IEEE P802.11  
Wireless LANs

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| Comment Resolution for CIDs on PHY Data Field Other | | | | |
| Date: 2016-05-16 | | | | |
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Abstract

This document contain comment resolutions for CID 2566, 2474, 2081, 2080, 2079, and 2078 (corresponding to sections 26.3.10.5, 26.3.10.6, and 26.3.10.7), CID 1866, 2087, 2086, 2089, and 2092 (corresponding to section 26.3.10.10), and CID 2092 (corresponding to section 26.3.10.11).

The CID 1450 and 2183 are comments for section 26.3.10.7. However, it can’t not be resolved without a contribution.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

**CID for Section 26.3.10.5**

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| **CID** | **Commenter** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution** |
| 2081 | Sigurd Schelstraete | 26.3.10.5 | 142 | 5 | Range of k should be 0 to N\_CBPSS-1 | Replace N\_CBPS with N\_CBPSS | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2080 | Sigurd Schelstraete | 26.3.10.5 | 141 | 58 | index k is defined twice | Range of k is defined on line 58, page 141 and on line 5 of page 142. Delete occurrence on page 141. | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2079 | Sigurd Schelstraete | 26.3.10.5 | 141 | 44 | No need for variable N\_block | N\_Block only appears in two places: (1) on line 47 as "N\_Block.S" (2) on line 58 as "N\_Block.s" Since the text states that N\_CBPS = N\_block.S for all RU sizes, (1) can be replaced with N\_CBPS and (2) can be replaced withb N\_CBPSS. Remove N\_Block and make the substituions above | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2078 | Sigurd Schelstraete | 26.3.10.5 | 141 | 18 | Add scrambling | Change "After coding, puncturing and post-FEC padding ..." with "After scrambling, coding, puncturing and post-FEC padding ..." | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |

**Discussion:**

Proposed resolutions for CIDs 2081, 2080, 2079, and 2078, which correspond to section 26.3.10.5.

The following is a summary of changes.

Section 26.3.10.5:

* Accept proposed changes in CID 2078, 2079, 2080, and 2081.
* Add parenthesis around “k mod s” to avoid further confusion in the mathematical equation.
* Remove the note regarding even allocation of bits per stream as it is not essential to interpretation of the specification.

**Proposed Text Changes:**

The following contains the proposed changes to 26.3.10.5 (with change marks).

------------- Begin Text Changes ---------------

**26.3.10.5 Stream parser**

After scrambling, coding, puncturing and post-FEC padding, the data bit streams at the output of the FEC encoder are processed in groups of *NCBPS* bits. Each of these groups is re-arranged into *NSS* blocks of *NCBPSS* bits (*NSS,u* blocks of *NCBPSS,u* bits in the case of a HE MU transmission). This operation is referred to as “stream parsing” and is described in this section.

The description is given in terms of an SU transmission. For MU transmissions, the rearrangements are carried out in the same way per user.

The number of bits assigned to a single axis (real or imaginary) in a constellation point in a spatial stream is denoted by Equation (26-94).

|  |  |
| --- | --- |
|  | (26‑94) |

The sum of these over all streams is .

Consecutive blocks of *s* bits are assigned to different spatial streams in a round robin fashion.

For the bits of each OFDM symbol, *S* bits from the output of the encoder are divided among all spatial streams, *s* bits per stream.

The following equations are an equivalent description to the above procedure. Bit i at the output of the encoder is assigned to input bit *k* of spatial stream *iSS* where



where



-------------- End Text Changes ----------------

**CID for Section 26.3.10.6**

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| **CID** | **Commenter** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution** |
| 2566 | Youhan Kim | 26.3.10.6 | 142 | 9 | In case of HE160 or HE80+80, does the first bit of segment parser go to the Primary80 or the 80 MHz lower in frequency? | Clarify whether the first bit of segment parser go to the Primary80 or the 80 MHz lower in frequency in case of HE160 or HE80+80. | Revised.  Agree in principle.  Added equations and supporting text for performing segment parser for 11ax. 11ac equations for segment parser cannot be directly re-used since the addition of a new subscript ‘r’ for RU index.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2474 | Yongho Seok | 26.3.10.6 | 142 | 10 | "For a 160 MHz and 80+80 MHz HE SU PPDU, a 160 MHz and 80+80 MHz HE MU PPDU, and a HE trigger-based PPDU with the RU spanning the entire PPDU bandwidth, the output bits of each stream parser are segment parsed as specified in 22.3.10.7." The segment parser is used only for the 2x996-tone RU, as specified in 802.11ax SFD. Because the 160 MHz and 80+80 MHz HE MU PPDU transmitted in OFDMA does not need a segment parser. Change the corresponding sentence as the following: "For a 160 MHz and 80+80 MHz HE SU PPDU, a 160 MHz and 80+80 MHz HE MU PPDU with the RU spanning the entire PPDU bandwidth, and a HE trigger-based PPDU with the RU spanning the entire PPDU bandwidth, the output bits of each stream parser are segment parsed as specified in 22.3.10.7." | As per comment | Revised.  Agree in principle.  Correct the potential confusion PPDU format conditions for applying segment parser.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |

**Discussion:**

Proposed resolutions for CIDs 2566, and 2474 which correspond to section 26.3.10.6.

