IEEE P802.11
Wireless LANs

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| 11ax Comment Resolutions for HE Preamble |
| Date: 2017-03-10 |
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Abstract: This document contains proposed resolutions for comments in *Clause 28.3.10.3, 28.3.10.4, 28.3.10.5, 28.3.10.5, 28.3.10.7.4 and 28.3.10.8.3* from 11ax D1.1with the CIDs below.

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| ***Clause 28.3.10.3*** |  |
| * 8897,8898,9064,4870

***Clause 28.3.10.4**** 4907,5256,5265,9487,10405

***Clause 28.3.10.5*** |  |
| * 8899,5105,8900,5257,8901,10403

***Clause 28.3.10.6**** 8902,10401,10402,5258,4898

***Clause 28.3.10.7.4**** 4915,8927,8928,8933,8934,10214,5106,8929,8930,8931,5263,6116,8932,10215

***Clause 28.3.10.8.3**** 8944,8945,8946,8947,5270,8169,8948,8949
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| 8897 | Sigurd Schelstraete | 28.3.10.3 | 268.52 | Wrong reference: 22.3.8.3.4 | Probably 21.3.7.3 | **Revised.**Change to as in the resolution of CID8897 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.3*:

* On P268L52 (CID #8897):

N20MHz is defined in 21.3.7.3(Channel frequencies)

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| 8898 | Sigurd Schelstraete | 28.3.10.3 | 268.62 | Break definition of Omega\_20MHz in separate sentences for clarity. | e.g.: "is a set of 20 MHz channels that contains the channels where pre-HE modulated fields are located. For an HE trigger-based PPDU or HE MU PPDU with preamble puncturing, it contains one or more values within the range 0 to N20MHz +/- 1. For other HE formats the index runs from 0 to N20MHz +/- 1." | **Revised.**Change to as in the resolution of CID8898 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.3*:

* On P268L62 (CID #8898):

 is a set of 20 MHz channels that contains the channels where pre-HE modulated fields are located. The set of 20MHz channels contains one or more values within the range of 0 to for an HE trigger-based PPDU or HE MU PPDU with preamble puncturing, and it contains all values from 0 to for other HE PPDU formats.

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| 9064 | Sriram Venkateswaran | 28.3.10.3 | 269.11 | Change reference to Equation 28-8 to 28-9 | Change equation number reference | **Rejected.**There is nothing wrong on the equation reference number. |
| 4870 | Bin Tian | 28.3.10.3 | 269.14 | Matrix A\_HE\_LTF only needs to be applied to HE -LTF and L-LTF when beamchange=0. It is not related to L-STF. Remove the A\_HE-LTF from equation 28-8 and the explanation in line 29 . | As in comment | **Reject.**A\_HE\_LTF matrix is need to convert one stream L-STF to more than 1 spatial streams if Q matrix is for steering more than one spatial streams of data. |

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| 4907 | Bo Yu | 28.3.10.4 | 270.13 | TGI,LegacyPreamble in equations (28-10) should be replaced by TGI,L-LTF. | As in comment | **Revised.**Change to as in the resolution of CID4907 in doc IEEE802.11-17/0398r1.  |
| 5256 | Dorothy Stanley | 28.3.10.4 | 270.13 | Should T\_GI,LegacyPreamble be changed to T\_GI,L-LTF in Eq 28-10? | As in comment | **Revised.**Change to as in the resolution of CID4907 in doc IEEE802.11-17/0398r1.  |
| 9487 | Yan Zhang | 28.3.10.4 | 270.14 | TGI,LegacyPreamble in equations (28-10) should be replaced by TGI,L-LTF, which is double value of TGI,LegacyPreamble. | Replace TGI,LegacyPreamble in equation (28-10) to TGI,L-LTF. | **Revised.**Change to as in the resolution of CID4907 in doc IEEE802.11-17/0398r1.  |
| 10405 | Oghenekome Oteri | 28.3.10.4 | 270.10 | eqn 28-10: i\_BW = 0,…, N\_20\_MHz | eqn 28-10: i\_BW = 0,…, N\_20\_MHz-1 | **Revised.**Change to as in the resolution of CID4907 in doc IEEE802.11-17/0398r1.  |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.4*:

