IEEE P802.11
Wireless LANs

|  |
| --- |
| Comment Resolution for Data field (Section 32.3.9) |
| Date: 2021-03-10 |
| Author(s): |
| Name | Affiliation | Address | Phone | Email |
| Rui Cao | NXP | 350 Holger Way, San Jose,CA |  | rui.cao\_2@nxp.com |

Abstract

This submission proposes resolutions for comments received on Section 32.3.11 Receiver Specification in TGbd D1.0. The following is the list of 15 CIDs:

* 1087, 1163, 1465, 1581, 1582, 1583, 1584, 1585, 1675, 1780, 1829, 1830, 1831, 1832, 1835

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 1581 | 32.3.9.2 | 73.15 | B0-B6 should be set in accordance with Table 17-7 when CH\_BANDWIDTH\_IN\_NON\_NGV is present. | as in comment | Rejected.B0-B6 are used for scrambler initialization, and shall be set to 0. All SERVICE bits will be scrambled by the values defined in Table 17-7. This is the same setting as other PHY amendments, like 11a/g/n/ac/ax. |
| 1582 | 32.3.9.4 | 73.31 | It is observed that, considering APEP\_LENGTH from 20 to1000 octets in CBW10 and N\_SS=1, there are still 35%, 20%, and 44% of excessive punctured bits (N\_punc) existing after expanding N\_avbits, for MCO0, MCS1, and MCS10, respectively. In another word, excessive N\_punc is still observed after LDPC\_EXTRA\_SYMBOL set to 1 and N\_avbits and N\_punc adjusted accordingly. When a specific APEP\_LENGTH having such condition occurs, the decoding performance of the PPDU can be catastrophic even at a high SNR, mainly bacause excessive valid codeword has been punctured for transmission. | Please verify the observation by LDPC simulation. If the simulation result concurs with the observation, suggest adding BCC back to the coding option or providing a table of the "bad" APEP\_LENGTH to avoid for use. For the latter, need to expand the search to include N\_SS=2 and CBW20 and make sure it doesn't introduce issues to the higher layers. | Rejected.Agree that the LDPC coding gain over BCC will vary with payload length, and the gain can be smaller for short payload length. In practice, the coding gain can also vary due to channel condition, receiver implementation and etc. Transmitter is not able to decide the coding type simply based on payload size. If transmitter wants to use BCC for small payload, 11p format is available if needed. Efficiency is not a concern for small payload. 11bd adoptes the same LDPC definition as other major 802.11 PHY, like 11n/ac/ax. The superior performance of LDPC has been validated in corresponding mature 802.11 products, and also validated by many technical contributions to 11bd under C2C channels. So 11bd group has decided to mandate LDPC being the only encoding scheme for NGV PPDU, to simplify NGV product design.  |
| 1829 | 32.3.9.4 | 73.31 | unnecessary "-" added in the sentence | delete "-" after (LDPC) code and after process | Accepted. |
| 1163 | 32.3.9.6 | 73.54 | DCM is applied to NGV-MCS 10 according to the MCS table. | Replace "NGV-MCS0" with "NGV-MCS 10" | Revised.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx>  |
| 1465 | 32.3.9.6 | 73.54 | "For DCM applied to NGV-MCS0" is confusing | Change to "For NGV-MCS 10" | Revised.Same resolution to CID 1163. 11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1830 | 32.3.9.6 | 73.46 | DCM is applied when setting to MCS 10 | NGV-MCS0 should be replaced with NGV-MCS 10 | Revised.Same resolution to CID 1163. 11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1780 | 32.3.9.8.1 | 74.44 | In Equation (32-31), Nss is used for input of spatial mapping, while Nsts is used for input of spatial mapping in Equation (32-27). | Please make it consistent between NGV-LTF and Data field time domain representations. | RevisedAgree that we need to change NGV-LTF Equation (32-27). The resolution is already included in<https://mentor.ieee.org/802.11/dcn/21/11-21-0028-03-00bd-the-comment-resolution-for-32-3-8-3-6.docx> |
| 1831 | 32.3.9.8.1 | 75.6 | improve the text | "10 MHZ NGV transmission" could be improved with "10 MHZ NGV PPDU transmission" | Revised.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1583 | 32.3.9.8.1 | 75.10 | Where is d\_tilde first defined in Eq. (32-32)? | Please specify the reference location. | RevisedAgree that the notation is not clearly defined in 11bd. The d\_tilde is defined in Clause 21.3.10.9 (Constellation Mapping) to accommodate both segment parser and STBC. Agree that to it is more clear to defined it within Clause 32.9.8. The notation is unified in the proposed resolution in related places in the draft.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1585 | 32.3.9.10 | 77.3 | What is d\_tilde defined in D\_k\_n? The same notaion is also used in Eq. (32-32) but has different number of subscripts. | Please clarify. Also, suggest labeling this expression by an equation number. | RevisedSimilar comment as CID1583. The notation is unified.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1832 | 32.3.9.8.1 |  | improve the text | "20 MHZ NGV transmission" could be improved with "20 MHZ NGV PPDU transmission" | Revised.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1584 | 32.3.9.8.1 | 75.51 | "... the number of transmit chains NTX could be 1 or 2." Is 2 the maximum of N\_TX in NGV? If so, it is suggested moving this phrase to the front following the optional requirement of 2 spatial sstreams. | As in the comment. | RevisedThe number ot transmit chain is implementation specific. Change the text to make it more general.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1087 | 32.3.9.10 | 76.59 | Equation 32-35 doesn't look correct: e.g. (j\*exp) | as in comment | RevisedCorrect the typo in the equation.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1835 | 32.3.9.10 | 76.59 | Equation 32-35 includes error | (jexp) should be updated with jexp | RevisedSame comment as CID1087.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |
| 1675 | 32.3.9.10 | 76.59 | In (32-35) last line two parantheses around (j\*exp) are set incorrectly and need to be removed. | Remove parantheses around " (j\*exp)" on last line in (32-35) | RevisedSame comment as CID1087.11bd Editor: please see the changes in <https://mentor.ieee.org/802.11/dcn/21/11-21-0018-00-00bd-comment-resolution-for-data-field.docx> |

