IEEE P802.11
Wireless LANs

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| TGbd D0.3 Comment Resolutions for Section 32.3.8 Data Field |
| Date: 2020-06-08 |
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Abstract

This submission proposes resolutions for comments received on Section 32.3.8 Data Field in TGbd D0.3. The following is the list of CIDs:

* 151, 158, 171, 198, 199, 327, 328, 329, 330, 331, 332, 333, 335, 336, 337, 338, 339

***CIDs for Clause 32.3.8***

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 151 | 32.3.8.4 | 52.11 | As LDPC is the only coding scheme for data portion, Sec. 32.3.8.4 can be streamlined without sub sections. | As in the comment. | RevisedSee changes in 11-20/0901r1. |
| 158 | 32.3.8.5 | 52.51 | Wrong variable names (s and S confused). | Ensure that s and S are properly differentiated. It appears that:In (32-31), should be S instead of s. (confer (21-69) in Clause 21.3.10.6 (Stream parser) in IEEE 802.11-2016)In the enumerator of (32-32), should be S instead of s (only in the enumerator). (confer (21-70) in IEEE 802.11-2016)"Then, \*\*\*S\*\*\* bits from the output of next encoder are used, and so on. If NCBPS is greater than \*\*\*N\_BLOCK \cdot S\*\*\*, then for the last \*\*\*N\_CBPS - N\_Block \cdot S\*\*\* bits of each OFDM symbol [...]"Alternative: The description of the stream parser can be massively simplified and shortened because the maximum number of spatial streams in an NGV PPDU is 2. For example, M is always zero when there are only two spatial streams. | RevisedAgree in principle that the “stream parser” sub-section can be simplified. A better way is to simply refer it to section 21.3.10.6 (Stream parser) with limit of 2 spatial streams.See changes in 11-20/0901r1. |
| 171 | 32.3.8.9.1 | 56.18 | "R efer" should be "Refer." | See comment. | Accepted |
| 198 | 32.3.8 | 51.28 | Heading reads "32.3.8 Data field." | Remove "." after "Data field" | Accepted |
| 199 | 32.3.8.9.1 | 56.17 | Typo | Change "R efer" to "Refer" | Accepted |
| 327 | 32.3.8.5 | 52.43 | N\_ss should be N\_SS all capital lettwe to be consistent for all other amendments like 11ac and 11ax. Those are shown in several spots. Correct it all in this subclause. | as in comment | RevisedThe “stream parser” sub-section can be simplified by referring it to section 21.3.10.6 (Stream parser) with limit of 2 spatial streams.See changes in 11-20/0901r1. |
| 328 | 32.3.8.5 | 52.58 | In Equation (32-32), in N\_Block, Block should not be in italic to be consistent for all other amendments like 11ac and 11ax | as in comment | RevisedSee resolution to CID 327. |
| 329 | 32.3.8.5 | 52.61 | In N\_Block, Block should not be in italic to be consistent for all other amendments like 11ac and 11ax. Those are shown in several spots. Correct it all in this subclause. | as in comment | RevisedSee resolution to CID 327. |
| 330 | 32.3.8.5 | 52.51 | In Equation (32-31), s should be S | as in comment | RevisedSee resolution to CID 327. |
| 331 | 32.3.8.5 | 52.58 | In denominator of Equation (32-32), s should be S | as in comment | RevisedSee resolution to CID 327. |
| 332 | 32.3.8.5 | 52.61 | In the setence starting at L61, s and S are used in mix. Those are shown in sever spots, even in some equations. Correct it to make sense the stream parser operation. | as in comment | RevisedSee resolution to CID 327. |
| 333 | 32.3.8.5 | 53.06 | i\_ss should be i\_SS in this subclause. But i\_ss and i\_SS are used in mix.Those are shown in several spots. Correct it all in this subclause. | as in comment | RevisedSee resolution to CID 327. |
| 335 | 32.3.8.7 | 53.45 | add the D\_(TM\_DCM), LDPC tone mapper for DCM case in the Table 32-13 and coresponding spec text and equations like Equation (32-35) and Equation (32-36) in this subclause | as in comment | RevisedLDPC DTM is not needed for 11bd, straw polled in 11-20/0887r0 with consensus. The subsection is removed.See changes in 11-20/0901r1 |
| 336 | 32.3.8.7 | 54.01 | d'\_t(k),I,n should be d''\_t(k),I,n to be consistent with other amendments like 11ac and 11ax. Permuted steam should use the different term before LDPC tone mapper. If using the same d', it may cause some confusion to readers. If decided to be modified as requested, then correct it all through this subclause. | as in comment | RevisedSee resolution to CID 335. |
| 337 | 32.3.8.8 | 54.34 | In equation (32-37), add space between subcarrier indices in brasket. For exampe, {-22,-8,8,22} could be {-22, -8, 8, 22} to support more readable text. | as in comment | Accepted |
| 338 | 32.3.8.8 | 54.50 | In equation (32-38), add space between subcarrier indices in brasket. For exampe, {-54,-26,-12,12,26,54} could be {-54, -26, -12, 12, 26, 54} to support more readable text. | as in comment | Accepted |
| 339 | 32.3.8.9.1 | 55.50 | with k+28, its range should start with -28 (not -21) | as in comment | Accepted |

