IEEE P802.11
Wireless LANs

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| **CRs on LDPC** 62,63,64,182,210,272,549,951,963,1080, ,1126,1334,2065,2066,2266,2267,2268, 2350,2439,2700, 2756,2757,2758,2759,2760,2761,3298,3299,3540, 3547 |
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Abstract

This submission contains proposed comment resolutions to comments on P802.11bn D0.1. The changes are based on P802.11bn D0.1.

The submission provides resolutions to the following CIDs

* 62,63,64,182,210,272,549,951,963,1080, 1126,1334,2065,2066,2266,2267,2268, 2350,2439, 2756,2757,2758,2759,2760,2761,3298,3299,3540, 3547

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Changes based on initial feedback
* Rev 2: CIDs 1125 and 2700 are removed (These are to be addressed separately)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 1334 | 111.49 | 38.3.6 | missing "? " in the 2nd column | Add? | REVISEDNote to editor: This appears to be fixed in the draft 0.2 already. No change per se for this editorial comment. The table as in CR#2066 will now have this taken care of. |
| 2065 | 111.24 | 38.3.6.1 | typo in the existing LDPC codeword lengths. | Replace "1294" with "1296". | ACCEPTEDNote to Editor: Just the number replaced in the sentence. The full sentence and the relevant change is highlighted in CR#2065 |
| 2066 | 111.52 | 38.36.1 | A mistake in description of "LDPC codeword length" in Table 38-11."1994, otherwise" should be "1944, otherwise". | Replace "1994, otherwise" with "1944, otherwise". | ACCEPTEDNote to Editor: The PPDU Encoding parameters table is updated for this CID along with all other relevant ones pertaining to the table. The exact changes for this are highlighted in red. CR#2066 |
| 2266 | 111.49 | 38.3.6.1 | In table 38-11, number of LDPC codewords column, last row the ceiling symbol is not missing on the left side. | Please fix the ceiling symbol. | ACCEPTEDNote to Editor: The ceiling function appears to be already fixed in draft 0.2. CR#2066 has the updated table for reference |
| 2267 | 111.56 | 38.3.6.1 | Note that the 2xLDPC subfield is defined in the trigger frame, please add User info field of the trigger frame to be accurate | As in comment | REVISEDCR#2066Note to editor: The first sentence below the table in CR2066 has this change highlighted (in red).  |
| 2268 | 112.36 | 38.3.6.2 | In Matrix E(H), it is better to add that bi,j in the range of [-1 Z-1]. Note that, when d>=0, the first row of the matrix C(d) will have 0 at all entries, except at the position d, where it is set to 1. For a matrix, it is better to use row and column instead of position. If d is 0, position 0 is not clear. Please change to column d+1 to be accurate. | As in comment | REVISEDNote to editor: The last part of the sentence in CR2759 has this change highlighted (in red). Essentially the word “column” is inserted to make the description clear as proposed by the commenter.CR#2759 |
| 2350 |  | 38.3.6.2 | LDPC code matrix definition should follow 11n defined in Annex F | As in comment | REJECTED. Note: The structure of the 2x1944 code in UHR has this product lifting structure which is better explained in an all inclusive section as in draft 0.1 |
| 2439 | 111.13 | 38.3.6.2 | There is an issue with the first ceiling operator | Please fix | ACCEPTEDNote to Editor: This was an editorial error in the draft 0.1 but is already resolved in draft 0.2 and hence no change as such needed. The PPDU encoding table shown as reference in CR#2066 has this change along with other related CIDs |
| ~~2700~~ | ~~111.19~~ | ~~38.3.6.2~~ | ~~LDPC encoding should be consolidated to 38.3.16.1.3. While this is editorial comment, marking it as technical as I presume people would want to debate this.~~ | ~~Move 38.3.6 under 38.3.16.1.3.~~ | ~~OPEN~~ |
| 951 | 111.19 | 38.3.6.2 | Fix the ceiling function | Fix the ceiling function | REVISEDNote to Editor: No change needed since this was a valid comment w.r.t draft 0.1, but has gotten resolved in draft 0.2 already. CR#2066 has this change along with other relevant comments resolved.  |
| 963 | 111.61 | 38.3.6.1 | Further clarify that LDPC codeword length of 648, 1296 or 1944 shall not be used when 2xLDPC subfield is set to 0. | Add "Nominal LDPC codeword length of 648, 1296 or 1944 shall not be used if the 2xLDPC subfield in the Trigger frame or the User field of UHR-SIG field is set to 1." | REJECTEDNote: The text and the table look clean. Open to hear further comments and make appropriate changes if needed.  |
| 2756 | 111.24 | 38.3.6.2 | Change from "1294" to "1296" | See comments | ACCEPTEDNote to Editor: The first sentence has this change highlighted as shown in CR#2065 |
