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Wireless LANs

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| Miscellaneous 11mc comment resolutions (Initial Sponsor Ballot) |
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Abstract

This document contains the discussion of and proposed resolutions to CIDs 5892, 5900, 5913, 5914, 5915, 5916, 5919, 5922, 5920, 5923, 5926, 5927, 5929, 5931, 5937, 5928, 5932, 5934, 5935 and 5936.

**CID 5892**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5892 | 9.16 | 1316 | 9 | A statement similar to the first paragraph should be included for VHT transmisisons. | Add LDPC requirement for VHT. |

The current text is:



Section 9.16 has some generic requirements on LDPC, but only for HT. Similar text should be added to cover VHT.

**Proposed resolution**

Revised. Change subclause 9.16 as follows:

**9.16 LDPC operation**

An HT STA shall not transmit a frame with the TXVECTOR parameter FORMAT set to HT\_MF or HT\_GF and the TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless the RA of the frame corresponds to a STA for which the LDPC Coding Capability subfield of the HT Capabilities element received from that STA contained a value of 1 and dot11LDPCCodingOptionActivated is true.

A VHT STA shall not transmit a frame with the TXVECTOR parameter FORMAT set to VHT and the TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless the RA of the frame corresponds to a STA for which the Rx LDPC subfield of the VHT Capabilities element received from that STA contained a value of 1 and dot11LDPCCodingOptionActivated is true.

Further restrictions on TXVECTOR parameter values may apply due to rules found in 9.26 (Protection mechanisms) and 9.7 (Multirate support).

**CID 5900**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5900 | 9.32.3 | 1424 | 63 | This section should not have requirements on VHT beamformee. Delete paragraph or move to appropriate section. | See comment |

Subclause 9.32.3 deals with Explicit Feedback beamforming for HT transmissions, as is clear from the first sentence of the subclause:



Within the subclause, the following text appears on Page 1424, Line 63:



Given that 9.32.3 is explicitly about HT PPDUs, it’s not clear why this statement is needed. Every VHT STA is an HT STA, so the requirements when operating in HT mode should be fully covered by the HT clauses.

Also, the statement seems to have it backwards. By design, the feedback can not exceed the number of streams that was sounded in the sounding frame. In VHT, the maximum number of streams in a sounding frame is indeed limited by the Beamformee STS Capability subfield of the VHT Capabilities element. As such, the statement on Page 1424, Line 63 would be trivially met.

However, HT has its own field to indicate the maximum number of streams in an NDP. That field is the Channel Estimation Capability subfield in the Transmit Beamforming Capabilities field (HT Capabilities field). It would appear that that field is the relevant number. However, again, the requirement would be trivially met since the sounding PPDU will never provide an opportunity to provide feedback for more streams.

**Proposed resolution**

Revised. Remove the lines 63-64 on Page 1424:

**CID 5913**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5913 | 22.1.4 | 2456 | 55 | The line "the FORMAT parameter determines the overall structure of the PPDU and includes thefollowing:" seems to imply that the subsequent list is not exhaustive, while it is. | Replace "the FORMAT parameter determines the overall structure of the PPDU and includes thefollowing:" with "the FORMAT parameter determines the overall structure of the PPDU and can take the following values:" |



**Proposed resolution**

Accept.

Change the text as follows:

For a VHT STA, the FORMAT parameter determines the overall structure of the PPDU and can take the following values:

— Non-HT format (NON\_HT), based on Clause 18 (Orthogonal frequency division multiplexing

(OFDM) PHY specification) and including non-HT duplicate format.

— HT-mixed format (HT\_MF) as specified in Clause 20 (High Throughput (HT) PHY specification).

— HT-greenfield format (HT\_GF) as specified in Clause 20 (High Throughput (HT) PHY

specification).

**CID 5914**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5914 | 22.2.2 | 2458 | 40 | In Table 22-1, sometimes reference is made to Table 20-1 for HT-related values, while sometimes content of Table 20-1 is copied explicitly. | Propose to consistently refer to Table 20-1 when appropriate rather than duplicating text in both Table 22-1 and Table 20-1. |

Table 22-1 extends to definition of TXVECTOR and RXVECTOR from HT to VHT. Some fields of TXVECTOR and/or RXVECTOR exist for both HT and VHT. The way these are handled in the table is not consistent however. In some cases, all the HT information is duplicated, while in other cases, reference is made to Table 20-1 for HT-related values.

For example, L\_LENGTH in Table 22-1 is defined as follows:



This copies most of the definition for Table 20-1:



Other definitions only specify only the changes that affect VHT. For example:



It’s always better to avoid duplication of text from one clause in another and instead reference the relevant text. The proposal is to clean up Table 22-1 to apply this consistently throughout the table.

No final text proposal is included in this submission. This can be done in a separate document if the the group agrees with the proposed way forward.

**Proposed resolution**

Pending, following discussion in the group.