* On P270L13 (CID #4907, CID #5256, CID #9487, CID #10405):

(28-10)

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| 8899 | Sigurd Schelstraete | 28.3.10.5 |  | 270.39 | Include value of Length field for Trigger-based PPDUs (taken directly from Trigger frame, instead of being calculated) | See comment | **Revised.**Change to as in the resolution of CID8899 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.5*:

* On P270L39 (CID #8899):

The LENGTH field shall be set to the value given by Equation (28-11). Note that the value of the LENGTH field for an HE trigger-based PPDU is set to the value decoded from the preceding Trigger frame.

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| 5105 | Dong Guk Lim | 28.3.10.5 | 270.45 | Definition of m is wrong, accroding to PHY motion 69, m =1 means SU PPDU format and triger based PPDU, m=2 means either MU PPDU or Exended range SU PPDU format. Thus, this sentence shoud be corrected. | Change the following sentence ''m is 1 for an HE MU PPDU and HE extended range SU PPDU, and 2 otherwise '' to "m is 1 for HE SU PPDU and HE trigger-based PPDU and 2 for an HE MU PPDU and HE extended range SU PPDU " | **Rejected.**PHY motion 69 says that “If the length subfield in L-SIG field mod 3 equals 1, it indicates HE SU PPDU or HE trigger based PPDU. If the length subfield in L-SIG field mod 3 equals 2, it indicates HE MU PPDU or HE extended range SU PPDU.” Length mod 3 is 2 when m=1, which indicates HE MU PPDU and HE extended range SU PPDU. Length mod 3 is 1 when m= 2, which indicates HE SU PPDU and HE trigger-based PPDU.  |

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| 8900 | Sigurd Schelstraete | 28.3.10.5 | 271.3 | Improve language for clarity | Change two sentences starting at "Extra 4 BPSK ..."to "d\_k, k=0,..., 47 are mapped to the data tones in the range -26:26. In addition, tones [-28,-27,27,28] are also modulated with BPSK. The constellations on those tones are [-1 -1 -1 1] respectively." | **Revised.**Change to as in the resolution of CID8900 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.5*:

* On P271L3 (CID #8900):

,  are mapped to tones [-26,26]. In addition, values [-1,-1,-1,1] are mapped to4 extra tones [-28, -27, 27, 28] of L-SIG in 20 MHz HE PPDU. Tones [-28,-27,27,28] are also BPSK modulated.

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| 5257 | Dorothy Stanley | 28.3.10.5 | 271.49 | P\_0 be change to p\_0 to match Eq 28-12 | As in comment | **Revised.**Change to as in the resolution of CID5257 in doc IEEE802.11-17/0398r1.  |
| 8901 | Sigurd Schelstraete | 28.3.10.5 | 271.49 | P0 should be lower case | Change P\_0 to p\_0 | **Revised.**Change to as in the resolution of CID5257 in doc IEEE802.11-17/0398r1.  |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.5*:

* On P271L49 (CID #5257, CID #8901):

*p0* is the first pilot value in the sequence defined in 17.3.5.10 (OFDM modulation)

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| 10403 | Oghenekome Oteri | 28.3.10.5 | 272.6 | 28-13 : i\_BW = 0 to N\_20 MHz. Error in bound in equation. | set to N\_20 MHz - 1 | **Revised.**Change to as in the resolution of CID10403 in doc IEEE802.11-17/0398r1.  |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.5*:

* On P272L6 (CID #10403):

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|  | (28-13) |

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| 8902 | Sigurd Schelstraete | 28.3.10.6 | 272.23 | "The RL-SIG field is used to identify an HE PPDU." This needs more explanation. | Clarify | **Revised.**Change to as in the resolution of CID8902 in doc IEEE802.11-17/0398r1. |

