IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D0.1 Comment Resolution – Corrections to Equation Errors | | | | |
| Date: 7 May 2011 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Minho Cheong | ETRI |  |  | minho@etri.re.kr |
|  |  |  |  |  |

Abstract

This document provides resolutions for CIDs 1637, 416, 1670, 1683, 1685, 443, 445, 447, 1630, 1692, 1693.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 1637 | 22.3.9.2.5 | 109 | 38 | N\_STS, which referred in Equation 22-31 does not be defined in SU case | N\_STS in Equation 22-31 needs to be changed into N\_STS,total | Accept |

<Discussion>

*NSTS* is not defined for MU in Table 22-5. *NSTS,total* is appropriate in Equation (22-32).

**TGac editor: modify D0.4 P134L38--42, as follows**

|  |  |
| --- | --- |
|  | (22-32) |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 416 | 22.3.9.2.6 | 111 | 64 | NSTS is undefined for MU, and SIGB is a MU field. Also the "as defined in" is misleading since it is only P that is defined in 22.3.9.2.5 | Rewrite this section to deal with MU PPDUs (""For each user, the VHT SIG B ...). Change "as defined in" to "which is defined in" | Accept |

<Discussion>

Describing per user basis seems more appropriarte.

**TGac editor: modify D0.4 P136L58--61, as follows**

For each user *u*, the VHT-SIG-B field shall be BCC encoded at rate R = 1/2, interleaved, mapped to a BPSK constellation, and have pilots inserted following the steps described in 22.3.11.10 (Pilot subcarriers). The VHT-SIG-B field constellation points are mapped to *NSTS,u* space-time streams by the user-specific elements of the first column of the *PVHTLTF* matrix which is defined in clause 22.3.9.2.5 (VHT-LTF definition).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 1670 | 22.3.11.8.1 | 125 | 64 | N\_SS is not defined for multi-user case in Table 22-5 | N\_SS,total can be used for multi-user case | Counter |
| 1683 | 22.3.11.8.3 | 127 | 35 | N\_SS and N\_STS are not defined for multi-user case in Table 22-5 | They need to be changed in N\_SS,u and N\_STS,u respectively (this kind of modifications are also needed in sub-sequent clauses) | Accept |
| 1685 | 22.3.11.8.3 | 128 | 3 | N\_SS and N\_STS are not defined for multi-user case in Table 22-5 | They need to be changed in N\_SS,u and N\_STS,u respectively (this kind of modifications are also needed in sub-sequent clauses) | Accept |

<Discussion>

As CID #1670 pointed out, *NSS* is not appropriate because *NSS* is not defined in Table 22-5. But, instead of *NSS,total* which is suggested by CID #1670, *NSS,u* is appropriate because *NSS,u* is well-defined for MU and SU as well.

Similarly, *NSS* and *NSTS* in CID #1683, #1685 also need to be changed into *NSS,u* and *NSTS,u*, respectively.

**TGac editor: modify D0.4 P150L63--65, as follows**

The streams of complex numbers for user *u* are denoted

**TGac editor: modify D0.4 P152L31—P153L53, as follows**

##### **22.3.11.9.3 Space-time block coding**

This subclause defines a set of optional robust transmission formats that are applicable only when using STBC coding. In this case, *NSS,u* spatial streams for user *u* are mapped to *NSTS,u* space-time streams. These formats are based on STBC. When the VHT-SIG-A STBC field is set to 1, a symbol operation shall occur between the constellation mapper and the spatial mapper as defined in this subclause.

If STBC is applied, the stream of complex numbers for user *u*, , generated by the constellation mapper, is the input to the STBC encoder, which produces as output the stream of complex numbers . For given values of *k* *a*nd *i*, STBC processing operates on the complex modulation symbols in sequential pairs of OFDM symbols so that the value of and depend on and . Also, and depend on and . This is defined in Table 22‑16 (Constellation mapper output to spatial mapper input for STBC).

Table 22‑16--Constellation mapper output to spatial mapper input for STBC for user *u*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***NSTS,u*** | ***NSS,u*** | ***iSTS*** |  |  |
| 2 | 1 | 1 |  |  |
| 2 |  |  |
| 4 | 2 | 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 6 | 3 | 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 8 | 4 | 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |

If STBC is not applied, and .

*NOTE*--When STBC is applied, an odd number of space time streams per user *u* is not allowed, and *.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 443 | 22.3.11.9 | 129 | 55 | P k\n element equation is missing | Add | Accept in principle |

<Discussion>

Different from 20, 40, 80MHz cases, in a 160MHz transmission, it is omitted to have an equation to describe the case in which index *k* does not belong to pilot carriers. So, I inserted this in Equation (22-75).

