IEEE P802.11
Wireless LANs

|  |
| --- |
| 11ax Comment Resolutions for Clauses 26.3.2-26.3.9.3-26.3.9.4-26.3.9.5-26.3.10.2-26.3.10.13 |
| Date: 2016-06-28 |
| Author(s): |
| Name | Affiliation | Address | Phone | Email |
| Yan Zhang | Marvell  | 5488 Marvell Ln, Santa Clara, CA 95054 | 408-222-0975 | yzhang@marvell.com |
| Rui Cao | Marvell |  |  | ruicao@marvell.com |
| Hongyuan Zhang | Marvell |  |  | hongyuan@marvell.com |

Abstract: This document contains proposed resolutions for comments in *Clause 26.3.2, 26.3.9.3, 26.3.9.4, 26.3.9.5, 26.3.10.2 and 26.3.10.13* from 11ax D0.1 with the CIDs below.

|  |  |  |
| --- | --- | --- |
| ***Clauses 26.3.2, 26.3.9.3, 26.3.9.4, 26.3.9.5, 26.9.10.2 and 26.9.10.13*** |  |  |
| * 836 883 884 1930 2247
* 292 525 904 906 908 1984 1990 1995
 |  |  |
| * 2531
* 1988 1994
* 1058
* 1992
* 1991
* 1985 1989
* 1684
* 523
* 1857
* 271
* 1412 1195
* 1996 2532 2120
* 2098
* 293 1987 1993
 |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

***CIDs for Clause 26.3.2***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 271 | Bin Tian | 26.3.9.2 | 74.02 | Inconsistency in HE MU PPDU descrption between "HE MU PPDU format (HE\_MU) carries one or more PSDUs to one or more users" in 26.1.4 and "This format is used for MU transmission." The HE MU PPDU can be used for SU transmission | Change to: the format is used for SU or MU tranmission that is not a response of .. ." | **Accepted.** |

ax editor: please make the following changes in *Clause 26.3.2*:

* On P74L02 (CID #271): Change to: “This format is used for transmission to one or more users that is not a response of a Trigger frame.”

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 836 | Jinsoo Choi | 26.3.2 | 75.25 | There are some fields with variable size in the Figure 26-5 NDP PPDU format such as HE-SIG-A (2 symbols or 4 symbols) or HE-STF (1x or 2x), but there is no note or explanation on those fields. It would be better to add some explanation or include the duration of each field in the figure explicitly. | Specify the duration of each field in Figure 26-5. | **Revised.**Change to as in the resolution of CID836 in doc IEEE802.11-16/0634r1. |
| 883 | JUNG HOON SUH  | 26.3.2 | 75.33 | Need to confirm the description for HE NDP PPDU, NOTE 2 | Change to: “There is only one HE-LTF mode for NDP packet” | **Revised.**Change to as in the resolution of CID883 in doc IEEE802.11-16/0634r1. |
| 884 | JUNG HOON SUH  | 26.3.2 | 75.35 | Need to confirm the description for HE NDP PPDU, NOTE 3 | Change to: " T\_HE-LTF-2X is the only symbol length for NDP PPDU” | **Revised.**Change to as in the resolution of CID884 in doc IEEE802.11-16/0634r1. |
| 1930 | Sigurd Schelstraete | 26.3.2 | 75.37 | "The presence and duration of PE are TBD" | The reason for PE does not appear to apply for sounding packet. Remove PE. | **Rejected.**PE gives the beamformees sufficient time to prepare extensive feedbacks after receiving sounding NDP PPDU. |
| 2247 | Vincent Knowles IV Jones | 26.3.2 | 75.15 | The GI for an NDP should be the maximum length GI. The maximum length GI will provide the best fidelity of channel measurement, and since there are very few GI in an entire NDP PPDU, there isn't too much overhead for selecting the max GI | Define a GI for the HE NDP. Define it to be the maximum GI length. | **Rejected.**11ax spec framework specifies that mandatory GI value for NDP is either 1.6uS or 0.8uS. This decision is made after many discussions. Maximum GI value is applied only when HELTF-4x sequence is used in NDP PPDU in spec framework, which is an optional mode. |

**Discussion:**

The commenters are right that HE-LTF mode and PE duration for HE NDP PPDU should be explicitly specified as in ax spec framework. The commenters are right that duration of each field in Figure 26-5 need to be specified.