*TGbd Editor: Please make the following changes in Section 32.3.9 of D1.0.*

32.3.9.4 Coding

The Data field of an NGV PPDU shall be encoded using a low-density parity check (LDPC) code and uses the same LDPC code and encoding process as described in Clause 21.3.10.5.4 (LDPC coding) for a VHT SU PPDU with parameter set to 1. (#1829)

32.3.9.6 Constellation mapping

The mapping between bits at the output of the stream parser and complex constellation points for BPSK, QPSK, 16-QAM, and 64-QAM follows the rules defined in 17.3.5.8 (Subcarrier modulation mapping) and 256-QAM follows the rules defined in 21.3.10.9 (Constellation mapping).

The streams of complex numbers are denoted as shown in Equation (32-X).

 ,

For NGV data portion modulated with NGV-MCS15, the input stream is broken into groups of bits . Each bit is BPSK modulated to a sample. This generates the samples for the lower half of the data subcarriers. For the upper half of the subcarriers, the samples are generated as, with. The here refers to the for NGV-MCS15, which is half the value of for NGV-MCS0. (#1163, #1465, #1830, #1583)

*TGbd Editor: Please make the following changes in P75L6 of Section 32.3.9.8.1 of D1.0.*

In a 10 MHz NGV PPDU transmission, (#1831)

*TGbd Editor: Please make the following changes in P75L25 of Section 32.3.9.8.1 of D1.0.*

In a 20 MHz NGV PPDU transmission, (#1832)

*TGbd Editor: Please make the following changes in Section 32.3.9.8.1 of D1.0 in addition to the changes in 11-21/0126r1.*

33.3.9.8 OFDM modulation

33.3.9.8.1 Transmission in NGV format

The time domain waveform of the Data field of an NGV PPDU from transmit chain *iTX*, 1  *iTX*  *NTX* shall be as defined in Equation (32-31).

where

is the *nth* OFDM data symbol in the Data field, .

 is defined in Equation (32-27)

 is the duration of one midamble

 is defined in 17.3.5.10 (OFDM modulation)

 is the index for the midambles,

 is defined in 32.3.9.7 (Pilot subcarriers)

 is defined in Equation (32-4) and Equation (32-5)

 is the transmitted constellation at subcarrier *k*, spatial stream *m*, and Data field OFDM symbol *n* and is defined in Equation (32-32) to Equation (32-33)

 has the value given in Table 32-8 (Tone scaling factor and guard interval duration values for PHY fields)

 is given in Table 21-11 (Cyclic shift values for the NGV modulated fields of a PPDU)

 is the guard interval duration. .

In a 10 MHz NGV transmission,

 (33-32)

where

In a 20 MHz NGV transmission,

 (33-33)

(#1583)

 is a spatial mapping/steering matrix with *NTX* rows and *NSS* columns for subcarrier *k*. may be frequency dependent. Refer to the examples of listed in 19.3.11.11.2 (Spatial mapping) for examples of that could be used for NGV PPDU. Note that implementations are not restricted to the spatial mapping matrix examples listed in 19.3.11.11.2 (Spatial mapping) and the number of transmit chains *NTX* could be more than one. The beamforming steering matrices are implementation specific. (#1584)

*TGbd Editor: Please make the following changes in Section 32.3.9.10 of D1.0.*

33.3.9.10 Non-NGV duplicate transmission

When the TXVECTOR parameter FORMAT is NON\_NGV\_10 and the TXVECTOR parameter NON\_NGV\_MODULATION is NON\_NGV\_10\_DUP\_OFDM, the transmitted PPDU is a non-NGV duplicate. Non-NGV duplicate transmission is used to transmit to STAs that support non-NGV OFDM and may be present in a part of a 20 MHz channel (see Table 32-2 (Interpretation of FORMAT, NON\_NGV\_MODULATION and CH\_BANDWIDTH parameters)). The RL-SIG, NGV-SIG, RNGV-SIG, NGV-STF and NGV-LTF fields are not transmitted. The L-STF, L-LTF, and L-SIG fields shall be transmitted in the same way as in the NGV transmission, with the exceptions for the Rate and Length fields which shall follow Clause 17.3.4 (SIGNAL field). Data field shall be as defined in Equation (32-35).

(#1087, #1835, #1675)

where

 and are defined in 17.3.5.10 (OFDM modulation)

 (32-X)

(#1585)