The following is a summary of changes.

Section 26.3.10.6:

* Agree with proposed changes in CID 2474.
* Agree in principal with proposed changes in CID 2566. Added equations and supporting text for performing segment parser for 11ax..

**Proposed Text Changes:**

The following contains the proposed changes to 26.3.10.6 (with change marks).

------------- Begin Text Changes ---------------

**26.3.10.6 Segment parser**

The description in this subclause is given in terms of an SU transmission. For MU transmissions, the rearrangements are carried out in the same way per user.

Segment parser is bypassed for a 20 MHz, a 40 MHz, an 80 MHz, a 160 MHz, or an (#6388)80+80 MHz transmission a RU with 26, 52, 106, 242, 484, or 996 subcarriers and the output bits of each stream parser are as specified in Equation (26-Z).

|  |  |
| --- | --- |
|  | (26-Z) |

where

x*m* is the *k* th bit of a block of *NCBPSS* bits, *k* = 0 to *NCBPSS* – 1,

*l* is the frequency subblock index. *l* = 0 for a RU with 26, 52, 106, 242, 484, or 996 subcarriers.

*yk,l* is bit *k* of the frequency subblock *l,*

*s* is defined in Equation 26-94.

For a (#6388)160 MHz or an (#6388)80+80 MHz transmission with 2x996 subcarrier RU, the output bits of each stream parser are first divided into blocks of *NCBPSS* bits (*NCBPSS,u* bits in the case of an MU transmission). Then, each block is further divided into two frequency subblocks of *NCBPSS*/2 bits as shown in Equation (26-X)

|  |  |
| --- | --- |
|  | (26-X) |

where

|  |  |
| --- | --- |
|  | (26-Y) |

and

x*m* is the *m* th bit of a block of *NCBPSS* bits, *m* = 0 to *NCBPSS* – 1,

*l* is the frequency subblock index, *l* = 0, 1,

*yk,l* is bit *k* of the frequency subblock *l,*

*s* is defined in Equation 26-94.

-------------- End Text Changes ----------------

**CID for Section 26.3.10.10 and 26.3.10.7**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution** |
| 1866 | Sameer Vermani | 26.3.10.7 |  |  | In Table 26-26, 2x996 for table 26-26, needs to be handled in a note; we might need to say that this is happening on a per 80MHz basis. | as in comment | Accept.  Add description under the table 26-26 that LDPC tone mapping parameter DTM and DTM\_DCM is applied for each frequency subblock *l* = 0, and 1.  *TGax Editor*: : make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2086 | Sigurd Schelstraete | 26.3.10.10 | 144 | 3 | Wrong reference | Replace Table 26-24 with Table 26-26. | Accept.  In addition, LDPC tone mapper reference in Table 26-24 does not belong in section 26.3.10.7. Therefore, we propose Table 26-24 from section 26.3.10.7.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2087 | Sigurd Schelstraete | 26.3.10.10 | 144 | 3 | Wrong reference | Replace 25.3.10.7 with 26.3.10.8 | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2089 | Sigurd Schelstraete | 26.3.10.10 | 145 | 42 | Wrong reference | Two errored references to be corrected | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |
| 2092 | Sigurd Schelstraete | 26.3.10.11 | 146 | 9 | Wrong reference | Equation 26-89 can't be the right reference. Correct. | Accept.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |

**Discussion:**

The CID 1866 belong to clause 26.3.10.10 (not 26.3.10.7) and therefore has been grouped with CIDs 2087, 2086, 2089, and 2092.

Section 26.3.10.10:

* Agree and accept all comments with CIDs 1866, 2087, 2086, 2089, and 2092.

Section 26.3.10.7:

* LDPC tone mapper reference in Table 26-24 does not belong in section 26.3.10.7. Therefore, we propose Table 26-24 and associated text from section 26.3.10.7.

**Proposed Text Changes:**

The following contains the proposed changes to 26.3.10.7 and 26.3.10.10 (with change marks).

------------- Begin Text Changes ---------------

**26.3.10.7 BCC interleavers**



For ease of explanation, the operation of the interleaver is described only for the SU case. For user *u* in the *r-*th RU of an MU transmission, the interleaver operates in the same way on the output bits for the user from the stream parser by replacing *NSS*, *NCBPSS*, *NCBPSSI*, and *NBPSCS* with *NSS,r,u*, *NCBPSS,r,u*, *NCBPSSI,r,u*, and *NBPSCS,r,u*, respectively. That is, the operation of the interleaver is the same as if the transmission were an SU one, consisting of bits from only that user.

The BCC interleaver operation is specified in 22.3.10.8 (BCC interleaver). The values of the interleaver parameters, *NCOL*, *NROW*, and *NROT* are selected based on the RU size of the user, and are given in Table 26‑25 (BCC interleaver parameters).