**TGac editor: modify D0.4 P154L41—55, as follows**

For a 160 MHz transmission, the 80 MHz pilot mapping is replicated in the two 80 MHz subbands of the 160MHz transmission. Specifically, 16 pilot tones shall be inserted in subcarriers -231, -203, -167, -139, -117, -89, -53, -25, 25, 53, 89, 117, 139, 167, 203 and 231. The pilot mapping  for subcarrier *k* for symbol *n* shall be as follows

(22-75)

(22-75)

where is given in Table 22-17 (Pilot values for 80 MHz transmission).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 445 | 22.3.11.10.1 | 130 | 11 | equation is for Tsym and TGI | Add an equation for short GI | Counter |
| 447 | 22.3.11.10.1 | 130 | 11 | The LHS is per segment, but the RHS, especially D, is not defined per segment | Get the math right for both 1 and 2 segments | Accept in principle |

<Discussion>

About CID #445, other kind of solution is suggested and straw poll passed by the resolution to CID #1332 and #343 (11-11-0386-01-00ac-comments-resolution-cid-342-343-899-1342-1563-1628), that is, additionally to define *TSYMS* as a symbol duration when short GI is used, keeping original *TSYM* unchanged. So, those resolutions solve CID #445 as well.

About CID #447, *D* can be dependent on frequency segment and user as well, so, I modified the equations accordingly.

**TGac editor: modify D0.4 P155L14, as follows**

 in Equation (22-76) is needed to change into 

**TGac editor: modify D0.4 P155L29-30, as follows**

is the transmitted constellation for user *u* at subcarrier *k*, space-time stream *iSTS,u* and Data field OFDM symbol *n* in frequency segment *iseg*

**TGac editor: modify D0.4 P155L46-P156L33, as follows**

For a 20 MHz VHT transmission for user *u* in frequency segment *iseg*,

|  |  |
| --- | --- |
|  | (22-77) |

where  is defined in Equation .

For a 40 MHz VHT transmission for user *u* in frequency segment *iseg*

|  |  |
| --- | --- |
|  | (22-78) |

where  is defined in Equation .

For an 80 MHz VHT transmission for user *u* in frequency segment *iseg*,

|  |  |
| --- | --- |
|  | (22-79) |

where  is defined in Equation .

For a 160 MHz VHT transmission for user *u* in frequency segment *iseg*,

|  |  |
| --- | --- |
|  | (22-80) |

where  is defined in Equation .

For a non-contiguous 80+80 VHT transmission, each frequency segment shall follow the 80 MHz VHT transmission format as specified in Equations (22-79) and .

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 1630 | 22.3.12.1 | 132 | 61 | y\_k\_N\_TX in the small equation is wrong | It needs to be changed into y\_K\_N\_RX\_i | Accept |

<Discussion>

It needs to be changed into , of which definition is also described in the subsequent paragraph.

**TGac editor: modify D0.4 P157L56-62, as follows**

For MU-MIMO beamforming, the receive signal vector in subcarrier *k* at beamformee *i*, , is shown in Equation (22-82), where denotes the transmit signal vector for *Nu* beamformees, with being the transmit signal for beamformee *i*.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 1692 | 22.3.12.2 | 133 | 45 | V\_k does not match to the previous mentioning in this page | needs to be changed into V\_k,j or needs to add some explanatory note on which simulation between SU and MU | Accept |

<Discussion>

It seems more readable to have additional subscripts which denote beamformee *j* and subcarrier *k*, respectively.

**TGac editor: modify D0.4 P158L40-43, as follows**

The beamforming feedback matrix, *Vk,j*, found by beamformee *j* for subcarrier *k* shall be compressed in the form of angles using the method described in 19.3.12.3.6 (Compressed beamforming feedback matrix)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CommentID** | **Subclause** | **Page** | **Line** | **Comment** | **SuggestedRemedy** | **Response** |
| 1693 | 22.3.12.2 | 133 | 62 | in multi-user cases, per-tone SNR needs at carrier-by-carrier | needs to be changed into 'SNR\_j,k' | Accept in principle |

<Discussion>

SNR can be dependent on subcarrier *k* as well as beamformee *j* for MU-MIMO because per-tone SNR is used in MU-MIMO beamforming. So, *SNRk,j* seems more appropriate because this paragraph is describing MU-MIMO. While SNR is also depending on space-time stream *i*, I don’t think we should insist on inserting this subscript here, too.

**TGac editor: modify D0.4 P158L50-56, as follows**

After receiving the angle information, *k* and *k*, the beamformer reconstructs *Vk,j* using Equation (19-79). For SU-MIMO beamforming, the beamformer uses this *Vk,1* matrix as a steering matrix *Qk*. For MU-MIMO beamforming, the beamformer may calculate a steering matrix using *Vk,j* and *SNRk.j* () in order to suppress crosstalk between participating beamformees. The method used by the beamformer to calculate the steering matrix *Qk* is implementation specific.