IEEE P802.11
Wireless LANs

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| D3.0 Sounding Comment Resolutions |
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Abstract

This document provides resolutions to the following comments:

MU comments: 6414, 6294, 6498, 6175, 6388, 6834, 6559, 6092, 6093, 6094, 6295, 6560, 6835, 6833, 6831, 6095, 6702, 6296, 6096, 6367, 6097, 6056, 6098, 6099, 6167, 6501, 6500, 6297, 6057, 6058, 6059, 6298, 6463, 6380, 6100, 6299, 6176

MAC comment: 6679

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| 6414 | 142.32 | 9.31.1 | Is a "single MPDU control frame" a type of single MPDU? The term "single MPDU" now has a special meaning, but here it comes from text pre-dating the introduction of this special meaning | Change to "carrying single control frames" and check the baseline for any other uses of the term "single MPDU" | RevisedMake changes as shown in 11-12/1007r6 under CID 6208. These changes remove the definition (and special meaning) for "single MPDU". |

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| 6294 | 142.40 | 9.31.1 | "NDP Announcement" is not immediately clear | Rename NDP Announcement to "HT NDP Announcement". Go on. You' know you'll have to sooner or later | REVISED See changes under CID 6294 in 12/1032r1, change NDP Announcement to HT NDP Announcement in pre-VHT text |

**Proposed resolution:**

In the whole 802.11 spec, replace all “*xxx NDP Announcement*” to “*xxx HT NDP Announcement*” unless xxx = VHT

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| 6498 | 142.42 | 9.31.1 | What is a "+HTC field"? | Change to "HT Control" and perhaps add "contained in a Control Wrapper" for clarity | REVISEDSee changes under CID 6498 in 12/1032r1, change to +HTC frames |

*Revise P148 L17 in P802.11ac\_D3.1 as follows:*

A CTS frame that is a +HTC frame shall not contain the NDP Announcement subfield set to 1.

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| 6175 | 144.47 | 9.31.5 | Define the value for dot11VHTMUBeamformeeOptionImplemented. | Change "If dot11VHTMUBeamformeeOptionImplemented," to "If dot11VHTMUBeamformeeOptionImplemented is true,". | ACCEPTED  |
| 6388 | 144.47 | 9.31.5 | missing "is true" | Change "If dot11VHTMUBeamformeeOptionImplemented," to "If dot11VHTMUBeamformeeOptionImplemented is true," | ACCEPTED  |

*Revise P150 L21 in P802.11ac\_D3.1 as follows:*

If dot11VHTMUBeamformeeOptionImplemented is true, a STA shall set dot11VHTSUBeamformeeOptionImplemented to true.

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| 6834 | 145.02 | 9.31.5 | The statement "A VHT NDP shall only be transmitted SIFS after a VHT NDP Announcement frame" is duplicated and redundant at P145L11. | Remove the redundant description. | REVISEDDelete "A VHT NDP shall only be transmitted SIFS after a VHT NDP Announcement frame" |
| 6559 | 145.02 | 9.31.5 | Duplicate sentence | Sentence on line 11 is almost literal copy of sentence on line 2. Delete one. | REVISEDSee CID 6834 resolution |
| 6092 | 145.11 | 9.31.5 | "A VHT NDP shall be transmitted only following a SIFS after a VHT NDP Announcement frame." duplicates L2 "A VHT NDP shall only be transmitted SIFS after a VHT NDP Announcement frame." in the same page. | Remove "A VHT NDP shall be transmitted only following a SIFS after a VHT NDP Announcement frame." | REVISEDSee CID 6834 resolution |
| 6093 | 145.11 | 9.31.5 | "A VHT NDP Announcement frame shall be followed by a VHT NDP after SIFS." duplicates P144 L61 "A VHT beamformer shall initiate a sounding feedback sequence by transmitting a VHT NDP Announcement frame followed by a VHT NDP after a SIFS." | Remove "A VHT NDP Announcement frame shall be followed by a VHT NDP after SIFS." | Rejected1) The P144 L61 text does not rule out the possibility for a STA to transmit an NDPA solely, or transmit a non-NDP frame following an NDPA frame for other purpose. 2) The commented text emphasizes that VHT NDPA+VHT NDP is the only allowed transmission sequence. |
| 6094 | 145.12 | 9.31.5 | "A VHT beamformer shall not transmit a frame other than a VHT NDP a SIFS period after a VHT NDP Announcement frame" adds nothing. | Remove it. | Accepted |

