IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | D1.0 VHT Related CIDs | | | | | | Date: 2018-07-10 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm | 1700 Technology Dr.  San Jose, CA 95110 |  | youhank@qti.qualcomm.com | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from the letter ballot on P802.11REVmd D1.0:

1374, 1127, 1339, 1331

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version.

R1: Updated per discussion during PM1 session on 5/8/2018.

R2: Updated resolution to CID 1374 per discussion during the May 2018 IEEE meeting. Note that resolutions for CIDs 1127, 1339 and 1331 were already accepted and motioned during the May 2018 IEEE meeting.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 1374 | 9.3.1.2 | 767.30 | 9.3.1.2 says  "In an RTS frame transmitted by  a VHT STA in a non-HT or non-  HT duplicate format and where the scrambling sequence carries the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT (see 10.3.2.7), the TA field is a bandwidth signaling TA",  suggesting the TA might not be bw-sig for an RTS from a VHT STA in non-HT/non-HT dup, but 10.3.2.7 says  "A VHT STA transmitting an RTS frame carried in non-HT or non-HT duplicate format and addressed to a VHT STA shall set the TA field to a bandwidth signaling TA",  saying it must be for an RTS from a VHT STA in non-HT/non-HT dup to another VHT STA | Change 9.3.1.2 to say  "In an RTS frame transmitted by a VHT STA in a non-HT or non-HT duplicate format to another VHT STA, the scrambling sequence carries the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT (see 10.3.2.7) and the TA field is a bandwidth signaling TA." |

**Discussion**

A VHT STA may send an RTS frame to either a VHT STA or a non-VHT STA. The commenter is correct that when a VHT STA sends an RTS frame to a VHT STA using a non-HT or non-HT duplicate PPDU format, then the TA of the RTS frame must be a Signaling TA (per 10.3.2.7). However, when a VHT sends an RTS frame to a non-VHT STA (e.g. 11a or 11n STA), then Signaling TA should not be used as the non-VHT STAs do not understand Signaling TA. So, both D1.0 9.3.1.2 and commenter are correct.

Given that the Signaling TA is used only when a VHT STA transmits to another VHT STA, it is proposed to accept the comment to provide additional clarity. Following is the text update provided by the commenter in redline format, to help aid the readers understand the updates being made.

|  |
| --- |
| In an RTS frame transmitted by a VHT STA in a non-HT or non-HT duplicate format to another VHT STA, the scrambling sequence carries the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT (see 10.3.2.7) and the TA field is a bandwidth signaling TA. |

**Proposed Resolution: CID 1374**

**Accepted**.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 1127 | 9.4.1.48.1 | 879.30 | The VHT Compressed Beamforming Report field subclause is poorly written. In the subclause with "in non-S1G Band" in the heading, there are descriptions for S1G use (P879L50). Also, while the headings refer to the band the text itself refers to the PPDU format (VHT or S1G). | Add a "General" subclause and change the other two headings to "Matrix angles order for non-S1G bands" and "Matrix angles order for S1G bands".  Most of the material belongs in the General subclause.  Place the "matrix angles order" in the format specific subclauses.  Provide an ppropriate forward references in the General subclause.  Align the subclause headings with the angle order table titles: is it the PPDU that matters, the band that matters or the sending or receiving STA type? (PS. I'm not 100% sure the 11ah modification for VHT PPDU is accurate - it could potentially be sent in HT or non-HT PPDU). |

**Discussion**

Agree with the commenter that subclause 9.4.1.48 (VHT Compressed Beamforming Report field) is poorly written due to additions made by 11ah. Note that the only differences in the VHT Compressed Beamforming Report field between 11ac and 11ah are (a) the order of angles and (b) channel bandwidth numerology. Rather than splitting into multiple subclauses, it seems cleaner to call out the differences ‘on the spot’ in a single subclause.

Also, the phrases “order of angles … in a VHT PPDU” and “order of angles … in an S1G PPDU” are incorrect as the commenter has pointed out. To be more specific, there is no requirement that the VHT Compressed Beamforming Report field must be transmitted using a VHT PPDU in a non-S1G band.

**Proposed Resolution: CID 1127**

**Revised**.

Proposed text update in 11-18/0879r1 cleans up the text for the VHT Compressed Beamforing Report field without having separate subclauses between 11ac and 11ah.

Instruction to Editor: Implement the proposed text update for CID 1127 in 11/18-0879r1.

**Proposed Text Updates: CID 1127**

*TGmd Editor: Update D1.0 P879L30 as shown below.*

**9.4.1.48 VHT Compressed Beamforming Report field**

The VHT Compressed Beamforming Report field is used by the VHT Compressed Beamforming feedback (see 9.6.22.2) to carry explicit feedback information in the form of angles representing compressed beamforming feedback matrices *V* for use by a transmit beamformer to determine steering matrices Q, as described in 10.33.3 and 19.3.12.3.

The size of the VHT Compressed Beamforming Report field depends on the values in the VHT MIMO Control field. The VHT Compressed Beamforming Report field contains VHT Compressed Beamforming Report information or successive (possibly zero-length) portions thereof in the case of segmented VHT Compressed Beamforming feedback (see 10.35.5). VHT Compressed Beamforming Report information is always included in the VHT Compressed Beamforming feedback.