* On P75L25 (CID #836): Figure 26-5 is modified as suggested.

ax editor: please make the following changes in *Clause 26.3.2*:

L

-

STF

L

-

LTF

L

-

SIG

RL

-

SIG

HE

-

SIG

-

A

HE

-

STF

HE

-

LTF

HE

-

LTF

...

8

µ

s

8

µ

s

4

µ

s

4

µ

s

8

µ

s

4

µ

s

-

6.4/12.8μs+GI per HE-LTF symbol

PE

4µs

**Figure 26-5—HE NDP PPDU format**

* On P75L33 (CID #883):

ax editor: please make the following changes in *Clause 26.3.2*:

The HE NDP PPDU has the following properties:

—It uses the HE SU PPDU format but without the Data field

—2X HE-LTF is the only mandatory mode for NDP. 4X HE-LTF is optional mode for NDP.

—PE is always present in a NDP PPDU, with a duration of 4uS.

—NDP PPDU uses either of the mandatory GI values (1.6uS or 0.8uS). GI shall be set to 3.2uS if 4X HE-LTF sequence is used for NDP PPDU.

* On P75L35 (CID #884): Refer to resolution of CID #883.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 292 | Bin Tian | 26.3.9.3 | 101.13 | Why use signficant different math equations to describe L-STF, L-LTFwaveform from thoise I previous amendments? For example, Eq 26-12 is different from 22-20 in VHT section. In Eq 26-12, the T\_GI\_legacypreamble term shall be removed. | Use the same equations and texts to describe the L-STFand L-LTFwaveforms as in previous amendents. Only make necessary changes to the reflect the delta introudced in 11ax like boosting and beam\_change=0 case. | **Rejected.**The reason that the equation becomes much different is to handle the HE\_TRIG PPDU preamble, in which preambles are only transmitted on the same 20MHz channels where data are transmitted. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 525 | Dong Guk Lim | 26.3.9.5 | 103.35 | we agreed that the same power per tone as L-LTF is applied in L-SIG, RL-SIG, HE-SIG-A and HE-SIG-B fields. But, in D0.1, it does not applied yet. So, It should be applied in description/ equation of L-SIG, RL-SIG, HE-SIG-A and HE-SIG-B fields | add the text and field based on the PHY Motion #144 in IEEE 802.11-16/0235r7 | **Revised.**Change to as in the resolution of CID525 in doc IEEE802.11-16/0634r1. |
| 904 | Junghoon Suh | 26.3.9.3 | 101.49 | The first column of Q matrix is always used in Eqn (26-14) | in [Q\_4(~)^(i\_seq)]\_i\_TX,m -->m should be 0? Because the 1st column of Q matrix is always used here, and N\_STS,total is always 1 | **Revised.** Change to as in the resolution of CID904 in doc IEEE802.11-16/0634r1. |
| 906 | Junghoon Suh | 26.3.9.4 | 102.33 | The first column of Q matrix is always used in Eqn (26-16) | in [Q\_4(~)^(i\_seq)]\_i\_TX,m -->m should be 0? Because the 1st column of Q matrix is always used here, and N\_STS,total is always 1 | **Revised.** Change to as in the resolution of CID906 in doc IEEE802.11-16/0634r1. |
| 908 | Junghoon Suh | 26.3.9.4 | 104.19 | The first column of Q matrix is always used in Eqn (26-19) | in [Q\_4(~)^(i\_seq)]\_i\_TX,m -->m should be 0? Because the 1st column of Q matrix is always used here, and N\_STS,total is always 1 | **Revised.** Change to as in the resolution of CID908 in doc IEEE802.11-16/0634r1. |
| 1984 | Siguard Schelstraete | 26.3.9.3 | 101.14 | L-STF should only sum over "active" 20 MHz subbands | The sum runs over all 20 MHz bandwidths. Following agreement on PHY motion 154, this should be changed. The same aplies to Equations 26-14, 26-15 and 26-16 | **Revised.**Change to as in the resolution of CID1984 in doc IEEE802.11-16/0634r1. |
| 1990 | Siguard Schelstraete | 26.3.9.4 | 101.49 | T\_Cs,HE(n) is not used in Equation (26-14) | See comment | **Revised.**Change to as in the resolution of CID1990 in doc IEEE802.11-16/0634r1. |
| 1995 | Siguard Schelstraete | 26.3.9.4 | 102.44 | T\_Cs,HE(n) is not used in Equation (26-16) | See comment | **Revised.**Change to as in the resolution of CID1995 in doc IEEE802.11-16/0634r1. |

**Discussion:**

There is no change of sum over all 20MHz channels in Equations (26-14) and (26-16) since BEAM\_CHANGE = 0 only applies for HE\_SU PPDU, and PHY motion 154 applies to HE\_TRIG PPDU. Equations (26-12) and (26-15) should be updated. In addition, change equations (26-18) and (26-21) for the same reason.