**Discussions:**

It is not accurate to say that “The RL-SIG field is used to identify an HE PPDU.” since we use the value of mod(LENGTH,3) to identify an HE PPDU. RL-SIG field is not included in the non-HT PPDU, HT PPDU, and VHT PPDU formats. Hence the RL-SIG field is unique to an HE PPDU.

ax editor: please make the following changes in D1.1 *Clause 28.3.10.6*:

* On P272L23 (CID #8902):

 The RL-SIG field is a repeat of L-SIG field, and it is used to differentiate an HE PPDU from non-HT PPDU, HT PPDU, and VHT PPDU formats.

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| 10401 | Oghenekome Oteri | 28.3.10.6 | 272.30 | 28-12 and 28-14 should be same. if RL-SIG is a repetition, should have identical values (or should be one section) | Make same or merge into one section | **Rejected.**The poloarity added to the pilot subcarriers needs to be take into account. Even though p0 has the same numerical value as p1, we cannot simply merge the equations into one equation. |
| 10402 | Oghenekome Oteri | 28.3.10.6 | 272.42 | 28-13 and 28-15 should be same. if RL-SIG is a repetition, should have identical values (or should be one section) | Make same or merge into one section | **Rejected.**The poloarity added to the pilot subcarriers needs to be take into account. Even though p0 has the same numerical value as p1, we cannot simply merge the equations into one equation. |
| 5258 | Dorothy Stanley | 28.3.10.6 | 272.34 | need to define p\_1 | As in comment | **Revised.**Change to as in the resolution of CID5258 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.6*:

* On P271L49 (CID #5258): Add a new line on below equation (28-15)

*p1* is the second pilot value in the sequence defined in 17.3.5.10 (OFDM modulation)

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| 4898 | Bin Tian  | 28.3.10.6 | 272.31 | It is better to write Eq (28-14) and (28-15) for RL-SIG in a same way as Eq (28-12) and (28-13) for L-SIG, to avoid any confusion | As in comment | **Revised.**Change to as in the resolution of CID4898 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.0 *Clause 28.3.10.6*:

* On P272L31 (CID #4898):

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| (28-14) |  |

* On P272L43 (CID #4898):

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|  | (28-15) |

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| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 4915 | Brian Hart | 28.3.10.7.4 | 283.18 | "each containing 26 bits" is not true due to the memory of a BCC encoder. The first bits smear into the second symbol | Don't bother with A1 and A2. Just have HE-SIG-A with 52 bits. Affects several places. Ditto for HE Extended which I have ot guess should be perceived as 52+52 bits .. because here actually the distinction becomes really important. Are "A1 and A3" BCC encoded as a unit (with the state from A1 initializing the BCC encoder for A3", then "A2 and A4" are encoded as a unit? The para at P284L32 is GROSSLY unclear / misleading on this vital question | **Rejected.**The phrase “each containing 26 bits” follows the tradition from Revmc\_8.0 document subcluase 21.3.8.3.3 VHT-SIG-A definition. It will cause confusion if we change HE-SIG-A definition, although the commentor has a point that data bits in HE-SIG-A1 have impact on HE-SIG-A2 contents after BCC encoding.  |

