### IEEE P802.11Wireless LANs

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| **11ax SA1 sounding comments** |
| Date: 4 May 2020 |
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Abstract

This document contains proposed resolutions for sounding related comments on 802.11ax SA ballot 1 (12 CIDs), on 11ax draft 6.0.

1. 24009 24042 24221 24262 24473 24474 24495 24496 24503 24504
2. 24505 24511

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| **CID****Clause****P.L****Commenter** | **Comment** | **Proposed Change** | **Resolution** |
| 2400926.7.2379.15Bims, Harry | The unqualified term "sounding sequences" is not defined. | Change the title to "HE TB and HE non-TB sounding sequences and support" | RevisedChange the heading to"HE sounding protocol" |
| 2404226.7.5387.58Seok, Yongho | The TXVECTOR parameters for an HE sounding NDP can have the INACTIVE\_SUBCHANNELS parameter.Please specify how to set the INACTIVE\_SUBCHANNELS parameter of an HE sounding NDP. | As in the comment. | RevisedAt 388.10, insert the following bullet item:— INACTIVE\_SUBCHANNELS is set to the value of the Disallowed Subchannel Bitmap subfield of the STA Info field with the AID11 subfield set to 2047 in the preceding HE NDP Announcement frame |
| 242219.4.1.66155.30Wilhelmsson, Leif | What does the word "typically" refer to? If Ng is signalled is this not then always used? The text reads as one don't have to. Or is there another intention with this wording? | If the sub-carriers are always spaced Ng apart, remove the word typically. If the sentence is formally correct, consider explaining why the word "typically" is used. | RevisedThe related text is at 155.30:"The HE MU Exclusive Beamforming Report information consists of Delta SNR subfields for each of the space-time streams, 1 to Nc, of a subset of subcarriers **typically** spaced Ng apart, where Ng is signaled in the Grouping subfield of the HE MIMO Control field."At 155.36, add a NOTE as follows:"NOTE--Most feedback subcarrier spacings are equal to Ng, but there are a few exceptions, generally around the RU edge and the DC tone, where extra feedback carriers are added to improve the channel interpolation/extrapolation quality. For example, for the 20 MHz feedback subcarrier indices as shown in Table 9-93e (Subcarrier indices for compressed beamforming feedback matrix), the subcarrier spacing at the edge (between -122 and -120 and between 120 and 122) is 2, and the subcarrier spacing around DC (between -4 and -2 and between 2 and 4) is also 2. For all the other tones in this example, the subcarrier spacing is 4." |
| 2426227.2.2479.10Seok, Yongho | The TXVECTOR parameter EXPANSION\_MAT is not used in anywhere of TGax Draft 6.0.Please remove this parameter or define how it is utilized in the PHY. | As in the comment. | RevisedAt 548.10, after 'columns.' add"When beamforming or DL MU-MIMO is applied, *Q(iseg)k*is a beamforming or DL MU-MIMO steering matrix that is derived from the TXVECTOR parameter EXPANSION\_MAT. The beamforming steering matrices and DL MU-MIMO steering matrices are implementation specific." |
| 244739.3.1.19117.52RISON, Mark | "In an individually addressed HE NDP Announcement frame that has only one STA Info field with a value other than 2047 in the AID11 subfield, the Nc subfield is reserved." suffers from the ambiguity identified in CID 22289 (and CID 22290) and fixed in a different location in CID 22289 (and CID 22290) | Change to "In an individually addressed HE NDP Announcement frame with a single STA Info field, the STA Info field having a value in the AID11 field other than 2047, the Nc subfield is reserved." | Accepted |
| 2447426.7.3382.15RISON, Mark | "the HE NDP Announcement frame with a single STA Info field that has a value in the AID11 field other than 2047" suffers from the ambiguity identified in CID 22289 (and CID 22290) and fixed in a different location in CID 22289 (and CID 22290) | Change to "the HE NDP Announcement frame with a single STA Info field, the STA Info field having a value in the AID11 field other than 2047" | Accepted |
| 24495.RISON, Mark | CID 22373, 20675. The resolution to the latter says "The HE equivalent does not provide more detail either.". The proposed change referred to VHT, and the VHT equivalent does provide more detail: "In a VHT Compressed Beamforming frame not carrying all or part of a VHT Compressed Beamforming report (see 10.36.5 (VHT sounding protocol) for a description of such a case)" in 9.4.1.48 VHT MIMO Control field | Give an explanation or xref (as in the VHT equivalent) | RevisedMake changes as specified in <this document> at CID 24496, which resolves the CID in the direction suggested by the comment. |
| 24496.RISON, Mark | CID 22373, 20675. The resolution to the latter says "The HE equivalent does not provide more detail either.". The proposed change referred to VHT, and the VHT equivalent does provide more detail: "In a VHT Compressed Beamforming frame not carrying all or part of a VHT Compressed Beamforming report (see 10.36.5 (VHT sounding protocol) for a description of such a case)" in 9.4.1.48 VHT MIMO Control field | Give an explanation or xref (as in the VHT equivalent). I think the VHT equivalent is referring to "A VHT beamformee that transmits VHT compressed beamforming feedback(#1367) shall include neither the VHT Compressed Beamforming Report information and nor the MU Exclusive Beamforming Report information if the transmission duration of the PPDU carrying the VHT Compressed Beamforming Report information and any MU Exclusive Beamforming Report information would exceed the maximum PPDU duration."but there may be other conditions in 10.36.5 | RevisedImplement changes specified in <this document> at CID 24496, which resolves the CID in the direction suggested by the comment.At 140.56, modify as shown"In an HE Compressed Beamforming/CQI frame not carrying all or part of an HE compressed beamforming/CQI report (see 26.7 (HE sounding protocol) for a description of such a case), the Nc Index, Nr Index, BW, Grouping, Codebook Information, Feedback Type and Sounding Dialog Token Number subfields are reserved, the First Feedback Segment subfield is set to 0 and the Remaining Feedback Segments subfield is set to 7."At 386.54, insert"An HE beamformee that transmits HE compressed beamforming feedback shall include neither the HE Compressed Beamforming Report information nor the HE MU Exclusive Beamforming Report information if the transmission duration of the PPDU carrying the HE Compressed Beamforming Report information and any HE MU Exclusive Beamforming Report information would exceed the maximum PPDU duration."The equivalent text for VHT is as follows:**9.4.1.48 VHT MIMO Control field**"In a VHT Compressed Beamforming frame not carrying all or part of a VHT Compressed Beamforming report (see 10.36.5 (VHT sounding protocol) for a description of such a case), the Nc Index, Nr Index, Channel Width, Grouping, Codebook Information, Feedback Type and Sounding Dialog Token Number subfields are reserved, the First Feedback Segment subfield is set to 0 and the Remaining Feedback Segments subfield is set to 7."Same resolution as CID 24495. |

