IEEE P802.11
Wireless LANs

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| CRs on Timing-Related Parameters |
| Date: 2021-11-17 |
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Abstract

This submission contains proposed comment resolutions to comments on P802.11be D1.0. The changes are based on P802.11be D1.2.

The submission provides resolutions to following

* 4550, 4657, 4995, 4996, 5813, 5814, 5815, 6822, 6925, 7190, 7191, 7193, 7312, 7658, 7659, 8098, 8100, 8101

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Added comments based on 11/21-1614r1

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 4550 | 389.57 | 36.3.10 | T\_GI Pre-EHT should be changed to T\_GI,L-LTF | as in the comment. | ACCEPTED |
| 4995 | 389.57 | 36.3.10 | T\_GI,Pre-EHT should be changed to T\_GI,L-LTF. | See the comment. | ACCEPTEDSame as CID 4550 |
| 5814 | 389.57 | 36.3.10 | GI duration for L-LTF is T\_GI,L-LTF instead of T\_GI,Pre-EHT | change "T\_GI,Pre\_EHT" to "T\_GI,L-LTF" for T\_L-LTF | ACCEPTEDSame as CID 4550 |
| 6822 | 389.59 | 36.3.10 | T\_L-LTF equation is incorrect. The same parameter is defined properly in 11ax/11ac. | T\_GI,Pre-EHT should be replaced with T\_GI,L-LTF | ACCEPTEDSame as CID 4550**Note:**The line number is wrong, which should be L57.  |

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 4657 | 388.53 | 36.3.10 | "used for data" is sloppy, as is "EHT data fields" | Change to "Tsym1, Tsym2 or Tsym4 depending on the GI used for the [EHT] Data field" and "OFDM symbol duration for the [EHT] Data field". IMHO "EHT" is not needed here, but it does little harm | ACCEPTED**Note:**The page number is wrong, which should be P389 in D1.0 |
| 5813 | 389.20 | 36.3.10 | pre-EHT modulated fields include L-LTF. However, GI for L-LTF is different from that for L-SIG, RL-SIG, U-SIG and EHT-SIG | change "Guard interval duration for the pre-EHT modulated fields"to "Guard interval duration for the pre-EHT modulated fields excluding the L-LTF field" | ACCEPTED |
| 7190 | 389.37 | 36.3.10 | T\_GI\_EHT-LTF should simply have the Value T\_GI\_Data. No need to repeat the definition here. | See comment | ACCEPTED |

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 5815 | 390.15 | 36.3.10 | EHT PHY has only two PPDU formats. It is better to change "non-TB EHT PPDU" to "EHT MU PPDU". | change "EHT-STF field duration for a non-TB EHT PPDU" to "EHT-STF field duration for an EHT MU PPDU" | REJECTEDThe similar comment was discussed for D0.3 CID 1322. See 11/21-0381r1. In case there is other PPDU format defined in R2 in which case may require to change all the variables and equations that using these variables. It may be future proof to use the non-TB term.  |
| 6925 | 390.35 | 36.3.10 | Change "OFDM symbol duration including GI during the pre-EHT modulated fields" to "OFDM symbol duration including GI in the pre-EHT modulated fields" | As in comment | ACCEPTED |
| 8100 | 391.07 | 36.3.10 | In Table 36-19, the name should be changed. Here full bandwidth seems to indicate nonpuncured. Nonpunctured terminogy is used frequenctly in the spec. | as in comment | REVISEDNote: Full bandwith non-OFDMA term has also been used in the spec. We are open on this. **Instructions to the editor:**Please change “full bandwidth” in the title of Table 36-19 to “nonpunctured”  |