*TGbd Editor: Please make the following changes in Section 32.3.8 of D0.3.*

32.3.8 Data field

32.3.8.1 General

The number of OFDM symbols in the Data field is determined by the Length field in L-SIG (see Equation (32-8)), the preamble duration and the setting of the NGV-LTF and Midamble field in NGV-SIG (see 32.3.7 (NGV preamble)).

For LDPC encoding, the Data field shall consist of the SERVICE field, the PSDU, and the PHY pad bits.

The padding flow is as follows. The MAC delivers a PSDU that fills the available octets in the Data field of the PPDU. The PHY determines the number of pad bits to add and appends them to the PSDU. The number of pad bits added will always be 0 to 7. The PHY padding bits are calculated using Equation (32-29).

 (32-29)

where

 is defined in 32.4.3 (TXTIME and PSDU\_LENGTH calculation)

 is given by Equation (21-62) with .

32.3.8.2 SERVICE field

The SERVICE field is as shown in Table 32-12 (SERVICE field).

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| Table 32-12 (SERVICE field) |
| Bits | Field | Description |
| B0-B6 | Scrambler Initialization | Set to 0 |
| B7-B15 | Reserved | Set to 0 |

32.3.8.3 Scrambler

The SERVICE, PSDU, and PHY pad parts of the Data field shall be scrambled by the scrambler defined in 17.3.5.5 (PHY DATA scrambler and descrambler). The Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT are not present; therefore, the initial state of the scrambler is set to a pseudorandom nonzero seed.

32.3.8.4 Coding

The Data field of a 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 21.3.10.5.4 (LDPC coding) for a VHT SU PPDU with parameter *m*STBC set to 1.

32.3.8.5 Stream parser

After coding and puncturing, the data bit streams at the output of the FEC encoders are processed in groups of *NCBPS* bits. Each of these groups is rearranged into *NSS* blocks of *NCBPSS* bits. This operation is referred to as *stream parsing* and is described in 21.3.10.6 (Stream parser) for a SU transmission .

32.3.8.6 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).

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*TGbd Editor:* *Please remove sub-section 32.3.8.7, and update the* section and equation numbers in the entire document here-after.32.3.8.7 Pilot subcarriers

In a 10 MHz transmission, four pilot tones shall be inserted in subcarriers . The pilot mapping for subcarrier *k* for symbol *n* shall be as specified in Equation (32-30).

  (32-30)

where,

 is given by the row of Table 19-19 (Pilot values for 20 MHz transmission)

In a 20 MHz transmission, six pilot tones shall be inserted in subcarriers .. The pilot mapping for subcarrier *k* for symbol *n* shall be as specified in Equation (32-31).

 (32-31)

where

 is given by the *NSTS =* 1 row of Table 19-20 (Pilots values for 40 MHz transmission (excluding MCS 32))

The above pilot mapping shall be copied to all spatial streams before the spatial stream cyclic shifts are applied.

The pilot subcarrier locations in the NGV-LTF field for NGV-LTF-1x and NGV-LTF-2x are the same as the

pilot subcarrier locations in the Data field.

32.3.8.8 OFDM modulation

32.3.8.8.1 Transmission in NGV format

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

(32-32)

where

*pn* is defined in 17.3.5.10 (OFDM modulation)

 is defined in 32.3.8.7 (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 (32-33) and Equation (32-34)

 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,

 (32-33)

where

In a 20 MHz NGV transmission,

 (32-34)

where

 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 1 or 2. The beamforming steering matrices are implementation specific.