IEEE P802.11  
Wireless LANs

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| 11ax Draft 6.0 PHY Comment Resolutions | | | |
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Abstract: This document contains proposed resolutions for comments from 11ax D6.0 with the CIDs below.

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| ***Clause 27.3.4***   * 24182   ***Clause 27.3.9***   * 24323   ***Clause 27.3.10***   * 24183,24184   ***Clause 27.3.10.10***   * 24314,24315,24316,24317   ***Clause 27.3.12.5.2***   * 24197   ***Clause 27.3.12.5.5***   * 24322,24330   ***Clause 27.3.12.10***   * 24198 | |  |
| ***Clause 27.3.12.11***   * 24199   ***Clause 27.3.12.14***   * 24200,24201,24202,24203   ***Clause 27.3.12.16***   * 24204 | |  |

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| 24182 | 521.31 | 27.3.4 | The requirement on signal extension is not clear. The paragraph starting on line 31 describes that signal extension is present if NO\_SIG\_EXTN is set to false. The paragraph starting on line 35 states that signal extension is present is NO\_SIG\_EXTN is set to false and additional conditions apply. It would appear that these conditions are irrelevant given the requirement contained in the paragraph starting at line 31?  Is it instead the intention to say that NO\_SIG\_EXTN should be set to false if one of the conditions applies? | Clarify | **Rejected.**  The paragraph starting on line 35 states that signal extension is present if NO\_SIG\_EXTN is set to false and one of the following additional conditions apply, which seems to contradict with the paragraph starting on line 31 describes that signal extension is present if NO\_SIG\_EXTN is set to false. However, NO\_SIG\_EXTN is not present in VHT PPDU, and this is the reason that the text “one of the following conditions apply” is added to explicitly eliminate VHT PPDU. In 11md Draft 3.1 10.3.8 Signal extension, it states that “When an HT STA transmits a PPDU using a RIFS and with the TXVECTOR parameter FORMAT equal to  NON\_HT with the NON\_HT\_MODULATION parameter equal to one of ERP-OFDM and  NON\_HT\_DUP\_OFDM or a PPDU using a RIFS and with the TXVECTOR parameter FORMAT equal to  HT\_MF or HT\_GF, it shall set the TXVECTOR parameter NO\_SIG\_EXTN to true.”  So the intention is not say that NO\_SIG\_EXTN should be set to false if one of the conditions applies. |

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| 24183 | 543.36 | 27.3.10 | " with 0 being the center (DC) subcarrier".  In 27.3.2.2 the same term "DC subcarriers" is used in a different meaning. | Use consistent wording | **Revised.**  DC subcarriers consist of more than one subcarriers. The text in 27.3.10 intends to clarify that subcarrier 0 is the center subcarrier for tone plan of different bandwidth. (DC) wording is redundant and causes confusion. Change to as in the resolution of CID24183 in doc IEEE802.11-20/0514r1. |

ax editor: please make the following change in D6.0 *Clause 27.3.10*

* On P543L36 (CID #24183):

For a 20 MHz non-OFDMA HE PPDU transmission, the 20 MHz is divided into 256 subcarriers. The signal is transmitted on all or a subset of subcarriers –122 to –2 and 2 to 122, with [-1:1] being the DC subcarriers.

For a 20 MHz OFDMA HE PPDU transmission, the 20 MHz is divided into 256 subcarriers. The signal is transmitted on all or a subset of the subcarriers –122 to –4 and 4 to 122, with [-3:3] being the DC subcarriers.

For a 40 MHz non-OFDMA HE PPDU transmission, the 40 MHz is divided into 512 subcarriers. The signal is transmitted on subcarriers –244 to –3 and 3 to 244, with [-2:2] being the DCsubcarriers.

For a 40 MHz OFDMA HE PPDU transmission, the 40 MHz is divided into 512 subcarriers. The signal is transmitted on all or a subset of subcarriers –244 to –3 and 3 to 244, with [-2:2] being the DC subcarriers.

For an 80 MHz non-OFDMA HE PPDU transmission, the 80 MHz is divided into 1024 subcarriers. The signal is transmitted on subcarriers –500 to –3 and 3 to 500, with [-2:2] being the DC subcarriers.

For an 80 MHz OFDMA HE PPDU transmission, the 80 MHz is divided into 1024 subcarriers. The signal is transmitted on all or a subset of the subcarriers –500 to –4 and 4 to 500, with [-3:3] being the DC subcarriers.