**CID 5915**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5915 | 22.2.2 | 2463 | 24 | The range of PSDU values may be wrong. In Table 22-29, aPSDUMaxLength is given as 4 692 480 bytes (which may also be wrong, see separate comment on Table 22-29). | Clarify and correct |



1,048,575 is the maximum value of APEP\_LENGTH. However, PSDU\_LENGTH can take very different values, especially for MU. As such, the maximum value given here is not correct. See also 802.11-15/0908R2 for further background on the maximum possible value of the PSDU.

The outcome of the analysis in 802.11-15/0908R2 was that the maximum theoretical PSDU length of 4,692,480 bytes could never be reached due to other constraints on the MAC layer. The resolution there was to point this out more explicitly, rather than to replace aPSDUMaxLength with the “real” maximum number of bytes that could be carried in a PSDU. However, in this case, the field PSDU\_LENGTH needs to be dimensioned correctly to indicate the length observed by the receiver. The current value is too small to do that.

There are several options to resolve the issue:

1. Remove any reference to a possible range of values
2. Make the upper bound 4 692 480 bytes, with a NOTE or a reference to Table 22-29

Input from the group is requested to decide on a way forward.

**Proposed resolution**

Pending, following discussion in the group.

**CID 5916**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5916 | 22.2.2 | 2465 | 20 | "for non-HT or non-HT duplicate frames, CH\_BANDWIDTH is a receiver estimate of the bandwidth". I can't find any requirement on how the receiver is supposed to determine the value of CH\_BANDWIDTH for these cases, so this statement may not be supported by the spec. | Clarify |

Propose to withdraw this comment. The CH\_BANDWIDTH entry in the Table does mention the estimate. However, the NOTE may be more useful directly in the CH\_BANDWIDTH\_IN\_NON\_HT entry of Table 22-1. Most NOTEs in Table 22-1 that pertain to specific parameters are inserted in the table, rather than collected at the end.

**Proposed resolution**

Revised: no change needed.

**CID 5919**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5919 | 22.3.3 | 2473 | 50 | "Data field of a 20 MHz, 40 MHz, and 80 MHz VHT SU PPDU with BCC encoding for a single frequency segment" | 20 MHz, 40 MHz, and 80 MHz VHT SU PPDUs never have two frequency segments. The words "for a single frequency segment" should be deleted. |



**Proposed resolution**

Accept. Change text as follows:

Figure 22-10 (Transmitter block diagram for the Data field of a 20 MHz, 40 MHz, or 80 MHz VHT SU PPDU with BCC encoding) shows the transmitter blocks used to generate the Data field of a 20 MHz, 40 MHz, and 80 MHz VHT SU PPDU with BCC encoding.

**CID 5922**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5922 | 22.3.6 | 2488 | 57 | Refer to NOTE 1 for definition of "pre-modulated fields" | See comment |



Up until this point, no definition is given for the “pre-VHT modulated fields”. The term isn’t introduced until later. A proper reference is in order.

**Proposed resolution**

Revised. Change text as follows:

|  |
| --- |
| For pre-VHT modulated fields (see NOTE 1), *Nuser* = 1. For VHT modulated fields, *Nuser* represents the number of users in the transmission (equal to the TXVECTOR parameter NUM\_USERS). |

**CIDs 5920, 5923, 5926, 5927, 5929, 5931 and 5937**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5920 | 22.3.4.5 | 2480 | 60 | Change bullet h) from "CSD: Apply CSD for each transmit chain as described in 22.3.8.2.1 (Cyclic shift for pre-VHT modulated fields)." to "CSD: Apply CSD for each transmit chain and frequency segment as described in 22.3.8.2.1 (Cyclic shift for pre-VHT modulated fields).This makes it consistent with the description of CSD in 22.3.4.2, 22.3.4.3 and 22.3.4.4. | See comment |
| 5923 | 22.3.7.4 | 2494 | 1 | Change "The signal transmitted on frequency segment i\_seg of transmit chain i\_TX" with "The signal transmitted on frequency segment i\_seg and transmit chain i\_TX" to be consistent with usage in other places (e.g. 22.3.4.2, 22.3.4.3, 22.3.4.4) | See comment |
| 5926 | 22.3.8.2.2 | 2498 | 38 | Change "the signal on frequency segment i\_Seg oftransmit chain i\_TX" with "the signal on frequency segment i\_Seg and transmit chain i\_TX" | See comment |
| 5927 | 22.3.8.2.3 | 2499 | 27 | Change "The time domain representation of the signal on transmit chain i\_TX" with "The time domain representation of the signal on frequency segment i\_Seg and transmit chain i\_TX" | See comment |
| 5929 | 22.3.8.3.4 | 2506 | 57 | Change "The time domain representation of the signal on frequency segment i\_Seg of transmit chain i\_TX" to "The time domain representation of the signal on frequency segment i\_Seg and transmit chain i\_TX" | See comment |
| 5931 | 22.3.8.3.5 | 2509 | 55 | Change "The time domain representation of the waveform transmitted on frequency segment i\_Seg of transmit chain i\_TX" with "The time domain representation of the waveform transmitted on frequency segment i\_Seg and transmit chain i\_TX" | See comment |
| 5937 | 22.3.10.11.1 | 2535 | 52 | Replace "from transmit chain i\_TX" with "on transmit chain i\_TX and frequency segment i\_Seg" | See comment |

In several places in the standard dealing with 80+80 MHz transmissions, reference is made to “the signal on frequency segment i\_Seg of transmit chain i\_TX”. There was a prior comment (CID 3178) that this characterizes the 80+80 as sending the full analog signal on a single antenna, whereas an implementation may just as well send separate segments on separate antennas. In that case, the wording “transmit chain i\_TX of frequency segment i\_Seg” may be more appropriate.