| 2757 | 111.57 | 38.3.6.2 | Remove "it is" | See comments | ACCEPTEDNote to editor: The change is in the second sentence following the table as shown in #CR2066. The exact change is to remove the phrase “it is:” |
| 2758 | 111.57 | 38.3.6.2 | Change from "648, 1296 or 1944 is" to "3888 is not" | See comments | REJECTEDNote: The existing statement reflects the possible situation in a better way. Excluding 3888 could mean several other possibilities  |
| 2759 | 111.57 | 38.3.6.2 | Change from "parity matrix" to "parity check matrix" | See comments | ACCEPTEDNote to editor: The change is reflected and highlighted as shown in #CR2759. The sentence and the title entries of the table are updated |
| 2760 | 112.43 | 38.3.6.2 | Change from "parity matrix" to "parity check matrix" | See comments | ACCEPTEDNote to editor: The change is reflected and highlighted as shown in #CR2759. The sentence and the title entries of the table are updated |
| 2761 | 112.46 | 38.3.6.2 | Make "Exponent matrix size" and "Parity check matrix size" all capital | See comments | REVISEDNote: Rejecting the proposed comment since this will bring unnecessary inconsistency w.r.t to the spec. However, the title row has been updated with appropriate encapsulation. Party Matrix is also changed to Parity Check Matrix. #CR2066Note to editor: The title row of the table is updated as shown in #CR2066.  |
| 3298 | 111.33 | 38.3.6.1 | The math expressions in Table 38-11 is not displayed in correct format. | Correct the math expressions in table 38-11. | REVISEDNote to editor: This was a relevant comment w.r.t draft 0.1, but this has since been already fixed in draft 0.2. Hence no change as such for this, but the #CR2066 has all related comments addressed.  |
| 3299 | 112.12 | 38.3.6.2 | The equations in this page did not display in correct format. Also, equation indices need to be assigned to these equations. | Correct the equations and assign equation indices. | REVISEDNote to editor: #CR2066 has address this. Part of this has gotten resolved already in 0.2. |
| 3540 | 111.24 | 38.3.6 | typo | 1294 ---> 1296 | ACCEPTEDNote to editor: #CR2066 takes care of this along with few other relevant CIDs |
| 3547 | 112.44 | 38.3.6.2 | missing "check" after "parity" | "Table 38-12- Exponent matrix and parity check matrix size"; similarly on line 39 | REVISEDNote to editor: The changes are as highlighted in #2759. The second sentence as well as the title entries of the table has been updated  |
| 62 | 111.24 | 38.3.6 | Change "1294, 1944" to "1294 and 1944". | Refer to the comment | ACCEPTEDNote to editor: The changes are as highlighted in #2759. The second sentence as well as the title entries of the table has been updated |
| 63 | 111.49 | 38.3.6 | In the 2nd column of Table 38-11, the ceiling function is incomplete. | Refer to the comment | REVISEDNote to editor: The problem has been resolved in draft 0.2. CR2066 in general takes care of fixes pertaining to the PPDU encoding parameter table and description. |
| 64 | 111.55 | 38.3.6 | The description of the 2xLDPC subfield is duplicated since it has already been described in the trigger frame and UHR-SIG. Remove the paragraph. | Refer to the comment | REJECTEDThis content is being reasserted as a note, and the purpose of this note is solely to provide clarity regarding a table being discussed. |
| 182 | 111.52 | 38.3.6 | typo in Table 38-11, the '1994' should be '1944' | change to '1944' | ACCEPTEDNote: #CR2066 takes care of this already |
| 210 | 111.49 | 38.3.6.1 | Number of LDPC codewords for 3888<Navbits is not shown correctly | make the formula clearly shown | REVISEDNote: #CR2066 takes care of this already |
| 272 | 111.52 | 38.3.6.1 | In Table 38-11--PPDU encoding parameters, when the Range of Navbits (bits) is 3888 < Navbits and the 2xLDPC subfield in the User Info field of the trigger frame or in the User field of the UHR-SIG field is set to 0, the LDPC codeword length LLDPC should not be 1994. | Change 1994 to 1944 | REVISEDNote: #CR2066 takes care of this already |
| 549 | 111.52 | 38.3.6.1 | a typo in section 38.3.6.1 Table 38-11 line 52, the 1994 should be 1944 | 1994-->1944 | REVISEDNote: #CR2066 takes care of this already |
| 1080 | 111.52 | 38.3.6.1 | "1994, otherwise" should be "1944, otherwise" | change to 1944 | REVISEDNote: #CR2066 takes care of this already |
| ~~1125~~ | ~~111.19~~ | ~~38.3.6~~ | ~~It is better to move this clause into 38.3.16 Data field because it is related to the data field.~~ | ~~As the comment~~ | ~~OPEN~~ |
| 1126 | 111.50 | 38.3.6 | There is a typo in the second column of the last row of Table 38-11. | Fix it | REVISEDNote: #CR2066 takes care of this already |