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| 24184 | 546.3 | 27.3.10 | "HE modulated fields refer to the HE-STF, HE-LTF and Data fields, as shown in Figure 27-23". Figure 27-23 also shows the PE as an HE modulated field | Make consistent | **Revised.**  Change to as in the resolution of CID24184 in doc IEEE802.11-20/0514r1. |

ax editor: please make the following change in D6.0 *Clause 27.3.10*

* On P546L3 (CID #24184):

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, Data, and PE fields, as shown in Figure 27-23 (Timing boundaries for HE PPDU fields if midamble is not present).

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| 24197 | 614.15 | 27.3.12.5.2 | "Following the calculation of N\_pld, ...". N\_avbits is calcuated independently of N\_pld. The wording "following ..." implies a specific order of operations and is unneccessary. | Delete "Following the calculation of N\_pld," | **Accepted.**  Change as commentor suggested . |

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| 24198 | 625.43 | 27.3.12.10 | "for BCC coded spatial streams, Equation (27-97) applies." This only covers the case without DCM (specifically, the range of k) | Correct | **Revised.**  Change to as in the resolution of CID24198 in doc IEEE802.11-20/0514r1. |

Discussions:

BCC encoder is supported up to 242-tone RU. So *k* and *l* index in Equation (27-97) shall not include RU size greater than 242 tone. However, since LDPC tone mapper does not have any operations on the BCC coded streams, there is no need to differentiate whether DCM is applied to Data field.

ax editor: please make the following change in D6.0 *Clause 27.3.12.10*

* On P625L43 (CID #24198):

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| 24199 | 626.8 | 27.3.12.11 | Range of k-values only covers case without DCM | Correct | **Rejected.**  For segment deparser, input are QAM symbols, which are output either from constellation mapper for BCC encoding, or from LDPC tone mapper for LDPC encoding. The operations done in segment deparser do not differentiate whether DCM is applied to Data field. Hence there is no need to have different k values when DCM is applied to Data field. |

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| 24200 | 632.12 | 27.3.12.14 | Change "If midambles are not present," to "If midambles are not present and DCM is not applied," | See comment | **Rejected.**  Equation (27-108) is transparent to DCM=0 or DCM=1. When DCM=1, it means that and are modulated from the same set of bits depending on the modulation order. In Equation (27-108), index , which includes all data tones of the corresponding RU *r*. |

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| 24201 | 632.24 | 27.3.12.14 | The pilot sequence P^k\_n should also depend on the RU size and location. See 27.3.12.13. | See comment | **Revised.**  Change to as in the resolution of CID24201 in doc IEEE802.11-20/0514r1. |

Discussions:

The pilot sequence depends on the RU size, but not location. For any given RU size, the pilot sequence is fixed regardless the RU location. To make it clear that depends on the size of RU *r*, we can change the description of in the spec.

ax editor: please make the following change in D6.0 *Clause 27.3.12.14*

* On P632L61 (CID #24201):

can be selected from one of the equations (27-101) – (27-107) defined in 27.3.12.13 (Pilot subcarriers), depending on the corresponding RU size.

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| 24202 | 632.45 | 27.3.12.14 | K\_pilot should also depend on the RU size and location | See comment | **Revised.**  Change to as in the resolution of CID24202 in doc IEEE802.11-20/0514r1. |

Discussions:

It is true that *KPilot* depends on the RU size and location. However, the range of *k* index is known, , *KPilot* for a given RU have to be within this range, and can be easily derived from the set of pilot subcarrier indices defined in 27.3.12.13 based on RU size of the given RU. However, the reference for *KPilot* is not correct in the context.

ax editor: please make the following change in D6.0 *Clause 27.3.12.14*

* On P632L61 (CID #24202):

*KPilot* is the set of pilot subcarrier indices for the Data field OFDM symbols, as defined in 27.3.12.13(Pilot subcarriers).