The VHT Compressed Beamforming Report information contains the channel matrix elements for each subcarrier from lowest frequency to highest frequency. For each subcarrier, the channel matrix element is represented by a sequence of angles. The order of the angles within each subcarrier when used in a non-S1G band is shown in Table 9-73. The order of the angles within each subcarrier when used in an S1G band for SU and MU type feedback are shown in Table 9-73a and 9-73b, respectively. Explanation on how these angles are generated from the beamforming feedback matrix *V* is given in 19.3.12.3.6.

*TGmd Editor: Update the title of Table 9-73 (D1.0 P880L1) as shown below.*

**Table 9-73—Order of angles in the Compressed Beamforming Feedback Matrix subfield when used in a non-S1G band**

…

*TGmd Editor: Move Table 9-78 and 9-79 to right after Table 9-73 (at P881L52), making them Table 9-73a and 9-73b, respectively. Also, make the following changes to the table titles.*

**Table 9-73a—Order of angles in the Compressed Beamforming Feedback Matrix subfield for SU type feedback when used in a S1G band**

…

**Table 9-73b—Order of angles in the Compressed Beamforming Feedback Matrix subfield for MU type feedback when used in a S1G band**

…

*TGmd Editor: Update D1.0 P882L22 as shown below.*

The VHT Compressed Beamforming Report information has the structure and order defined in Table 9-75, where Na is the number of angles used for the compressed beamforming feedback matrix subfield (see Table 9-73, Table 9-73a and Table 9-73b).

*TGmd Editor: For every row in Table 9-75 (D1.0 P882L50) in which the 3rd column (Meaning) has the phrase “refer to Table 9-73”, change to “refer to Table 9-73, Table 9-73a or Table 9-73b”Update D1.0 P882L22 as shown below. For example:*

**Table 9-75—VHT Compressed Beamforming Report information**

|  |  |  |
| --- | --- | --- |
| **Field** | **Size (bits)** | **Meaning** |
| … | | |
| Compressed Beamforming Feedback Matrix V for subcarrier *k* = *scidx(k)* | *Na×*(*b*ψ *+bφ*)/2 | Compressed beamforming feedback  matrix as defined in Table 9-73, Table 9-73a or Table 9-73b |

*TGmd Editor: Update the 1st column of Table 9-76 (D1.0 P883L51) as shown below.*

**Table 9-76—** **Subcarriers for which a Compressed Beamforming Feedback Matrix subfield is sent back**

|  |  |  |  |
| --- | --- | --- | --- |
| **Channel Width** | ***Ng*** | ***Ns*** | **Subcarriers for which Compressed Feedback Beamforming Matrix subfield is sent: *scidx*(0), *scidx*(1), …, *scidx*(*Ns*-1)** |
| 20 MHz in  non-S1G band  or 2 MHz in  S1G band | … | | |
| 40 MHz in  non-S1G band  or 4 MHz in  S1G band |
| 80 MHz in  non-S1G band  or 8 MHz in  S1G band |
| 160 MHz in  non-S1G band  or 16 MHz in S1G band |
| 80+80 MHz |

*TGmd Editor: Delete the entire subclause 9.4.1.48.2.*

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 1339 | 10.35.5.2 | 1787.01 | "A VHT beamformer may use the following worst-case parameters to estimate the duration of the expected frame(s) that contain(s) the feedback response(s): lowest rate in basic VHT-MCS set, no grouping."  -- also need to specify the codebook size | Change the cited text at the referenced location to "A VHT beamformer may use the following worst-case parameters to estimate the duration of the expected frame(s) that contain(s) the feedback response(s): lowest rate in basic VHT-MCS set, no grouping, highest-precision codebook." |

**Context**

When a VHT beamformer transmits VHT NDPA and VHT NDP frames, and then expects VHT Compressed Beaforming frame(s) to be sent back, the VHT beamformer should set the NAV in the VHT NDPA frame to cover the duration of the expected frames.

**Proposed Resolution: CID 1339**

**Revised**.

The commenter is correct that there are parameters other than the ones listed (rate and grouping) which affect the duration of the expected frame. However, codebook is not the only missing parameter. For example, PPDU type (non-HT, HT, VHT) and PPDU bandwidth also impact the duration of the expected frame. It is not practical to list out all parameters in the standard.

Proposed text update in 11-18/0879r1 includes the codebook size to the list as suggested by the commenter, but also clarifies that there are other parameters involved.

Instruction to Editor: Implement the proposed text update for CID 1339 in 11-18/0879r1.

**Proposed Text Updates: CID 1339**

*TGmd Editor: Update D1.0 P275L40 as shown below.*

A VHT beamformer may use the worst-case for various parameters to estimate the duration of the expected frame(s) that contain(s) the feedback response(s), such as the lowest rate in basic rate, HT-MCS or VHT-MCS set, no grouping and the highest precision codebook.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 1331 | 21.3.11.2 | 2980.41 | "The beamformee decides the tone grouping value to be used in the beamforming feedback matrix V. A beamformer shall support all tone grouping values and Codebook Information values."  -- first sentence missing codebook and second has odd capitalisation | Change the cited text to  "The beamformee decides the tone grouping and codebook size to be used in the beamforming feedback matrix V. A beamformer shall support all tone groupings and codebook sizes." |

**Discussion**

Commenter is correct that the beamformee decides both the tone grouping value and the codebook size for VHT sounding.

**Proposed Resolution: CID 1331**

**Accepted**.

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