IEEE P802.11
Wireless LANs

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| LB188 Clause 8 Comment Resolutions |
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Abstract

This document proposes resolutions for the following CIDs: 6243, 6244, 6245, 6530, 6169, 6385, 6531, 6532, 6533, 6535, 6547, 6386, 6788

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| **CID** | **Commenter** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6243 | Brian Hart | 8.4.1.48 | 57.57 | "Subcarriers 0, +-2, +-4 and +-128 are skipped" without explanantion whereas other nearby notes given explanations | "DC subcarriers ... are skipped"? Ditto P58L18 |  |

**Discussion:**

For other bandwidth modes, a note listing the skipped subcarriers (including an explanation) is provided for Ng=1, but no note is provided for Ng > 1 because the skipped subcarriers are the same. I suggest that the notes referred to in this comment (57.57 and 58.18) both be deleted because they are for Ng > 1, and a note for the corresponding Ng=1 case has already been given.

**Proposed Resolution:**

Revised.

Revise 57.57 to “DC subcarriers 0, plus/minus 2, plus/minus 4, and subcarriers plus/minus 128 are skipped.”

Revise 58.18 to “DC subcarriers plus/minus 2 are skipped.”

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| **CID** | **Commenter** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6244 | Brian Hart | 8.4.1.49 | 61.62 | "Spaced 2Ng apart" but near DC this is not true - e.g. -6,-4,-2-1,1,2,4,6 | "Typically spaced ..." | Accepted |

**Discussion:**

Commenter is correct.

**Proposed Resolution:**

Accept.

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| **CID** | **Commenter** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6245 | Brian Hart | 8.4.1.49 | 62.50 | Now scidx has two definitions - in table 8-53g and in table 8-53j. Ambiguous | For SNR, use a different term - e.g. use sscidx in place of scidx in table 8-53i and j. Also, at the end of table 8-53i add a note "NOTE--sscidx(.) is defined in Table 8-53j" | Revised:  |

**Discussion:**

Commenter is correct, and a reader could be confused by the two defintisions of scidx, especially since they appear very close to one another.

**Proposed Resolution:**

Revised: Replace "scidx" with "sscidx" on 62.16, in table 8-53i, and in table 8-53j. Also, at the end of table 8-53i add a note at the bottom: "NOTE--sscidx(.) is defined in Table 8-53j"

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| **CID** | **Commenter** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6530 | Sigurd Schelstraete | 8.4.1.48 | 53.64 | The dimensions of the channel are not N\_BFEE,RX x N\_BFER,TX. It should be N\_BFEE,RX x N\_BFER,N\_STS. | Change text accordingly |  |
| 6169 | Youhan Kim | 8.4.1.48 | 53.53 | A STA may use only a portion of the antennas for transmission and/or reception | Change "antenna numbers" to "number of active antennas" or "number of enabled antennas". |  |
| 6385 | Allert Van Zelst | 8.4.1.48 | 53.53 | It may be that a beamformer at some point in time disables a number of TX antennas to be able to beamform to a client, therefore the relationship here is with respect to the active or enabled antennas | change "and antenna numbers on the beamformee and beamformer sides" to "and the number of active antennas on the beamformee and beamformer sides" or "and the number of enabled antennas on the beamformee and beamformer sides" |  |
| 6531 | Sigurd Schelstraete | 8.4.1.48 | 53.64 | "arbitrary diagonalization" is not precise enough | In order to work as described, the diagonalization should meet a number of constraints at least, e.g.:- C should be unitary- B should be diagonal with diagonal values in descending order |  |
| 6532 | Sigurd Schelstraete | 8.4.1.48 | 54.01 | Make it clear that "submatrix" means "selected columns" | Replace "V is a submatrix of C" with "V consists of a subset of the columns of C" |  |
| 6533 | Sigurd Schelstraete | 8.4.1.48 | 54.13 | Add clarifying text below formula on line 12 | Add:Nr = N\_BFER,N\_STSNc <= N\_BFER,N\_STS |  |

**Discussion:**

These comments point out a number of issues with the text that starts immediately after the table on pg. 53 and that ends at the second equation on pg. 54.

* The channel matrix has dimensionality N\_BFER,RX x N\_BFER,N\_STS instead of N\_BFER,RX X N\_BFER,TX, where N\_BFER,N\_STS is the number of space-time streams sent by the BFer during the NDP (which may be the same as the number of antennas enabled during the NDP) that this report is based upon.
* The discussion of the matrix decomposition and the corresponding equations are confusing from a number of different perspectives. The equation describing the matrix decomposition does not add value because the intention was to allow for arbitrary decompositions, in which case the type of decomposition needs to be left very general and thus cannot meaningfully be captured by an equation of the form of 8-1.
* The description of matrix V should indicate that V must be an orthonormal matrix (this is a requirement of the Givens decomposition that the compressed angles are derived from)
* The inequalities governing Nr, Nc, N\_BFEE,RX and N\_BFER, N\_STS are not clearly stated

Based on the above points and discussion of this section, sentiment was expressed that the matrix decomposition equation should be removed and be replaced with text converying the key points. Replacing the equations with text naturally prevents some of the issues that are stated in these coments (e.g., the matrix decomposition need not be described).