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| 8927 | Sigurd Schelstraete | 28.3.10.7.4 | 283.34 | Replace T\_SYML with T\_HE-SIG-A in (28-16), as defined in Table 28-9 (3 occurences) | See comment | **Rejected.**T\_SYML is defined as “Symbol duration including GI prior to the HE-STF field “ in Table 28-9, while T\_HE-SIG-A is defined as the entire duration of HE-SIG-A field. HE-SIG-A symbol duration instead of entire HE-SIG-A field duration should be used in equation (28-16). |
| 8928 | Sigurd Schelstraete | 28.3.10.7.4 | 284.14 | Replace T\_SYML with T\_HE-SIG-A in (28-17), as defined in Table 28-9 (3 occurences) | See comment | **Rejected.**T\_SYML is defined as “Symbol duration including GI prior to the HE-STF field “ in Table 28-9, while T\_HE-SIG-A is defined as the entire duration of HE-SIG-A field. HE-SIG-A symbol duration instead of entire HE-SIG-A field duration should be used in equation (28-17). |
| 8933 | Sigurd Schelstraete | 28.3.10.7.4 | 285.29 | Replace T\_SYML with T\_HE-SIG-A in (28-18), as defined in Table 28-9 (3 occurences) | See comment | **Rejected.**T\_SYML is defined as “Symbol duration including GI prior to the HE-STF field “ in Table 28-9, while T\_HE-SIG-A is defined as the entire duration of HE-SIG-A field. HE-SIG-A symbol duration instead of entire HE-SIG-A field duration should be used in equation (28-18). |
| 8934 | Sigurd Schelstraete | 28.3.10.7.4 | 285.47 | Replace T\_SYML with T\_HE-SIG-A in (28-19), as defined in Table 28-9 (3 occurences) | See comment | **Rejected.**T\_SYML is defined as “Symbol duration including GI prior to the HE-STF field “ in Table 28-9, while T\_HE-SIG-A is defined as the entire duration of HE-SIG-A field. HE-SIG-A symbol duration instead of entire HE-SIG-A field duration should be used in equation (28-19). |

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| 10214 | Yusuke Asai | 28.3.10.7.4 | 284.32 | The definitions of HE-SIG-Ax (x=1,2,3,4) for an HE extended range SU PPDU is inconsistent with Table 28-18. | Revise it. For example, replace HE-SIG-A1, HE-SIG-A2, HE-SIG-A3 and HE-SIG-A4 with HE-SIG-A11, HE-SIG-A12 HE-SIG-A21 HE-SIG-A22, respectively. In addition, some text changes are needed accordingly. | **Rejected.**HE-SIG-A for an HE extended range SU PPDU is defined in Table 28-16. And it explicitly stated that the second HE-SIG-A part in Table 28-16 refers to HE-SIG-A3 for HE extended range SU PPDU. There is no inconsistency between the definitions of HE-SIG-Ax (x=1,2,3,4) for an HE extended range SU PPDU and Table 28-16.  |

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| 5106 | Dong Guk Lim | 28.3.10.7.4 | 284.43 | Accroding to PHY motion 69, m =2 means HE MU PPDU and HE extended range SU PPDU so, it should be correted. | Change m =1 to m =2. | **Rejected.**PHY motion 69 says that “If the length subfield in L-SIG field mod 3 equals 1, it indicates HE SU PPDU or HE trigger based PPDU. If the length subfield in L-SIG field mod 3 equals 2, it indicates HE MU PPDU or HE extended range SU PPDU.” Length mod 3 is 2 when m=1, which indicates HE MU PPDU and HE extended range SU PPDU.  |

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| 8929 | Sigurd Schelstraete | 28.3.10.7.4 | 284.35 | Replace "the same data bits" with "identical encoded bits" | See comment | **Revised.**Change to as in the resolution of CID8929 in doc IEEE802.11-17/0398r1. |
| 8930 | Sigurd Schelstraete | 28.3.10.7.4 | 284.36 | "The data bits of HE-SIG-A1 and HE-SIG-A3 shall beBCC encoded at rate, R = 1/2 (...) HE-SIG-A2 shall be BCC encoded at rate, R = 1/2, mapped ...". This makes it sound as if HE\_SIG-A1 and HE-SIG-A2 are encoded separately, while the encoding is done over the full 52 bits. | Rewrite to make it clear that encoding is common and that only the first 52 encoded bits are then interleaved. | **Revised.**Change to as in the resolution of CID8929 in doc IEEE802.11-17/0398r1. |
| 8931 | Sigurd Schelstraete | 28.3.10.7.4 | 284.43 | Replace "The QBPSK constellation on HE-SIG-A2 is used to differentiate between an HE extended range SU PPDU and an HE MU PPDU when m = 1 in Equation (28-11), which indicates HE MU PPDU or HE extended range SU PPDU." with "The QBPSK constellation on HE-SIG-A2 is used to differentiate between an HE extended range SU PPDU and an HE MU PPDU, which both use m=1 in (28-11)." | See comment | **Revised.**Change to as in the resolution of CID8929 in doc IEEE802.11-17/0398r1. |