**Proposed Changes**

**CR#2066**

# PPDU Encoding Parameters

Table PPDU Encoding parameters table

|  |  |  |
| --- | --- | --- |
| **Range of Navbits(bits)** | **Number of LDPC codewords(NCW)** | **LDPC codeword length LLDPC(bits)** |
| $N\_{avbits}\leq 648$ | 1 | 1296, if $N\_{avbits}\geq N\_{pld}+912 (1-R)$648, otherwise |
| $$648 <N\_{avbits}\leq 1296$$ | 1 | 1944, if $N\_{avbits}\geq N\_{pld}+1464 (1-R)$1296, otherwise |
| $1296 <N\_{avbits}\leq 1944$ | 1 | 1944 |
| $1944 <N\_{avbits}\leq 2592$ | 2 | 1944, if $N\_{avbits}\geq N\_{pld}+2916 (1-R)$1296, otherwise |
| $$2592 <N\_{avbits}\leq 3888$$ | 2 | 1944 |
| $N\_{avbits}>3888$ | $$\left⌈\frac{N\_{pld}}{ R. L\_{LDPC}}\right⌉$$  | 3888, if 2xLDPC subfield in User (Info) field of the trigger frame or in the per-user field of the UHR-SIG is set to 1. 1944, Otherwise |

Note that the 2xLDPC subfield is defined in the User Info field of the trigger frame and in the User field of UHR-SIG field. The subfield indicates whether the nominal LDPC codeword length of 3888 is used in the PPDU, i.e.,

—0 to indicate that the nominal LDPC codeword length of 648, 1296 or 1944 is being used.

—1 to indicate that the nominal LDPC codeword length of 3888 is being used.

**CR#2065**

# 38.3.5 LDPC Encoding

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In addition to the codeword lengths of 648, 1296, 1944, the UHR STA may also support codeword length of 3888 bits. The specifications for the length 3888 LDPC codes are defined in Table 38-11 **(PPDU encoding parameters).**

**CR #2759**

For $d \geq 0$, $C\left(d\right)$ is the matrix obtained by cyclically shifting the identity matrix $I\_{Z}$, to the right by $d$ positions. $C\left(-1\right)$ is the NULL matrix of size $Z×Z$, which has all its entries set to 0. Note that, when $d \geq 0$ , the first row of the matrix $C\left(d\right)$ will have 0 at all entries, except at the column position $d$, where it is set to 1.

For the code rate $R$ , the size of the matrix $E\left(H\right)$ is $48\left(1-R\right)×48$. The parity check matrix is a binary matrix of size $48\left(1-R\right)Z×48Z$.

Table 38-12 **(Exponent Matrix and Parity Check Matrix sizes).**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code Rate**  | **Exponent Matrix** | **Exponent Matrix Size** | **Parity Check Matrix Size** |
| 1/2 | E(H)\_R\_12 | $$24×48$$ | $$1944×3888$$ |
| 2/3 | E(H)\_R\_23 | $$16×48$$ | $$1296×3888$$ |
| 3/4 | E(H)\_R\_34 | $$12×48$$ | $$972×3888$$ |
| 5/6 | E(H)\_R\_56 | $$8×48$$ | $$648×3888$$ |