The commentor is right that LSIG, RL-SIG, HE-SIGA and HE-SIGB fields’ power scaling factors in D0.1 texts are not consistent with PHY motion 144 and motion in 11-16/0652r2. We need to apply a power scaling facotr in equations (26-12), (26-14)-(26-16) to reflect PHY motion 144. We need to apply a power scaling factor 

for L-LSIG in equation (26-18) to differential extra 4 edge data tones and other data tones to reflect PHY motion 156.

The commenter is right that index *m* should start from 1 in Eqn(26-14), Eqn(26-16) and Eqn(26-19). The time domain CSD per antenna is used in these equations, which is inaccurate and should be replaced by frequency domain CSD per spatial stream.

In addition, L-STF sequence does not include GI. *TGI,LegacyPreamble* should be removed from the equations (26-12) and (26-14). And there should be no applied in equations (26-14) and (26-16) when BEAM\_CHANGE = 0.

In addition, sum over all 20MHz channels in equation (26-25) for HE-SIG-B need to be changed to sum over only active 20MHz channels when non-continguous channel bonding is applied. Phase rotation for HESIGB PAPR reduction shall be applied over each 20MHz channel.

ax editor: please make the following changes in *Clause 26.3.9.3*:

* On P103L28 (CID #525): change equations (26-12), (26-14), (26-15), (26-16), (26-18) and (26-19).

(26-12)

Where ε is a power scaling factor, with the following value



and  is PPDU format dependent scaling factor for L-STF on the *k*th tone index, with the following value

(26-13)

Add a line after P101L40

*Ω20MHz* is a set of 20MHz channels, which equals to the channels where HE modulated fields are located and within 0 to *N20MHz-1* in a HE\_TRIG PPDU or when non-continguous channel bonding is applied, or equals to *{0, 1, …, N20MHz-1}* otherwise.

|  |  |
| --- | --- |
|  | (26-14) |

In addition, GI for L-LTF sequence is double GI, *TGI2,Data*. Change equation (26-15),

(26‑15)

Where  is PPDU format dependent scaling factor for L-LTF on the *k*th tone index, with the same value as.

|  |  |
| --- | --- |
|  | (26-16) |

  (26-18)

|  |  |
| --- | --- |
|  | (26-19) |
|  |  |

Where  is PPDU format dependent scaling factor for L-SIG on the *k*th tone index, with the following value

|  |  |
| --- | --- |
|  (26-21)On P109L45, modify  as below |  |
|  | (26-22) |
| ax editor: please make the following changes in *Clause 26.3.9.8.3 (P113L56)*: For the c-th content channel (c = 1 or 2), denote the sample on the k-th data subcarrier of the n-th symbol by d*k,n,c*. The time domain waveform for the HE-SIG-B follows Equation (26-25) |  |
|  | (26‑25) |
| where is the phase rotation value for HESIGB PAPR reduction. When HESIGB is modulated with MCS=0 and DCM=1, . For all other modulation schemes of HESIGB,  |  |
|  |  |

* On P104L19 (CID #525): Refer to resolution of CID #292.
* On P104L19 (CID #904): Refer to resolution of CID #292.
* On P104L19 (CID #906): Refer to resolution of CID #292.
* On P104L19 (CID #908): Refer to resolution of CID #292.
* On P104L19 (CID #1984): Refer to resolution of CID #292.
* On P104L19 (CID #1990): Refer to resolution of CID #292.
* On P104L19 (CID #1995): Refer to resolution of CID #292.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 2531 | Youhan Kim | 26.3.9.3 | 101.53 | What is N\_{STS,total} in L-STF? | Define what N\_{STS,total} is in the context of L-STF. This also applies to equations in other fields using BEAM\_CHANGE = 0. | **Revised.**Change to as in the resolution of CID2531 in doc IEEE802.11-16/0634r1. |