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| 24503.RISON, Mark | CID 22388, 20571. There are still far too many locations where the requirement for an AP that supports >= 4SS to support DL MU-MIMO is stated (search for "4 or more"): 4.3.15a High efficiency (HE) STA,Table 9-321b--Subfields of the HE PHY Capabilities Information field, 26.7.2 Sounding sequences and support,27.1.1 Introduction to the HE PHY,27.3.3.1.2 Maximum number of spatial streams in an HE MU PPDU,dot11HESUBeamformerOptionImplemented (but ironically not dot11HEMUBeamformerOptionImplemented!). I would hope that by now we all agree that duplication is a Bad Idea | Delete most of the duplicate statements; add a statement in the description of dot11HEMUBeamformerOptionImplemented | Revised.At 761.14, after "as an SU beamformee is supported;", add"for an AP implementation, the operation as an SU beamformer is supported when the AP is equipped with 4 or more spatial streams."This addition aligns dot11HESUBeamformeeOptionImplemented with dot11HESUBeamformerOptionImplemented, as requested by the comment.4.3.15a is an overview of the HE features, so "4 or more" can not be omitted here. The duplication is due to the structure of 4.3.15a.In Table 9-321b, the notes recite the normative requirement when this field is set to 1. These notes are informative to the reader.In 26.7.2 and 27.3.3.1.2, the "4 or more" is part of a normative requirement for the MAC and the PHY respectively. The duplication is useful in this case, so that PHY and MAC are both aware of it.27.1.1 is an overview of normative requirements on an HE AP, so "4 or more" can not be omitted here. The duplication is due to the structure of 27.1.1. |
| 2450426.7.2.RISON, Mark | The MU Beamformer field is not used anywhere. There was some vague suggestion during letter ballot that it might somehow be used by a STA to decide which AP to associate with, which is pretty weak, but hey | After the third para of 26.7.2 Sounding sequences and support add a "NOTE---A STA might use the setting of the MU Beamformer subfield to determine which AP to associate with." | Accepted |
| 245059.4.2.247.3.RISON, Mark | The MU Beamformer field is not used anywhere. A field that has no behaviour associated with it on reception has no purpose | In Figure 9-787c--HE PHY Capabilities Information field format change "MU Beamformer" to "Reserved" | Rejected -- a note was added to clarify a purpose of this field, in CID 24504 in <this document>.("NOTE---A STA might use the setting of the MU Beamformer subfield to determine which AP to associate with.") |
| 2451126.7.3385.62RISON, Mark | "An HE beamformer soliciting SU or CQI feedback in an HE non-TB sounding sequence shall set the Feedback Type And Ng, Codebook Size and Nc subfields in the HE NDP Announcement frame to 0."Fields should not be needlessly forced to 0. If they are not needed, they should be reserved, so that thay can be used in the future for new signalling | In the referenced subclause change "An HE beamformer soliciting SU or CQI feedback in an HE non-TB sounding sequence shall set the Feedback Type And Ng, Codebook Size and Nc subfields in the HE NDP Announcement frame to 0." to "The Feedback Type And Ng, Codebook Size and Nc subfields in the HE NDP Announcement frame are reserved in an HE non-TB sounding sequence." | Accepted |