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 7658 | 391.16 | 36.3.10 | In table 36-19, NSD for MCS 14 BW = 80 is 936 while NSD,u for MCS 14 BW = 80 is 234 in table 36-86. Please clarify | See comment. | REVISEDAgreed that there is ambiguity in using the variable Nsd with DCM or DUP mode. Propose to use separate variables to differentiate the cases with and without DCM or DUP involved **Instructions to the editor:**Please make the changes as shown in 11/21-1893r1 |
| 7659 | 391.16 | 36.3.10 | NSD in Table 36-19, 20, 21 and 22 are for non-DCM case? Please clarify. | See comment. | REVISEDNsd in Table 36-19, 20, 21 and 22 indicates the total number of data subcarriers in the allocated RU/MRU, which is independent of DCM or modulation mode **Instructions to the editor:**Please make the changes as shown in 11/21-1893r1 |
| 8098 | 391.16 | 36.3.10 | Given CBW80 (EHT-MCS 14) in Table 36-19, CBW160(EHT-MCS 14) and CBW320(EHT-MCS 14) should be added. A value of N\_SD in this table is different from the Table Table 36-86. Make clear the Table 36-19. | as in comment | REVISEDTable 36-19, 20, 21 and 22 list subcarrier allocation related parameters with different RU/MRU, which is independent of DCM or modulation mode. Different from CBW80 (EHT-MCS 14), CBW160 and CBW320 have same tone plan regardless using MCS14 or not, so no need to list them additionally.Agreed that there is ambiguity in using the variable Nsd with DCM or DUP mode. Propose to use separate variables to differentiate the cases with and without DCM or DUP involved **Instructions to the editor:**Please make the changes as shown in 11/21-1893r1 |

***Discussion:***

There are two different definitions for Nsd in the current 11be and 11ax spec

* Definition 1: total number of data tones
	+ e.g., in Table 36-19



* Definition 2: effective number of data tones carrying unique data
	+ For non-DCM and non-DUP cases, it is the same number of tones as with definition 1;
	+ When MCS15 (DCM mode), it is a half number of tones from definition 1;
	+ When MCS14 (DUP mode), it is a quarter number of tones from definition 1;
	+ e.g., in Table 36-86



Nsd with definition 1 is used in the following subclauses in D1.2:

* 36.3.10 Timing-related parameters: Table 36-19 to Table 36-22
* 36.3.13.12 OFDM modulation: P601L4
* 36.3.19.4.4 Transmitter modulation accuracy (EVM) test

Nsd with definition 2 is used in the DCM, MCS14 and MCS15 related subclauses in D1.2:

* 36.3.13.5 Segment parser
	+ Note that Nsd,total used in Table 36-48 Proportional round robin segment parser parameters
* 36.3.13.6 BCC interleavers
* 36.3.13.7 Constellation mapping
* 36.3.13.8 LDPC tone mapper
* 36.3.13.9 Segment deparser
* 36.3.13.10 Frequency domain duplication
* 36.5 Parameters for EHT-MCSs
* 36.6 Parameters for EHT-SIG-MCSs

To minimize the spec change, propose to change Nsd to Nsd,total in the locations where the definition 1 is assumed; otherwise use “Nsd” with definition 2 when applicable

***Instructions to the editor: Please make the following changes to Table 36-19 to Table 36-22 in*** ***36.3.10 Timing-related parameters highlighted in red***

## Table 36-19—Subcarrier allocation related constants for the EHT-modulated fields in a full bandwidth non-OFDMA EHT PPDU

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **CBW20** | **CBW40** | **CBW80****(non-EHT- MCS 14)**(#1611) | **CBW80 (EHT- MCS 14)**(#1611) | **CBW160** | **CBW320** | **Description** |
| *NSD,total* | 234 | 468 | 980 | 936 | 1 960 | 3 920 | Total number of data subcarriers(#1257) |
| *NSP* | 8 | 16 | 16 | 32 | 32 | 64 | Number of pilot subcarriers(#1257) |

**Table 36-20—Subcarrier allocation related constants for the EHT-modulated fields in a punctured non-OFDMA EHT PPDU**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **CBW80****with 20 MHz****puncturi ng****484+ 242-****tone MRU**(#32 85) | **CBW160****with 40 MHz****puncturi ng****996+ 484-****tone MRU**(#32 85) | **CBW160****with 20 MHz****puncturi ng 996+484+****242-tone MRU**(#32 85) | **CBW320****with 120 MHz****puncturi ng 2****996+****484-tone MRU**(#32 85) | **CBW320****with 80 MHz****puncturi ng 3****996-****tone MRU**(#32 85) | **CBW320****with 40 MHz****puncturi ng 3****996+****484-tone MRU**(#32 85) | **Description** |
| *NSD,total* | 702 | 1 448 | 1 682 | 2 428 | 2 940 | 3 408 | Total number of data subcarriers (#1257) |
| *NSP* | 24 | 32 | 40 | 48 | 48 | 64 | Number of pilot subcarriers(#125 7) |
| *NST* | 726 | 1 480 | 1 722 | 2 476 | 2 988 | 3 472 | Total number of subcarriers(#125 7) |