**Proposed resolution:**

Revised.

Replace text beginning immediately after table on pg. 53 through second equation on pg. 54 with the following text:

“The beamforming feedback matrix V is formed by the beamformee as follows. The beamformer transmits an NDP with N\_STS space-time streams. Based on this NDP, the beamformee estimates the N\_{RX,BFEE} X N\_{STS,NDP} channel, and based on that channel it determines a Nr x Nc orthonormal matrix V, where Nr,Nc satisfy:

Nr = N\_{STS,NDP}, Nc <= min(N\_{STS,NDP}, N\_{RX,BFEE}) equation 8-1

Further restrictions on Nc are described in 9.31.5, VHT Sounding Protocol. “

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| 6535 | Sigurd Schelstraete | 8.4.1.48 | 61.27 | Clarify "when the beamformer applies the matrix V" | Change "when the beamformer applies the matrix V" to "when the beamformer uses V or a subset of the columns of V as the beamforming steering matrix" |  |

**Discussion:**

If a subset of the columns of V are used, then the SNR per stream will be different than if the entire V is applied due to power splitting per stream. Therefore, adding text that mentions usage of a subset of the columns of V will actually introduce ambiguity into this definition, and thus should be avoided. The feeling is that “applies the matrix V” is precise, and does not need to be replaced with “uses V as the beamforming steering matrix”.

**Proposed resolution:**

Revised. On 61.26 change “the matrix V” to “all columns of the matrix V".

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| **CID** | **Commenter** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6547 | Sigurd Schelstraete | 8.5.23.2 | 94.58 | The statement "No vendor-specific elements are present in a VHT Compressed Beamforming frame" has no value. As an informative statement, this is already obvious from the description above. It might be marginally more useful as a normative statement, but even then it is not clear why this should be stated here and not for any other frame. Its presence here and absence for other frames would imply this somehow only applies to the VHT Compressed Beamforming frame. | Remove the sentence. |  |

**Discussion:**

An Action No Ack frame allows for a vendor specific element to be transmitted at the end of the frame by default, and the referenced sentence actually disallows such an element from being added to the VHT Compressed Beamforming Frame. Therefore, the sentence has value and should remain.

**Proposed resolution:**

Rejected. An Action No Ack frame allows for a vendor specific element to be transmitted at the end of the frame by default, and the referenced sentence actually disallows such an element from being added to the VHT Compressed Beamforming Frame. Therefore, the sentence has value and should remain.

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| **CID** | **Commenter** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6170 | Youhan Kim | 8.4.1.49 | 61.50 | Delta SNR is a new feature in 11ac. | Change "and 20.3.12.3" to ",20.3.12.3 and 22.3.11", and describe how to use delta SNR in 22.3.11. |  |
| 6386 | Allert Van Zelst | 8.4.1.49 | 61.50 | Add a reference to 22.3.11, because I don't believe a clause 20 section describes what to do with the delta SNRs | add reference to 22.3.11 | above |

**Discussion:**

Commenter is correct that the usage of Delta SNR is not described in 20.3.12.3. 22.3.11 does expalin that the MU steering matrices can be based on V and the SNR information.

**Proposed resolution:**

Revised. Replace paragraph on 61.47-51 with "The MU Exclusive Beamforming Report field is used by the VHT Compressed Beamforming frame (see VHT Compressed Beamforming frame format) to carry explicit feedback information in the form of delta SNRs. The information in the VHT Compressed Beamforming Report field and the MU Exclusive Beamforming Report field can be used by the transmit MU beamformer to determine steering matrices Q, as described in 9.29.3 (Explicit feedback beamforming), 20.3.12.3 (Explicit feedback beamforming), and 22.3.11 (SU-MIMO and MU-MIMO Beamforming)."

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| 6788 | Minho Cheong | 8.4.1.48 | 61.23 | It is a little uncertain in the description how to get average SNR value, between genemetric mean (summuation in decibels) and arithmetic mean (summation in original numbers). This uncertainty also lies in the description of SNR value in MFB field. FYI, average SNR value for CSI (only in 11n) was derived by arithmetic mean. | clearer description is needed |  |

**Discussion:**

The current description of average SNR is: "The AvgSNRi in Table 8-53h (Average SNR of Space-Time Stream i subfield) is the sum of the values of SNR per tone (in decibels) divided by the number of tones represented."

**Proposed resolution:**

Revised. Change the sentence "The AvgSNRi in Table 8-53h (Average SNR of Space-Time Stream i subfield) is the sum of the decibel-valued SNR per tone divided by the number of tones represented." to "The AvgSNRi in Table 8-53h (Average SNR of Space-Time Stream i subfield) is found by computing the SNR per subcarrier in decibels for the subcarriers identified in Table 8-53g, and then computing the arithmetic mean of those values."