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| 6295 | 145.14 | 9.31.5 | "frame .. VHT NDP" but is a VHT NDP really a frame, since it doesn't carry any MAC content? I'd say a VHT NDP is a PPDU only | frame => PPDU. And audit other useages of VHT NDP and see if it is assumed to be a frame, and fix accordingly. Or define VHT NDP to be an empty frame | RejectedThe sentence is deleted per CID 6094 |

*Revise P150 L41 in P802.11ac\_D3.1 as follows:*

A VHT beamformer shall initiate a sounding feedback sequence by transmitting a VHT NDP Announcement frame followed by a VHT NDP after a SIFS. The VHT beamformer shall include in the VHT NDP Announcement frame one STA Info field for each VHT beamformee that is expected to prepare a VHT Compressed Beamforming report and shall identify the VHT beamformee by including the VHT beamformee's AID in the AID subfield of the STA Info field. The VHT NDP Announcement frame shall include at least one STA Info field.

NOTE―A STA that transmits a VHT NDP Announcement frame to a DLS or TDLS peer STA obtains the AID for the peer STA from the DLS Setup Request, DLS Setup Response, TDLS Setup Request or TDLS Setup Response frame.

A VHT beamformer shall not transmit either a VHT NDP Announcement+HTC frame or a Beamforming Report Poll+HTC frame that contains an HT variant HT Control field.

A VHT NDP shall be transmitted only following a SIFS after a VHT NDP Announcement frame. A VHT NDP Announcement frame shall be followed by a VHT NDP after SIFS.

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| 6560 | 145.22 | 9.31.5 | The text states "A VHT beamformer that transmits a VHT NDP Announcement frame to a VHT SU-only beamformee shall include only one STA Info field"Why this restriction? It could be useful to sound several SU STAs at the same time to reduce sounding overhead. Since the NDP is always SU, this is no extra burden on any of the STAs. | Allow multiple STA info fields to address mutliple SU-only beamformee STAs with a single VHT sounding sequence. | REJECTEDThe proposed change does not reduce sounding overhead significantly, but does add burdens to SU-only BFmee; for example, 1) the SU-only BFmee needs to decode multiple STA info fields; 2) the SU-only BFmee needs to support BFming report poll frame.   |

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| 6835 | 145.24 | 9.31.5 | The statement "An example of the VHT sounding protocol with a single VHT beamformee is shown in Figure 9-41a" is logically unrelated with the rest of the same paragraph, | Move this statement and Figure 9-41a to the end of the following paragraph. |  REVISEDSee changes under CID 6835 in 12/1032r1, move figures to more related context. |

**Proposed resolution:**

*Move the sentence* “An example of the VHT sounding protocol with a single VHT beamformee is shown in Figure 9-41a.” *and also Figure 9-41a to P152 L25 in P802.11ac\_D3.1.*

*Move the sentence* “An example of the VHT sounding protocol with more than one VHT beamformee is shown in Figure 9-41b.” *and also Figure 9-41b to P152 L41 in P802.11ac\_D3.1.*

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| 6833 | 145.48 | 9.31.5 | It should be "a VHT". | as comment | REVISEDChange “A VHT beamformer that transmits an VHT NDP Announcement frame …” to “A VHT beamformer that transmits a VHT NDP Announcement frame …” |