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| 24203 | 633.5 | 27.3.12.14 | Change "If midambles are not present," to "If midambles are not present and DCM is not applied," | See comment | **Rejected.**  Equation (27-111) is transparent to DCM=0 or DCM=1. When DCM=1, it means that and are modulated from the same set of bits depending on the modulation order. In Equation (27-111), index , which includes all data tones of the corresponding RU *r*. |

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| 24204 | 634.51 | 27.3.12.16 | "indicates that the current channel between the transmitter and the recipient is with high channel Doppler, and recommends that midamble may be used". Who "recommends"? | Clean up sentence | **Revised.**  Change to as in the resolution of CID24204 in doc IEEE802.11-20/0514r1. |

ax editor: please make the following change in D6.0 *Clause 27.3.12.16*

* On P634L51 (CID #24204):

In this case, the Doppler field setting to 1 indicates that the current channel between the transmitter and the recipient is with high channel Doppler, and the transmitter recommends the recipient that midamble may be used for the PPDUs of the reverse link.

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| 24314 | 593.35 | 27.3.10.10 | "in an HE TB PPDU, NHE-LTF may take a value 1, 2, 4, 6 or 8 that is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU, where the initial number of HE-LTF symbols is calculated as a function of NSTS,r,total (where r is the index of the RU) based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition) with NVHT-LTF replaced by NHE-LTF." is duplicated in "For an OFDMA HE TB PPDU NHE-LTF may be 1, 2, 4, 6 or 8, which is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU r, which is calculated as a function of NSTS,r,total, separately based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition), replacing NVHT-LTF by NHE-LTF." | Delete the first piece of cited text | **Revised.**  Change to as in the resolution of CID24314 in doc IEEE802.11-20/0514r1. |
| 24315 | 593.35 | 27.3.10.10 | "in an HE TB PPDU, NHE-LTF may take a value 1, 2, 4, 6 or 8 that is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU, where the initial number of HE-LTF symbols is calculated as a function of NSTS,r,total (where r is the index of the RU) based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition) with NVHT-LTF replaced by NHE-LTF." is duplicated in "For an OFDMA HE TB PPDU NHE-LTF may be 1, 2, 4, 6 or 8, which is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU r, which is calculated as a function of NSTS,r,total, separately based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition), replacing NVHT-LTF by NHE-LTF." | Delete the second piece of cited text | **Revised.**  Change to as in the resolution of CID24315 in doc IEEE802.11-20/0514r1. |
| 24317 | 593.35 | 27.3.10.10 | "in an HE TB PPDU, NHE-LTF may take a value 1, 2, 4, 6 or 8 that is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU, where the initial number of HE-LTF symbols is calculated as a function of NSTS,r,total (where r is the index of the RU) based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition) with NVHT-LTF replaced by NHE-LTF." and "For an OFDMA HE TB PPDU NHE-LTF may be 1, 2, 4, 6 or 8, which is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU r, which is calculated as a function of NSTS,r,total, separately based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition), replacing NVHT-LTF by NHE-LTF." -- these are expressed in terms of the HE TB PPDUs, but should be expressed in terms of the contents of the Trigger frame | As it says in the comment | **Revised.**  Change to as in the resolution of CID24317 in doc IEEE802.11-20/0514r1. |

ax editor: please make the following change in D6.0 *Clause 27.3.10.10*

The commentor is right that *NHE-LTF* is set in the soliciting Trigger frame of the HE TB PPDU. The text already exists, but it is not well connected. To make the text clear to the readers, move the sentence “In an HE TB PPDU, *NHE-LTF* is indicated in the Trigger frame that triggers the transmission of the PPDU.” from line 32 to line 42.

* On P593L32 (CID #24314,CID #24315,CID #24317):

In an HE MU PPDU, *NHE-LTF* is indicated in the HE-SIG-A field. In an HE MU PPDU with more than one RU, *NHE-LTF* may take a value 1, 2, 4, 6 or 8 that is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU, where the initial number of HE-LTF symbols is calculated as a function of *NSTS,r,total* (where *r* is the index of the RU) based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition) with *NVHT-LTF* replaced by *NHE-LTF*.

In an HE TB PPDU, *NHE-LTF* is indicated in the Trigger frame that triggers the transmission of the PPDU. In a non-OFDMA HE TB PPDU, the number of HE-LTF symbols, *NHE-LTF* , is a function of the total num-ber of space-time streams, *NSTS*, as shown in Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition), replacing *NVHT-LTF* replaced by *NHE-LTF*.