In resolution of this comment, it was decided to use the more neutral wording “frequency segment i\_Seg and transmit chain i\_TX” (see 11-15/26r1), which covers both possibilities. It appears that this resolution was not consistently applied throughout the document. In other places, the mention of “segment” is omitted.

**Proposed resolution**

Revise. Change text in the following places as indicated:

On page 2480, Line 60:

h) CSD: Apply CSD for each transmit chain and frequency segement as described in 22.3.8.2.1 (Cyclic shift for pre-VHT modulated fields).

On page 2494, Line 1:

The signal transmitted on frequency segment *iSeg* and transmit chain *iTX* shall be as shown in Equation (22-12).

On page 2498, Line 38:

The time domain representation of the signal on frequency segment *iSeg* and transmit chain *iTX* shall be as specified in Equation (22-20).

On page 2499, Line 27:

The time domain representation of the signal on frequency segment *iSeg* and transmit chain *iTX* shall be as defined in Equation (22-23).

On page 2506, line 57:

The time domain representation of the signal on frequency segment *iSeg* and transmit chain *iTX* shall be as specified in Equation (22-33).

On page 2509, line 55:

The time domain representation of the waveform transmitted on frequency segment *iSeg* and transmit chain *iTX* shall be as described by Equation (22-43).

On page 2535, Line 52:

The time domain waveform of the Data field of a VHT PPDU from frequency segment *iSeg* and transmit chain *iTX*, 1 ≤ *iTX* ≤ *NTX* shall be as defined in Equation (22-96).

**CID 5928**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5928 | 22.3.8.3.4 | 2506 | 6 | Replace "The frequency domain sequence used to construct the VHT-STF field in a 20 MHz transmission is identical to the L-STF field" with "The frequency domain sequence used to construct the VHT-STF field in a 20 MHztransmission is identical to the HT-STF field". This makes it consistent with (22-29). (and yes, HT-STF is identical to L-STF) | See comment |



On line 6, it states that “The frequency domain sequence used to construct the VHT-STF field in a 20 MHz transmission is identical to the L-STF field”. While this is technically correct, it is not consistent with the formula (22-29), where the VHT-STF field is equated with HT-STF. The proposal is to make the text consistent with the formula.

**Proposed resolution**

Revise. Change Page 2506, Line 6 as follows:

The frequency domain sequence used to construct the VHT-STF field in a 20 MHz transmission is identical to the HT-STF field.

**CID 5932**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5932 | 22.3.8.3.6 | 2511 | 56 | The note is wrong. PSDU\_LENGTH can be very different from APEP\_LENGTH. As such, the number of octets represented by VHT-SIG-B will not be within 3 bytes of PSDU\_LENGTH. | Delete Note |



**Proposed resolution**

Revise. Change text on Page 2511, Line 56 as follows:

**CID 5934**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5934 | 22.3.10.5.3 | 2519 | 5 | Tortured English: replace "each is encoded" with "are each separately encoded" | See comment |



**Proposed resolution**

Revise. Change text on Page 2519, Line 4 as follows:

The BCC encoder parser output sequences of user *u *are each separately encoded by a rate R = ½ convolutional encoder defined in 18.3.5.6 (Convolutional encoder).

**CID 5935**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5935 | 22.3.10.7 | 2523 | 39 | Error in Equation (22-76) | Replace N\_CBPSS with N\_CBPSS-1 |



The index k runs over all coded bits per spatial stream (*NCBPSS*). The correct range is from 0 to *NCBPSS* -1.

**Proposed resolution**

Accept. Change text on Page 2523, Line 39 as follows:

*Yk,l* = *xk*, *k* = 0, 1,…, *NCBPSS-1*

**CID 5936**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5936 | 22.3.10.9.2 | 2531 | 37 | "will be transmitted on two data tones that are separated by at least D\_TM -1 from other data tones" doesn't make sense. Replace with "will be transmitted on two data tones that are separated by at least D\_TM -1 other data tones" (delete "from") | See comment |



The LDPC tone mapping is in essence a block interleaving operation. Tone that were initially adjacent will be separated by D\_TM -1 tone after the LDPC tone mapping operation – meaning there are D\_TM -1 other data tones between them. The current text states that the tones are separated from other data tones. This is not correct.

**Proposed resolution**

Accept. Change text on Page 2531, Line 35 as follows:

As a result of the LDPC tone mapping operation above, each two consecutively generated complex constellation numbers *d*'*k*,*i*, *n*,*l*,*u* and *d*'*k* + 1,*i*,*n*,*l*,*u* will be transmitted on two data tones that are separated by at least *DTM* – 1 other data tones.