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| 6831 | 145.52 | 9.31.5 | The sentence here is not in consistance with the rule at pgl45/ln7 which reads "A VHT beamformer shall not transmit either a VHT NDP Announcement+HTC frame or a Beamforming Report Poll+HTC frame that contains an HT variant HT Control field." | Clarify if a VHT NDP Announcement frame or a Beamforming Report Poll frame can contain an HT variant HT Control field. |  REVISEDSee CID 6702 resolution |
| 6095 | 145.53 | 9.31.5 | The sentence here contradicts with P145L8. | fix the problem. |  REVISEDSee CID 6702 resolution |
| 6702 | 145.53 | 9.31.5 | A VHT NDP Announcement frame with more than one STA Info field shall not carry an HT variant HT Con-trol field, unless all the STAs listed in the AID field of the STA Info fields have set +HTC-HT Support to 1in the HT Extended Capabilities field. conflicts with the paragraph earlier in the section P145L8A VHT beamformer shall not transmit either a VHT NDP Announcement+HTC frame or a Beamforming Re-port Poll+HTC frame that contains an HT variant HT Control field. | remove the sentence: A VHT NDP Announcement frame with more than one STA Info field shall not carry an HT variant HT Con-trol field, unless all the STAs listed in the AID field of the STA Info fields have set +HTC-HT Support to 1in the HT Extended Capabilities field | ACCEPTED |
| 6296 | 145.54 | 9.31.5 | "unless" seems to contradict P145L8. Duelling paras? | Harmonize para at P145L53 with P145L8 |  REVISEDSee CID 6702 resolution |

**Proposed resolution:**

*Revise P151 L30 in P802.11ac\_D3.1 as follows:*

A VHT NDP Announcement frame with more than one STA Info field

shall not carry a(#6027) VHT variant HT Control field, unless all the STAs listed in the AID field of the STA

Info fields have set +HTC-VHT Capable to 1 in the VHT Capabilities Info field.

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| 6096 | 146.02 | 9.31.5 | This note is not right since a VHT beamformee and VHT beamformer do not deed to follow the TXOP limit rule. | Remove the note or change the note. | REJECTED 1) Don’t see that this note implies the VHT BFming frames shall or shall not follow any TXOP limit rule;2) TXOP limit rules for VHT BFming frames are sufficiently specified in 9.19.2.2. Don’t see any issue there either.  |

**Discussion:**

The commented note is quoted below:

NOTE—The transmission of the VHT NDP Announcement, VHT NDP, VHT Compressed Beamforming and Beamforming Report Poll frames is subject to the rules in 9.19.2.4 (Multiple frame transmission in an EDCA TXOP).

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| 6367 | 146.18 | 9.31.5 | The example given in Figure 9-41b shows BF report polls sent immediately after the first VHT compressed BF. It is not clear to me if sending some other frames after the shown VHT compressed BF frame is possible before sending out the BF report polls. | If the behavior described in the comment is permitted. Perhaps we could add a note to say that this is possible. | REJECTED1) The figure caption clearly says it is an example sequence; so it does not imply whether other sequences are allowed or not allowed.2) The normative text does not prohibit the commented sequence.3) Don’t think it necessary to enumate every possible sequence (there can be tens of possible sequences allowed) |

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| 6679 | 146.26 |   | "the maximum number of supported spatial streams according to the Rx Nss subfield value in theOperating Mode field of the most recently received Operating Mode Notification frame." Wht about the Notification Element? | add the element in the sentence as well | REVISEDAlready resolved by CID 6437See CID 6437 resolution.  |

**Discussion**

The comment was already resolved by CID 6437 resolution:

the maximum number of supported spatial streams according to the Rx Nss subfield value in the

Operating Mode field of the most recently received Operating Mode Notification frame or Operating

Mode Notification element(#6437) with the Rx Nss Type subfield equal to 0 from the corresponding

VHT beamformee.

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| 6097 | 146.31 | 9.31.5 | It is not clear if the SIFS transmission is still true if the beamformee's NAV is not 0. | Change to "A non-AP VHT beamformee that receives a VHT NDP Announcement frame from a VHT beamformer with which it is associated or has an established DLS or TDLS session and that contains the VHT beamformee's AID in the AID subfield of the first (or only) STA Info field and also receives a VHT NDP a SIFS after the VHT NDP Announcement, shall transmit the PPDU containing its VHT Compressed Beamforming report a SIFS after the VHT NDP even if the beamformee's NAV is not 0. A VHT beamformee that is an AP, mesh STA, or STA that is a member of an IBSS, when receiving a VHT NDP Announcement frame with the RA matching its MAC address and the AID subfield of the only STA Info field set to 0, and also receiving a VHT NDP a SIFS after the VHT NDP Announcement, shall transmit its VHT Compressed Beamforming frame a SIFS after the VHT NDP even if the beamformee's NAV is not 0." |  REJECTEDIn subclause 9.19.2.2 EDCA TXOPs, there is a rule saying: “When a STA receives a frame addressed to it that requires an immediate response,except in the case of an RTS, it shall transmit the response independent of its NAV.”It is not necessary to repeat the rule again here. |