**Discussions:**

The commenter is right that only the data bits of HE-SIG-A1 and HE-SIG-A3 are encoded for HE extended range SU PPDU. The encoded bits of HE-SIG-A2/HE-SIG-A4 are identical to those of HE-SIG-A1/HE-SIG-A3. There are no separate BCC encoding procedures for HE-SIG-A2 and HE-SIG-A4.

ax editor: please make the following changes in D1.1 *Clause 28.3.10.7.4*:

* On P284L35 (CID #8929, CID #8930, CID #8931):

. The data bits of HE-SIG-A1 and HE-SIG-A3 shall be BCC encoded at rate, R = 1/2, interleaved, mapped to a BPSK constellation, and have pilots inserted. HE-SIG-A2 has the same encoded bits as HE-SIG-A1, and the encoded bits shall be mapped to a QBPSK constellation without interleaving and have pilots inserted. The constellation mappings of the HE-SIG-A field in an HE extended range SU PPDU is shown in Figure 28-19 (Data tone constellation of HE-SIG-A symbols). The QBPSK constellation on HE-SIG-A2 is used to differentiate between an HE extended range SU PPDU and an HE MU PPDU when m = 1 in Equation (28-11). HE-SIG-A4 has the same encoded bits as HE-SIG-A3, and the encoded bits shall be mapped to a BPSK constellation without interleaving and have pilots inserted.

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| 5263 | Dorothy Stanley | 28.3.10.7.4 | 285.10 | Figure 28-19 is really low resolution and the names of the fields are incomplete. | fix the figure. | **Revised.**Change to as in the resolution of CID5263 in doc IEEE802.11-17/0398r1. |
| 6116 | Jian Yu | 28.3.10.7.4 | 285.05 | Replace the figure with a high resolution one | As in comment | **Revised.**Change to as in the resolution of CID5263 in doc IEEE802.11-17/0398r1. |
| 8932 | Sigurd Schelstraete | 28.3.10.7.4 | 285.06 | Labels in Figure 28-19 are incomplete (e.g. HE-SIG- in upper figure) | Fix | **Revised.**Change to as in the resolution of CID5263 in doc IEEE802.11-17/0398r1. |
| 10215 | Yusuke Asai | 28.3.10.7.4 | 285.05 | The numbering for HE-SIG-\* are missed. | Fix them | **Revised.**Change to as in the resolution of CID5263 in doc IEEE802.11-17/0398r1. |

ax editor: please make the following changes in D1.1 *Clause 28.3.10.7.4*:

* On P285L10 (CID #5263, CID #6116, CID #8932, CID #10215 ):