**Discussions:**

The commentor is right that *NSTS,total* has not been defined for pre-HE fields yet. When BEAM\_CHANGE=0, the pre-HE fields are modulated as the first HELTF symbol, which means *NSTS,total* for the pre-HE fields is the same as the one defined for HE fields in Table 26-6.

ax editor: please make the following changes in *Clause 26.3.9.3*:

* On P101L64 (CID #2531): add a new line after L64

*NSTS,total* is defined in Table 26-6 (Frequently used parameters)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1988 | Siguard Schelstraete | 26.3.9.3 | 101.40 | wrong reference | Reference to Table 22-8 should be Table 26-13 | **Revised.**Change to as in the resolution of CID1988 in doc IEEE802.11-16/0634r1. |
| 1994 | Siguard Schelstraete | 26.3.9.4 | 102.24 | wrong reference | Reference to Table 22-8 should be Table 26-13 | **Revised.**Change to as in the resolution of CID1994 in doc IEEE802.11-16/0634r1. |

**Discussions:**

The commentor is right that reference table indices are not correct.

ax editor: please make the following changes in *Clause 26.3.9.3*:

* On P101L40 (CID #1988): Change L40 to

 has the value given in Table 26-13~~22-8~~ (Tone scaling factor and guard interval duration values for ~~PHY fields(11ac)~~HE PPDU fields).

* On P102L24 (CID #1994): Change L24 to

 has the value given in Table 26-13~~22-8~~ (Tone scaling factor and guard interval duration values for ~~PHY fields(11ac)~~HE PPDU fields).

Additional Changes to Table 26-13 are highlighted in “Yellow”.

|  |  |  |
| --- | --- | --- |
| **Field** | $N\_{Field}^{Tone}$ **as a function of bandwidth, and RU size per frequency segment** | **Guard interval duration** |
| **20 MHz** | **40 MHz** | **80 MHz** | **160 MHz** |
| L-STF | 12 | 24 | 48 | 96 | - |
| L-LTF | 52 | 104 | 208 | 416 | *TGI2,Data* |
| L-SIG (in HE PPDU) | 56 | 112 | 224 | 448 | *TGI,LegacyPreamble* |
| L-SIG (in NON\_HT\_DUP) | - | 104 | 208 | 416 |
| RL-SIG | 56 | 112 | 224 | 448 | *TGI,LegacyPreamble* |
| HE-SIG-A | 56 | 112 | 224 | 448 | *TGI,LegacyPreamble* |
| HE-SIG-B | 56 | 112 | 224 | 448 | *TGI,LegacyPreamble* |
| HE-STF not in HE\_TRIG | 14 | 30 | 62 | 126 | - |
| HE-STF in HE\_TRIG | 30 | 60 | 124 | 248 | - |
| HE-LTF 1x Duration | 60 | 122 | 250 | 500 | *TGI,HE-LTF1* |
| HE-LTF 2x Duration | 122 | 242 | 498 | 996 | *TGI,HE-LTF2* |
| HE-LTF 4x Duration | 242 | 484 | 996 | 1992 | *TGI,HE-LTF4* |
| HE-Data | 242 | 484 | 996 | 1992 | *TGI,Data* or *TGI2,Data* or *TGI4,Data* |
| NON\_HT\_DUP\_OFDM-Data | ~~56~~~~-~~ | ~~112~~104 | ~~224~~208 | ~~448~~416 | *TGI,LegacyPreamble* |
| NOTE--in the case of an HE OFDMA PPDU, the $ N\_{Field }^{Tone}$ value of HE-STF, HE-LTF and HE-Data fields is variable, and is determined by which RUs of the current full bandwidth are transmitted in the PPDU. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1058 | Ke Yao | 26.3.9.4 | 103.26 | those extra tones are regarded as an extension of L-LTF used to improve channel estimations for a lager band SIG. we don't need to specify them as BPSK modulated tones. | suggest to change "Extra 4 BPSK modulated tones " to be "Extra 4 tones " | **Rejected.**The extra 4 tones are defined as BPSK and the values are specified in the following sentence. It is better to make it clear. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1992 | Siguard Schelstraete | 26.3.9.4 | 102.09 | L\_k,20 is not defined in (26-15) | see comment | **Revised.**Change to as in the resolution of CID1992 in doc IEEE802.11-16/0634r1. |