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| 6056 | 146.43 | 9.31.5 | "A STA shall ignore"This is untestable. Any reasonable test cannot determine that the STA will not do something in the future. "Shall ignore" is also not very well defined. | Replace "shall ignore" with "ignores" |  ACCEPTED |

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| 6098 | 146.47 | 9.31.5 | 1), The beamformee of the beamformer the is DLS or TDLS peer can not be the STA info other than the only STA info in NDPA. 2) It is not clear when to transmit the Beamforming Report. IS it SIFS, PIFS, EIFS after? 3), It is not clear is the transmission is still true when the NAV in the beamformee is not 0? | Change to "A non-AP VHT beamformee that receives a VHT NDP Announcement from a VHT beamformer with which it is associated and that contains the VHT beamformee's AID in the AID subfield of a STA Info field that is not the first STA Info field shall transmit its VHT Compressed Beamforming report SIFS after receiving a Beamforming Report Poll with RA matching its MAC address and a non-bandwidth signaling TA obtained from the TA field matching the MAC address of the VHT beamformer." |  REVISEDSee changes under CID 6098 in 12/1032r1 |

**Discussion**

For comment 1), a DLS or TDLS STA can use an NDPA frame with multiple STA info fields to sound multiple peer STAs for SU BFming feedback;

For comment 2), agree -> see proposed text change

For comment 3), see CID 6097 resolution

**Proposed resolution:**

Change the commented text to “A non-AP VHT beamformee that receives a VHT NDP Announcement from a VHT beamformer with which it is associated or with which it has an established DLS or TDLS session and that contains the VHT beamformee’s AID in the AID subfield of a STA Info field that is not the first STA Info field shall transmit its VHT Compressed Beamforming report a SIFS after receiving a Beamforming Report Poll with RA matching its MAC address and a non-bandwidth signaling TA obtained from the TA field matching the MAC address of the VHT beamformer.”

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| 6099 | 146.53 | 9.31.5 | This violates the TXOP bandwidth selection rules defined in 9.19.2.4 which are also used for VHT beamforming training. | fix the problem. | REJECTEDThe commented text specifies the BW selection rules for a BFMee, which is a respnding STA, not a TXOP holder; while 9.19.2.4 defines BW selection rules for TXOP holders. |

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| 6167 | 147.03 | 9.31.5 | This is not a good design since a beamformee will never send beamforming report back to the beamformer if the beamforming report transmission exceed the maximum PPDU duration. | fix the problem to allow such transmission without violating the PPDU duration. |  REJECTEDA good designed BFmee should be able to adjust the BFming report parameters and ensure the transmission of the BFming report frame not exceeding the max PPDU duration. |
| 6501 | 147.04 | 9.31.5 | MU Exclusive Beamforming Report information is exclusive to MU beamforming | Change "the MU Exclusive" to "any MU Exclusive" | ACCEPTED  |
| 6500 | 147.06 | 9.31.5 | A beamforming report might be segmented | Change "the VHT Compressed Beamforming frame with the VHT Compressed Beamforming Report information and any MU Exclusive Beamforming Report information" to "the PPDU containing this information" |  REVISEDSee changes under CID 6500 in 12/1032r1, change “the VHT Compressed Beamforming frame” to “the PPDU” |
| 6297 | 147.07 | 9.31.5 | What if the VHT Compressed BFing Report fits but adding the MU Exclusive field exceeds the limit? Send only the VHT Compressed BFing Report? I think you're saying "send neither for simplicity of implementation" BUT, sentence is misleading is P147L5 says "the MU Exclusive BFing Report info" but P147L7 says "any MU Exclusive BFing Report info" | At P147L5 change "the MU Exlcusinve BFing Report info" to any MU Exclusive BFing Report info". Or better, allow thatm if the VHT Compressed BFing Report fits but adding the MU Exclusive field exceeds the limit, then sending only the VHT Compressed BFing Report |  REVISED1) See CID 6501 resolution;2) If a BFmee is requested to send a MU BFming report, it shall not respond a BFming report frame with VHT Compressed BFming Report field only |

**Proposed resolution:**

*Revise P152 L49 in P802.11ac\_D3.1 as follows:*

A VHT beamformee that transmits a VHT Compressed Beamforming report shall not include the VHT Compressed

Beamforming Report information and any 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.