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| 24316 | 593.35 | 27.3.10.10 | "in an HE TB PPDU, NHE-LTF may take a value 1, 2, 4, 6 or 8 that is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU, where the initial number of HE-LTF symbols is calculated as a function of NSTS,r,total (where r is the index of the RU) based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition) with NVHT-LTF replaced by NHE-LTF." and "For an OFDMA HE TB PPDU NHE-LTF may be 1, 2, 4, 6 or 8, which is greater than or equal to the maximum value of the initial number of HE-LTF symbols for each RU r, which is calculated as a function of NSTS,r,total, separately based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition), replacing NVHT-LTF by NHE-LTF." -- should not be greater than necessary | In both cases, change "is the smallest value greater than or equal to" | **Rejected.**  The commentor intent is to set NHE-LTF equal to the maximum value of the initial number of HE-LTF symbols for each RU, where the initial number of HE-LTF symbols is calculated as a function of NSTS,r,total (where r is the index of the RU) based on Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams) in 21.3.8.3.5 (VHT-LTF definition) with NVHT-LTF replaced by NHE-LTF. However, channel estimation of each RU for an OFDMA HE TB PPDU can be benefited by setting NHE-LTF greater than that equal value. This also applies to HE MU PPDU with more than one RU. |

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| 24322 | 618.15 | 27.3.12.5.5 | "For an HE TB PPDU with LDPC encoding, follow the HE SU PPDU padding and encoding process as introduced in 27.3.12.2 (Pre-FEC padding process), 27.3.12.5.2 (LDPC coding), and 27.3.12.5.3 (Post-FEC padding), with the following exceptions:  [...] Then continue with the LDPC encoding process as in 19.3.11.7.5 (LDPC PPDU encoding process)" -- this is confusing as to whether Clause 27 rules are followed, or Clause 19 rules | As it says in the comment | **Revised.**  Change to as in the resolution of CID24322 in doc IEEE802.11-20/0514r1. |

Discussions:

LDPC encoding process in 27.12.5.2 is based on the process described in 19.3.11.7.5 with modifications of Npld and Navbits specific to HE SU PPDU.

ax editor: please make the following change in D6.0 *Clause 27.3.12.5.5*

* On P618L15 (CID #24322):

Then continue with the LDPC encoding process as in 27.3.12.5.2 (LDPC coding), during which always increment Navbits as in Equation (27-70), and always recompute Npunc as in Equation (19-40).

If the TXVECTOR parameter TRIGGER\_METHOD is TRIGGER\_FRAME and the LDPC Extra Symbol Segment field in the Trigger frame is 0, set initial parameters to *NSYM,init* = *NSYM*, and *ainit* = *a*. Then continue with the LDPC encoding process as in 27.3.12.5.2 (LDPC coding), during which *Navbits* and *Npunc* are not changed, and *a* = *ainit*.

If the TXVECTOR parameter TRIGGER\_METHOD is TRS then the parameter LDPC\_EXTRA\_ SYMBOL is 1 and initial parameters set to *NSYM,init* = *FVAL* + 1 and *ainit* = 3, where *FVAL* is the value of the UL Data Symbols subfield of the TRS Control subfield. Then continue with the LDPC encoding process as in 27.3.12.5.2 (LDPC coding), during which always increment *Navbits* as in Equation (27-70), and always recompute *Npunc* as in Equation (19-40).

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| 24323 | 541.61 | 27.3.9 | "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 (a similar comment on the baseline has been submitted for REVmd/D3.0) | As it says in the comment | **Rejected.**  This comment can be resolved after the comment submitted to REVmd/D3.0 is resolved. Otherwise the resolutions for the two comments may conflict each other. |

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| 24330 | 617.42 | 27.3.12.5.5 | "NOTE--The AP might select any value for the pre-FEC padding factor" is not true if TRS Control present (see 26.5.2.2.4 Allowed settings of the Trigger frame fields and TRS Control subfield: "The Pre-FEC Padding Factor subfield is set to the default PE duration value") | Delete "pre-FEC padding factor and " in the NOTE and change "fields" to "field" | **Rejected.**  This “Note-“ paragraph is after the descriptions for an HE TB PPDU sent in response to a Trigger frame. And the descriptions for an HE TB PPDU sent in response to a frame containing a TRS Control subfield are after the “Note-“ paragraph. Hence “Note-“ paraghaph does not apply to the descriptions for an HE TB PPDU sent in response to a frame containing a TRS Control subfield. Beside that the descriptions for an HE TB PPDU sent in response to a frame containing a TRS Control subfield clearly states that the parameters are described in 26.5.2.3.4 (TXVECTOR parameters for HE TB PPDU response to TRS Control subfield). |