**Discussions:**

 is defined as in 11a, and is missing here.

ax editor: please make the following changes in *Clause 26.3.9.4*:

* On P102L09 (CID #1992): add a new line after L24

*Lk,20* is defined as *L-26,26* in Equation (18-8).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1991 | Siguard Schelstraete | 26.3.9.3 | 101.62 | Defintion of Qk | Clarify that the index of Qk refers to the tone spacing used for the data symbols | **Revised.**Change to as in the resolution of CID1991 in doc IEEE802.11-16/0634r1. |

ax editor: please make the following changes in *Clause 26.3.9.3*:

* On P101L62 (CID #1991):

 is the spatial mapping/steering matrix for subcarrier *k,* in frequency segment *iSeg* on the data symbols over tone spacing  as defined in Table 26-3. Refer to the descriptions in 22.3.10.11.1 (Transmission in VHT format) for examples of .

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1985 | Siguard Schelstraete | 26.3.9.3 | 101.18 | S\_k,20 is not defined in (26-14) | see comment | **Revised.**Change to as in the resolution of CID1985 in doc IEEE802.11-16/0634r1. |
| 1989 | Siguard Schelstraete | 26.3.9.3 | 101.54 | S\_k,20 is not defined in (26-14) | see comment | **Revised.**Change to as in the resolution of CID1989 in doc IEEE802.11-16/0634r1. |

**Discussions**

 is defined as in 11a STF, and is missing here.

ax editor: please make the following changes in *Clause 26.3.9.3*:

* On P101L18 (CID #1985): add a new line after L40

*Sk,20* is defined as *S-26,26* in Equation (18-6).

* On P101L54 (CID #1989): Refer to resolution to CID 1985.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1684 | Oghenekome Oteri | 26.3.9.5 | 102.50 | +/-1 TBD Should have values. | It was decided in 114, Should be updated. | **Revised.**Change to as in the resolution of CID1984 in doc IEEE802.11-16/0634r1. |

ax editor: please make the following changes in *Clause 26.3.9.5*:

* On P103L50 (CID #1684): “The content of 4 extra tones [-28,-27,27,28] of L-SIG and RL-SIG in 20MHz HE PPDU is [-1,-1,-1,1].” is passed in PHY Motion 26. Remove TBD in the definition of Dk,20.



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 523 | Dong Guk Lim | 26.3.9.5 | 104.05 | we define the NTonefields in table 26-13. | change the reference to table 26-13 | **Revised.**Change to as in the resolution of CID523 in doc IEEE802.11-16/0634r1. |

ax editor: please make the following changes in *Clause 26.3.9.5s*:

* On P104L05(CID #523):  has the value given in Table 26-13.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1857 | Sameer Vermani | 26.3.10.2 | 134.44 | Please update Table 26-22 | as comment | **Revised.**Change to as in the resolution of CID1857 in doc IEEE802.11-16/0634r1. |

ax editor: please make the following changes in *Clause 26.3.10.2*:

* On P134L44 (CID #1857):

Table 1 - $N\_{SD.SHORT} $values

|  |  |
| --- | --- |
| **RU Size** | NSD.SHORT |
|  | DCM = 0 | DCM = 1 |
| 26 | 6 | 2  |
| 52 | 12 | 6  |
| 106 | 24 | 12  |
| 242 | 60 | 30  |
| 484 | 120 | 60  |
| 996 | 240 | 120  |
| 996x2 | 492 | 246  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1412 | Mark RISON | 26.3.9.5 | 103.07 | Using m=1 or m=2 may cause existing devices to consider L-SIG corrupt and ignore it (just like some existing devices do for a Length greater than 2304), losing the CCA protection for the duration of the PPDU | Do not try to signal new stuff in the L-SIG Length. Instead signal the format in HT-SIG-A | **Rejected.**Using m= 1 or m= 2 will not cause existing devices to consider L-SIG corrupt and ignore it. 11n or 11ac device will interpret the packet as an 11a PPDU once it determines the length is not divisible by 3, and back off based on the duration indicated by this length. 11a device will decode the packet as an 11a PPDU and back off once it cannot correctly decode the packet.  |
| 1195 | Lei Huang | 26.3.9.5 | 103.07 | Regarding the length subfield in L-SIG field, m = 1 should be for an HE SU PPDU or HE trigger based PPDU and m =2 should be for an HE MU PPDU or HE extended range SU PPDU. | change "m is 1 for an HE MU PPDU and HE extended range SU PPDU, and 2 otherwise" to "m is 1 for an HE SU PPDU and HE trigger based PPDU, and 2 otherwise" | **Rejected.**As described in PHY motion 69, “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. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 1996 | Sigurd Schelstraete | 26.3.9.5 | 103.02 | The current defintion of TXTIME is not guaranteed to be a multiple of 4. How is this handled in the defintion of the Length field? | See comment | **Revised.**Change to as in the resolution of CID1996 in doc IEEE802.11-16/0634r1. |
| 2532 | Youhan Kim | 26.3.9.5 | 103.01 | Unlike VHT, TXTIME is not always a multiple of 4 usec in HE. | Add a ceil() function to Equation (26-17). Specifically, Length = ceil( ( TXTIME - 20 ) / 4 ) \* 3 - 3 - m. | **Revised.**Change to as in the resolution of CID2532 in doc IEEE802.11-16/0634r1. |
| 2120 | Sriram Venkateswaran | 26.3.9.5 | 103.02 | Length Field calculation: CEIL function expected | CEIL( (TXTIME-20)/4 ) | **Revised.**Change to as in the resolution of CID2120 in doc IEEE802.11-16/0634r1. |