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| 6057 | 147.11 | 9.31.5 | "A VHT beamformee shall transmit a VHT Compressed Beamforming frame with the VHT MIMO Control Feedback Type field set to the same value"This is intended to express a constraint, not a requirement to transmit. | Replace with: "A VHT beamformee that transmits a VHT Compressed Beamforming frame shall set the the VHT MIMO Control Feedback Type field to the same value .." |  REVISEDSee changes under CID 6057 in 12/1032r1, revise the text according to the comment  |

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| 6058 | 147.13 | 9.31.5 | "If the Feedback Type field indicates MU, the STA shall send a feedback with the Nc Index field"What is "a feedback"? | Replace "a feedback" with "a VHT Compressed Beamforming frame". | ACCEPTED  |
| 6059 | 147.22 | 9.31.5 | "the most recently transmitted Operating Mode Notification frame."Passive voice is considered dangerous.Transmitted by whom? Transmitted by any STA anywhere in the world? Transmitted by the VHT Beamformer? | Replace with: "the Operating Mode Notification frame most recently transmitted by the VHT Beamformee." | REVISEDSee changes under CID 6059 in 12/1032r1 |

**Proposed resolution:**

*Revise P151 L64 in P802.11ac\_D3.1 as follows:*

A VHT beamformer that sets the Feedback Type subfield of a STA Info field to MU(#6441) shall set the Nc

Index subfield of the same STA Info field to a value equal to or less than the minimum of the following:

— the maximum number of supported spatial streams according to the corresponding VHT beamformee's

Rx MCS Map in the VHT Supported MCS Set field, and

— the maximum number of supported spatial streams according to the Rx Nss subfield value in the

Operating Mode field of the most recently received Operating Mode Notification frame or Operating

Mode Notification element(#6437) with the Rx Nss Type subfield equal to 0 from the corresponding

VHT beamformee.

*Revise P152 L56 in P802.11ac\_D3.1 as follows:*

A VHT beamformee that transmits a VHT Compressed Beamforming frame shall set the the VHT MIMO Control Feedback Type field to the same value as the Feedback Type field in the corresponding STA Info field in

the VHT NDP Announcement frame. If the Feedback Type field indicates MU, the STA shall send a VHT Compressed Beamforming frame with the Nc Index field value in the VHT MIMO Control field equal to the minimum of the following:

— the Nc Index field value in the corresponding STA Info field in the VHT NDP Announcement frame,

and

— the maximum number of supported spatial streams according to its Rx MCS Map in the VHT Supported

MCS Set field, and

— the maximum number of supported spatial streams according to its Rx Nss subfield value in the

Operating Mode field(#6440) of the Operating Mode Notification frame or

Operating Mode Notification element(#6437) transmitted most recently by the VHT beamformee.

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| 6298 | 147.39 | 9.31.5 | "shall" at P147:39 cannot be reconciled with "shall not" at P147L4 | Harmonize - I assume the "shall not ... duration" has precedence |  REVISEDSee changes under CID 6298 in 12/1032r1 |

**Proposed resolution:**

*Revise P153 L17 in P802.11ac\_D3.1 as follows:*

A VHT beamformee shall not include MU Exclusive Beamforming Report information in a VHT Compressed

Beamforming report if the Feedback Type subfield in the MIMO Control field of the VHT Compressed

Beamforming frame(s) indicates SU. A VHT beamformee shall include both VHT Compressed Beamforming Report information and MU Exclusive Beamforming Report information in a VHT Compressed Beamforming report if the Feedback Type subfield in the MIMO Control field of the VHT Compressed Beamforming frame(s) indicates MU.

*Move the paragraph starting from P152 L49(as quoted below) in P802.11ac\_D3.1 to P153 L23*

A VHT beamformee that transmits a VHT Compressed Beamforming report shall not include the VHT Compressed

Beamforming Report information and any 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.

