11.12 Space-time Block Coding**

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| 22034 | 615.18 | 27.3.11.12 | d is used twice in proximate PHY   subclauses but with completely different meanings. Specifically, plain d is   used as the output of constellation mapping and also the output of the   Segment deparser | Ensure that distinct symbols are   used for distinct quantiies. Given that d dates back to clause 17 and is   inherited by reference, change the Segment deparser d to something new (e.g.   reshuttle the d, d', d'' so constellation mapper output (with DCM) is d, LDPC   tone parser output is d' and Segment deparser is d''.) Or go with dOverbar,   dHat, etc | **Revised.**  Change to as in the resolution of CID22034 in doc IEEE802.11-19/1983r0. |
| 22035 | 615.18 | 27.3.11.10 | The connection between the   constellation mapping and LDPC tone mapping sections is broken. Specifically,   the "input" to the LDPC tone mapping section is d', but the   "output" of the previous constellation mapping is undefined for the   no-DCM case (or perhaps plain d due to the cross-ref to 21.3.10.9 and thence   17.3.5.8) and is surely plain d for the DCM case. | Ensure that the same symbol is   due for the output of constellation mapping (currently plain d) as the input   to LDPC tone mapping (currently d'). Given that d dates back to clause 17 and   is inherited by reference, change d' to d in the LDPC tone mapping case. | **Revised.**  Change to as in the resolution of CID22035 in doc IEEE802.11-19/1983r0. |

Discussion:

The issues the commentor raised is due to mislabeling of constellation mapping output for DCM case. In 21.3.10.9, the constellation mapping output is d’ instead of d while d is used in 27.3.11.10 for constellation mapping output for DCM case.

ax editor: please make the following change in D5.0 clause 27.3.11.10

* On P615L18 (CID #22034, CID #22035):

If DCM is employed, bit sequences are mapped to a pair of symbols where k is in the range of …

* On P615L30 (CID #22034, CID #22035):

Each bit is BPSK modulated to a sample .

* On P615L32 (CID #22034, CID #22035):

For the upper half of the subcarriers, the samples are generated as ,

* On P615L39 (CID #22034, CID #22035):

Each pair of bits is QPSK modulated to a symbol . This generates the constellation points for the lower half the data subcarriers in the RU. For the upper half of the data sub-carriers in the RU, , where conj() represents the complex conjugate operation

* On P615L48 (CID #22034, CID #22035):

A group of 4 bits is 16-QAM modulated to a sample as described in 17.3.5.8 (Subcarrier modulation mapping). This is the sample on subcarrier in the lower half. In the upper half, the sample on subcarrier is obtained by 16-QAM modulating a per-mutation of the bits . Specifically, is obtained by applying the 16-QAM modulation procedure in 18.3.5.8 to the bit group .

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| 22044 | 539.15 | 27.3.9 | Kr is used in an equaton, and in the description of equaiton parameters below the equation, but is itself not defined below the equation. | To keep it simple, change to "|Kr| is the cardinality of the set of subcarriers Kr (defined in relation to Equations (27-3) and (27-4))" | **Rejected.**  Kr is defined on P538L25 in related to Equations (27-3) and (27-4). |

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| 22462 | 534.13 | 27.3.8 | Is N\_STS defined for an HE MU PPDU? | Please update as needed. | **Revised.**  Change to as in the resolution of CID22462 in doc IEEE802.11-19/1983r0. |

ax editor: please make the following change in D5.0 *Clause 27.3.8*

* On P534L13 (CID #22462): Add the following statement on P534L18

For an HE MU PPDU, is undefined if any one of the RUs is assigned to more than one user, and when all RUs are assigned to no more than one user, and STBC field is set to 1.