## Table 36-21—Subcarrier allocation related constants for RUs in an OFDMA EHT PPDU

|  |  |  |
| --- | --- | --- |
| **Parameter** | **RU size (subcarriers)**(#1258) | **Description** |
| **26** | **52** | **106** | **242** | **484** | **996** | **2****996** | **4****996** |
| *NSD,total* | 24 | 48 | 102 | 234 | 468 | 980 | 1 960 | 3 920 | Total number of data subcarriers per RU |
| *NSP* | 2 | 4 | 4 | 8 | 16 | 16 | 32 | 64 | Number of pilot subcarriers per RU |
| *NST* | 26 | 52 | 106 | 242 | 484 | 996 | 1 992 | 3 984 | Total number of subcarriers per RU |
| NOTE—*NST* = *NSD,total* + *NSP* |

## Table 36-22—Subcarrier allocation related constants for MRUs in an OFDMA EHT PPDU

|  |  |  |
| --- | --- | --- |
| **Parameter** | **MRU size (subcarriers)** | **Description** |
| **52+26** | **106+26** | **484+242** | **996+484** | **2****996****+484** | **3****996** | **3****996****+484** |
| *NSD,total* | 72 | 126 | 702 | 1 448 | 2 428 | 2 940 | 3 408 | Total number of data subcarriers per MRU |
| *NSP* | 6 | 6 | 24 | 32 | 48 | 48 | 64 | Number of pilot subcarriers per MRU |
| *NST* | 78 | 132 | 726 | 1 480 | 2 476 | 2 988 | 3 472 | Total number of subcarriers per MRU |
| NOTE—*NST* = *NSD,total* + *NSP* |

***Instructions to the editor: Please make the following changes to 36.3.13.12 OFDM modulation (P601L4) highlighted in red***

NOTE— *Mr* *k* translates a subcarrier index *k*  *Kr*  into the index of data symbols in a transmission over RU/MRU

*r*, 0  *Mr* *k*  *NSD,total*  . The subcarrier index *k* for the data subcarrier is first offset by the minimum value of subcarrier

index *Kr* min (for the lower edge subcarrier) in this RU/MRU and number of the unoccupied tones, and then subtracted

by the number of pilot subcarriers falling in between the data subcarrier and the edge subcarrier.

***Instructions to the editor: Please make the following changes to 36.3.19.4.4 Transmitter modulation accuracy (EVM) test highlighted in red (P632, P633, and P634)***

**For inband EVM measurement**

P632L41 in Eqn. (36-102): Nsd🡪Nsd,total

P632L45 in Eqn. (36-102): Nsd🡪Nsd,total

P632L62 change to: Nsd, total is the total number of data tones of the occupied RU.

**For unused tone error measurement:**

P633L58 in Eqn. (36-104): Nsd🡪Nsd,total

P633L60 in Eqn. (36-104): Nsd🡪Nsd,total

P634L3 change to: Nsd, total is the total number of data subcarriers in the occupied RU.

***Instructions to the editor: Please make the following change to Table 36-48 in*** ***36.3.13.5 Segment parser highlighted in red***

***Note: CID 7293 in 11/21-1614r1 suggests to remove this Nsd,total column, we are fine with it***

## Table 36-48—Proportional round robin segment parser parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU/MRU** | **RU order****(low to high frequency)** | **Is DCM****used?** | *~~Nsd~~*~~~~ *~~total~~ Nsd* | **Proportional ratio***m*0:*m*1:*m*2:*m*3 | **Leftover bits (on RU996)** |
| 996+484 | 484+996 | No | 1 448 | 1*s*:2*s* | 44  *Nbpscs* |
| Yes | 724 | 22  *Nbpscs* |
| 996+484 | No | 1 448 | 2*s*:1*s* | 44  *Nbpscs* |
| Yes | 724 | 22  *Nbpscs* |
| 996+484+242 | (242+484)+996 | No | 1 682 | 3*s*:4*s* | 44  *Nbpscs* |
| Yes | 841 | 22  *Nbpscs* |
| 996+(242+484) | No | 1 682 | 4*s*:3*s* | 44  *Nbpscs* |
| Yes | 841 | 22  *Nbpscs* |