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| 6463 | 147.53 | 9.31.5 | Why does the default need to be stated? | Make this para into a NOTE | ACCEPTED Change as suggested |

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| 6380 | 148.04 | 9.31.5 | The current sentence seems to say MU Exclusive BF report information is tagged on the end of each BF report segment which I'm sure is not intented! | Add a sentence to somewhere in this region to say "MU exclusive BF report information is only include in the last segment." | REVISED1) The suggested resolution is incorrect;2) See changes under CID 6380 in 12/1032r1, revise the sentence to avoid ambiguity. |
| 6100 | 148.05 | 9.31.5 | The restriction of each fragment except the last one must contain the maximal number of octets allowed by the beamformer is not flexible, A more flexible fragmentation may help the beamformee to organize its memory. | Change to " Each of the feedback segments except t length capability. The last feedback segment may be smaller than the other fragments. |  RejectedThe group does not see much benefit of more flexible fragmentation. |

**Proposed resolution:**

*Revise P153 L46 in P802.11ac\_D3.1 as follows:*

If a VHT Compressed Beamforming report would result in a VHT Compressed Beamforming frame that exceeds

the VHT beamformer’s maximum MPDU length capability, the VHT Compressed Beamforming report

shall be split into up to 8 feedback segments, with each feedback(#6422) segment sent in a different VHT

Compressed Beamforming frame and containing successive portions of the VHT Compressed Beamforming report consisting of the VHT Compressed Beamforming Report information followed by any MU Exclusive Beamforming Report information. Each of the feedback segments except the last shall contain the maximum number of octets allowed by the VHT beamformer’s maximum MPDU length capability. The last feedback segment may be smaller. Each feedback segment is identified by the value of the Remaining Feedback Segments subfield and the First Feedback Segment subfield in the VHT MIMO Control field as defined in 8.4.1.47 (VHT MIMO Control field); the other non-reserved subfields of the VHT MIMO Control field shall be the same for all feedback segments. All feedback segments shall be sent in a single A-MPDU and shall be included in the A-MPDU in the descending order of the Remaining Feedback Segments subfield values.

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| 6299 | 148.44 | 9.31.5 | "or transmit all all the FB info .. " is horriby inefficient and just gives lazy implementations a free pass. | Delete this option | REJECTEDThe selective polling may not be very useful for some cases, for example, when a BEmee expects that at most two segments will be transmitted in any case. It will be good to allow this type of BEmee an easy implementation choice.  |

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| 6176 | 148.57 | 9.31.6 | According to 9.17a (P122L58, P122L64), VHT NDP is an SU PPDU. On P148L57, it just says "NUM\_USERS set to 1" and note that MU PPDUs could have NUM\_USERS = 1. Thus, we should have additional clarifications stating that VHT NDP is an SU PPDU in 9.31.6. | Change P148L64 from "GROUP\_ID and PARTIAL\_AID are set as described in 9.17a" to "GROUP\_ID and PARTIAL\_AID are set as for SU PPDU as described in 9.17a". | REVISEDAdd the following text at the beginning of 9.3.16:“A VHT NDP shall use the SU PPDU format as described in 22.1.4 (PPDU formats).” |

**Discussions:**

The related text is quoted below:

**In 22.1.4 PPDU format:**

A VHT PPDU can be further categorized as an SU PPDU or an MU PPDU. A VHT PPDU using a group ID

value of 0 or 63 is an SU PPDU, and either carries only one PSDU or no PSDU. A VHT PPDU using a group

ID value in the range of 1 to 62 is an MU PPDU, and carries one or more independent PSDU(s) to one or

more STA(s).

**In 9.17a:**

A STA transmitting a VHT SU PPDU carrying one or more group addressed MPDUs or transmitting a VHT

NDP intended for multiple recipients shall set the TXVECTOR parameters GROUP\_ID to 63 and

PARTIAL\_AID to 0. The intended recipient of a VHT NDP is defined in 9.31.6 (Transmission of a VHT

NDP).

A STA transmitting a VHT SU PPDU carrying one or more individually addressed MPDUs or a VHT NDP

intended for a single recipient shall set the TXVECTOR parameters GROUP\_ID and PARTIAL\_AID as shown in Table 9-19 (Settings for the TXVECTOR parameters GROUP\_ID and PARTIAL\_AID).