* On P103L02 (CID #1996): Refer to resolution of CID #1683.
* On P103L02 (CID #2532): Refer to resolution of CID #1683.
* On P103L02 (CID #2120): Refer to resolution of CID #1683.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 2098 | Sigurd Schelstraete | 26.3.10.13 | 150.48 | Wrong reference | Two errored references to be corrected (line 48 and 50) | **Revised.**Change to as in the resolution of CID2098 in doc IEEE802.11-16/0634r1. |

ax editor: please make the following changes in *Clause 26.3.10.13*:

* On P150L43 (CID #2098):

 is defined in 22.3.10.10 (Pilot subcarriers).

 is the transmitted constellation for user *u* in the *r-*th RU at subcarrier *k*, space-time stream *m*, and Data field OFDM symbol *n* and is defined in Equation (26-109).

 has the value given in Table 26-13.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Comment | Proposed Change | Resolution |
| 293 | Bin Tian | 26.3.9.3 | 101.38 | Gamma\_k,BW is defined in Table 26-14 and following Equations (26-8)-(26-11) with mostly TBDs. But in the application of this varible, it points to section 22 (11ac spec) as its reference. The same problem appears in the descriptions os many pre-HE modulated fields, like L-STF, L-LTF, ... | Redefining Gamma\_k,BW seems not necessary unless we have different values from legacy. Suggest to remove the definition of Gamma\_k,BW for 11ax and replace it by simple statement of using legacy definition and value for this varible | **Revised.**Change to as in the resolution of CID293 in doc IEEE802.11-16/0634r1. |
| 1987 | Siguard Schelstraete | 26.3.9.3 | 101.38 | Defintion of Gamma\_k,BW contradicts statement on page 100. | Page 100 states that the values are determined by 26-9, 26-10 and 26-11 | **Revised.**Change to as in the resolution of CID1987 in doc IEEE802.11-16/0634r1. |
| 1993 | Siguard Schelstraete | 26.3.9.4 | 102.22 | Defintion of Gamma\_k,BW contradicts statement on page 100. | Page 100 states that the values are determined by 26-9, 26-10 and 26-11 | **Revised.**Change to as in the resolution of CID1993 in doc IEEE802.11-16/0634r1.  |

ax editor: please make the following changes in *Clause 26.3.9.3*:

* On P100L28 (CID #293): Remove the definition of *k,BW* in Equations (26-8) to (26-11) and Table 26-14.

Replace definition on P100L1 with

 is used to present a rotation of the tones. For HE modulated fields,  for all the tones. For pre-HE fields,  for all the tones when TXVECTOR parameter BEAM\_CHANGE is set to 0, and is defined as in 22.3.7.5(Definition of tone rotation) when TXVECTOR parameter BEAM\_CHANGE is set to 1. When TXVECTOR parameter BEAM\_CHANGE is not present (such as in HE MU PPDU and HE Trigger-based PPDU), BEAM\_CHANGE is assumed to be set to 1.

* On P101L38 (CID #1987): Refer to comment resolution of CID #293.
* On P102L22 (CID #1993): Refer to comment resolution of CID #293.