**Table 26-25**– **BCC interleaver parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **RU Size (tones)** | | | |
| **26** | **52** | **106** | **242** |
|  | 8 | 16 | 17 | 26 |
|  | 3 × *NBPSCS* | 3 × *NBPSCS* | 6 × *NBPSCS* | 9 × *NBPSCS* |
| *NROT* (*NSS* ≤ 4) | 2 | 11 | 29 | 58 |

-------------- End Text Changes ----------------

------------- Begin Text Changes ---------------

26.3.10.10 LDPC tone mapper

The LDPC tone mapper parameters are defined in Table 26-26 (LDPC tone mapping distance for each RU size).

The LDPC tone mapping shall be performed on all LDPC encoded streams mapped in a RU as described in this subclause. LDPC tone mapping shall not be performed on streams that are encoded using BCC. When DCM is applied to LDPC encoded streams, *DTM\_DCM* shall be applied on both the lower half data subcarriers in a RU and the upper half data subcarriers of the RU. The LDPC tone-mapping distance parameter *DTM* and *DTM\_DCM* are constant for each RU size and the values for different RU sizes are given in Table 26-26 (LDPC tone mapping distance for each RU size).

Table 26-26– LDPC tone mapping distance for each RU size

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **RU Size (tones)** | | | | | | |
| **26** | **52** | **106** | **242** | **484** | **996** | **2x9961)** |
| *DTM* | 1 | 3 | 6 | 9 | 12 | 20 | 20 |
| *DTM\_DCM* | 1 | 1 | 3 | 9 | 9 | 14 | 20 |

Note 1) LDPC tone mapping parameter DTM and DTM\_DCM is applied for each frequency subblock *l* = 0, and 1.

For an HE PPDU without DCM, the LDPC tone mapping for the LDPC encoded stream for user u in the r-th RU is done by permuting the stream of complex numbers generated by the constellation mappers (see 26.3.10.8) to

*<omitted>*

For a HE PPDU with DCM, the LDPC tone mapping for the LDPC encoded stream corresponding to user u in the r-th RU is done by permuting the stream of complex numbers generated by the constellation mappers (see 25.3.10.8) to

*<omitted>*

-------------- End Text Changes ----------------

**CID for Section 26.3.10.11**

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| **CID** | **Commenter** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution** |
| 2092 | Sigurd Schelstraete | 26.3.10.11 | 146 | 9 | Wrong reference | Equation 26-89 can't be the right reference. Correct. | Revised.  Agree in principle.  Added equations for performing segment de-parser for 11ax.  11ac equations for segment de-parser cannot be directly re-used since the addition of a new subscript ‘r’ for RU index.  *TGax Editor*: make changes as in 11-16-xxxx-00-00ax CR-for-CID-on-PHY-data-field-other |

**Discussion:**

Agree in principle with CID 2092. We propose to add equations and supporting text for performing segment de-parser for 11ax. This is because the 11ac equations for segment de-parser cannot be directly re-used since the addition of a new subscript ‘r’ for RU index that was introduced for 11ax OFDMA operations. In addition, other reference mistakes in section 26.3.10.11 have been corrected.

**Proposed Text Changes:**

The following contains the proposed changes to 26.3.10.11 (with change marks).

------------- Begin Text Changes ---------------

**26.3.10.11 Segment deparser**

In a transmission over a RU of 26, 52, 106, 242, 484 and 996 subcarriers, the segment deparsing is not performed and  is specified in Equation (26-X)1.

|  |  |
| --- | --- |
|  | (26-X) |

In a transmission over a RU of 2x996 subcarriers and with a 160 MHz HE SU PPDU, a 160 MHz HE MU PPDU, or a HE trigger-based PPDU, the two frequency subblocks at the output of the LDPC tone mapper are combined into one frequency segment as specified in Equation 26-Y

|  |  |
| --- | --- |
|  | (26-Y) |

In a transmission over a RU of 2x996 subcarrier and with an 80+80 MHz HE PPDU, the segment deparsing is not performed and  is specified in Equation (26-Z).

|  |  |
| --- | --- |
|  | (26-Z) |

NOTE—As per Table 21-7 (center frequency for frequency segment *iSeg* = 0), *fc*(0) is always less than *fc*(1) in case of 80+80 MHz HE PPDU transmissions. Hence, *d”k,i,n,*0*,r,u* (frequency subblock 0) is always transmitted in the frequency segment lower in frequency, while *d”k,i,n,*1*,r,u* (frequency subblock 1) is always transmitted in the frequency segment higher in frequency.(#3166)

-------------- End Text Changes ----------------

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| **CID** | **Commenter** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution** |
| 1450 | Mark RISON | 26.3.10.7 | 142 | 25 | A more efficient interleaver/tone mapper is possible than this | A presentation will be brought to describe this |  |
| 2183 | Tianyu Wu | 26.3.10.7 | 142 | 21 | The BCC interleaver parameters for DCM modulations are not defined. No interleaver designed for DCM+BPSK and interleaver for DCM with other modulations are also not clear. | Define BCC interleaver parameters for DCM modulations. |  |

**Discussion:**

The CID 1450 and 2183 should be classified as need presentation category. And cannot be resolved without a proper submission.

**Proposed Text Changes:**

None.