HE

-

SIG

-

A

1

HE

-

SIG

-A2

Q

HE\_SU PPDU, HE\_TRIG

PPDU

and

HE\_MU PPDU

I

Q

+1

-

1

I

+1

-

1

HE

-

SIG

-

A

1

HE

-

SIG

-A2

HE\_EXT\_SU PPDU

I

Q

+1

-

1

I

Q

+1

-

1

HE

-

SIG

-A3

HE

-

SIG

-A4

I

Q

+1

-

1

I

Q

+1

-

1

Figure 28‑19 - Data tone constellation of HE-SIG-A symbols

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| 8944 | Sigurd Schelstraete | 26.3.10.8.3 | 288.63 | Change "the bits corresponding to two STAs (i.e. two User fields) areencoded together" to "two User Fields are combined into a User Block Field". | See comment | **Revised.**Change to as in the resolution of CID8944 in doc IEEE802.11-17/0398r1. |
| 8945 | Sigurd Schelstraete | 26.3.10.8.3 | 288.63 | Delete "the STAs scheduled in the HE MU PPDU are split into groups of two". This is repetition and there is no need to mention HE MU, since this is the only format that has HE-SIG-B. | See comment | **Revised.**Change to as in the resolution of CID8944 in doc IEEE802.11-17/0398r1. |
| 8946 | Sigurd Schelstraete | 26.3.10.8.3 | 289.01 | Replace "group of two user fields" with "User Block field" | See comment | **Revised.**Change to as in the resolution of CID8944 in doc IEEE802.11-17/0398r1. |

**Discussions:**

The commenter is right that some contents of the following paragraph in 28.3.10.8.3 are redundant since “The User Specific field of an HE-SIG-B content channel consists of one or more User Block fields. Each User Block field is made up of two user fields that contain information for two STAs to decode their payloads.” In 28.3.10.8.1 already described the relationship between User Specific field and User Block fields, and the relationship between User Block field and User fields.

ax editor: please make the following changes in D1.1 *Clause 28.3.10.8.3*:

* On P285L10 (CID #8944, CID #8945, CID #8946):

In the User Specific field, in any 20 MHz band, each User Block Field shall have CRC and tail bits added and then be BCC encoded at rate R=1/2.

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| 8947 | Sigurd Schelstraete | 26.3.10.8.3 | 289.13 | "When the code rate of the HE-SIG-B MCS is not equal to 1/2". Make it clear that bits from both common field and user specific field need to be concatenated before the puncturing. | See comment | **Rejected.**The previous sentence reads “For both the Common Block and User Specific fields, the information bits, tail bits and padding bits (if present) are BCC encoded at rate R = ½ using the encoder described in 17.3.5.6 (Convolutional encoder).”. It is clear that each field in the context refers to Common Block field and User Specific field. The change proposed by commentor is not necessary. |

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| 5270 | Dorothy Stanley | 26.3.10.8.3 | 289.35 | Do we need an equation for Beam\_Change = 0? | As in comment | **Rejected.**Beam\_Change=0 does not apply to HE MU PPDU. Hence we do not need an equation for HE-SIG-B with Beam\_Change = 0. |

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| 8169 | Ming Gan | 28.3.10.8.3 | 289.36 | The big Gamma\_M(k) in the equation 28-20 is the phase rotation value, but it does not specify the value for the pilot subcarriers although phase rotation is not done on the pilot subcarriers. | as the proposed in the comment | **Revised.**Change to as in the resolution of CID8169 in doc IEEE802.11-17/0398r1. |

**Discussions:**

The commenter is right that  should not be applied to pilot subcarriers.

ax editor: please make the following change in D1.1 *Clause 28.3.10.8.3*.

* On P289L36 (CID #8169):

 (28-20)

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| 8948 | Sigurd Schelstraete | 28.3.10.8.3 | 289.36 | Replace T\_SYML with T\_HE-SIG-B in (28-20), as defined in Table 28-9 (2 occurences) | See comment | **Rejected.**T\_SYML is defined as “Symbol duration including GI prior to the HE-STF field “ in Table 28-9 . It is exchangeable with T\_HE-SIG-B. It is correct to use T\_SYML in equation (28-20). |

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| 8949 | Sigurd Schelstraete | 28.3.10.8.3 | 289.57 | Wrong reference: parameters are defined in 21.3.7.3 | Correct reference | **Revised.**Change to as in the resolution of CID8949 in doc IEEE802.11-17/0398r1. |

**Discussions:**

 is defined in 21.3.7.3(Channel frequencies) as the commenter pointed out. But the reference of  is correct.

ax editor: please make the following change in D1.1 *Clause 28.3.10.8.3*.

* On P289L36 (CID #8949):

 defined in 21.3.7.3(Channel frequencies)

 is defined in 21.3.8.2.4 (L-SIG definition)