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| 4996 | 392.36 | 36.3.10 | For the CBW80 with 20 MHz puncturing 484+242-tone MRU case, N\_DC should be 23 since this puncturing case follows the OFDMA tone plan. | See the comment. | ACCEPTED |
| 7191 | 392.05 | 36.3.10 | The term "punctured PPDU" needs a better definition. On the one hand we have preamble puncturing, which actually applies to both preamble and EHT-modulated fields. On the other hand, OFDMA or MRUs make it possible to leave certain parts of the EHT-modulated fields unassigned, regardless of what happens with the preamble. While preamble puncturing and MRUs will frequently be used together, they are different concepts. However, throughout the spec they often seem to be used synonymously. In Table 36-20 e.g. CBW80 with 20 MHz puncturing should not automatically imply that MRU 484+242 is used. Also, MRU 484+242 could be used without preamble puncturing, meaning the BW would be simply CBW80. | Clearly distinguish between preamble puncturing and MRU. In Table 36-20, refer to e.g. "SU transmisson using MRU 484+242" | REJECTEDAs indicated in the tilte and the top row of Table 36-20, the MRUs list here are used for non-OFDMA with preamble puncturing, which can be SU or MU MIMO transmissionRegardless puncture or not， MRUs used in OFDMA are listed in Table 36-22If needed, we are open to rephrase the wording  |

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| 7193 | 395.08 | 36.3.10 | Delete "R\_u is the" to make it consistent with the format of other rows in the table. | See comment | ACCEPTED |
| 7312 | 394.06 | 36.3.10 | Segment parser introduces N\_CBPSS,l,u and N\_BPSCS,l,u. Add to Table 36-23. | See comment | REVISEDAgreed in principle. Note: CID 7294 in 11/21-1614r1 provides similar comment for N\_CBPSS,l,u only **Instructions to the editor:**Please make the changes as shown in 11/21-1893r1 |

***Instructions to the editor: Please make the following changes to 36.3.10 (P494L06) highlighted in red***

## Table 36-23—Frequently used parameters

|  |  |
| --- | --- |
| **Symbol** | **Explanation** |
| *NRU* | For pre-EHT modulated fields, *NRU* = 1 *.*For EHT modulated fields, *NRU* represents the number of occupied RUs or MRUs in the transmission. |
| *Nuser* *r* | For pre-EHT modulated fields, *Nuser* *r* = 1 .For EHT modulated fields, *Nuser* *r* represents the total number of users in the *r*-th occupied RU or MRU of the transmission. |
| *Nuser* *total* | Total number of users in all occupied RUs or MRUs of an EHT transmission, i.e.,*NRU* – 1*Nuser* *total* =  *Nuser* *r* .*r* = 0 |
| *NCBPS* *u* | Number of coded bits per OFDM symbol for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *NCBPSS* *u* | Number of coded bits per OFDM symbol per spatial stream for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
|  *NCBPSS l*,*u* | Number of coded bits per OFDM symbol per spatial stream for user *u, u* = 0 1  *Nuser* *total* – 1, and in the *l*th 80MHz frequency subblock, *l =*0 1  *L* – 1. *L* is the number of 80MHz frequency subblocks. |
| *NDBPS* *u* | Number of data bits per OFDM symbol for user *u*, *u* = 0 1  *Nuser* *total* – 1 .(#1328)NOTE—For LDPC coding, this is the nominal number of data bits per OFDM symbol. |
| *NBPSCS* *u* | Number of coded bits per subcarrier per spatial stream for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *NBPSCS l*, *u* | Number of coded bits per subcarrier per spatial stream for user *u*, *u* = 0 1  *Nuser* *total* – 1, and in the *l*th 80MHz frequency subblock, *l =*0 1  *L* – 1. *L* is the number of 80MHz frequency subblocks. |
| *NRX* | Number of receive chains. |

**Table 36-23—Frequently used parameters *(continued)***

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| **Symbol** | **Explanation** |
| *Kr* | Set of used subcarrier indices in the *r*-th occupied RU or MRU. |
| *Ru* | *~~Ru~~* ~~is the~~ Coding rate for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *Mr* *u*  | The sum of the number of spatial streams of users prior to user *u* in RU or MRU *r*.For pre-EHT modulated fields, *Mr* *u* = 0 . For EHT modulated fields, *Mr* 0 = 0*u* – 1for *u* = 0 and *Mr* *u* =  *NSS* *r* *u*' , for *u* = 1 2  *Nuser* *r* – 1 .*u*' = 0 |

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| 8101 | 401.11 | 36.3.10 | L-STF should be Field because it is the equation applied to pre-EHT modulated fields. | as in comment | ACCEPTEDNote that This CID belongs to 36.3.11.4 Transmitted signal, rather than 36.3.10. It is just a typo in general math description of pre-EHT modulated fields.**Note to the editor:**It was already corrected in D1.2 for Eqn. (36-11) |