IEEE P802.11  
Wireless LANs

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| D0.1 Comment Resolution, | | | | |
| Date: 2011-05-03 | | | | |
| Author(s): | | | | |
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##### Changes are based on text from 11ac D0.3. Changes indicated by a mixture of Word track-changes and instructions.

PHY CIDs addressed: **238, 875, 896, 852, 1116, 1572, 1104, 1617, 1218, 1433**

***PHY***

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| 238 | Hart, Brian | 3.1 | 2 | 13 | TR | "MU-MIMO transmitted" yet MU-MIMO is defined as a technique, which cannot be TXed | MU-MIMO => "MU-MIMO technique where the PPDU is" (if we are defining a technique) or => "MU-MIMO PPDU" (if we are defining a transmission) |

**Proposed resolution: Accept**

Discussion:

1. In the text, the term DL MU-MIMO is used in “DL MU-MIMO transmission” or “DL MU-MIMO PPDU”.
2. Downlink MU-MIMO (DL MU-MIMO) should be defined as a technique.
3. Please refer to 11-11-0576-04 for relavant discussion.

***Change:***

**3.1 Definitions**

***Change the second paragraph as follows:***

**downlink MU-MIMO (DL MU-MIMO):** A MU-MIMO technique where the PPDU is transmitted by an AP to multiple receiving non-AP STAs.

##### PHY

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| 875 | Pillai, Krishna | 22.3.4.7 | 84 | 42 | ER | Did not find the definition of the term [P]u is else where | Does it mean first column of P for each user? Define P[u] in the appropriate section. |

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| 896 | Pulikkoonattu, Rethna | 22.3.4.7 | 84 | 42 | ER | Multiply with 1st Column of [P]u:Have pilots inserted and 1st column of P matrix calculation is applied. The total number of data and pilot subcarriers is the same as the data PSDU. | Is "[P]u" referreing to the matrix "P" for the user "u"? In this case, we need to define it and point to this location. |

**Proposed resolution: Agree**

**Discussion**: According to 22.3.9.2.6 VHT-SIG-B definition, the pilots are inserted after encoded bits are mapped to a BPSK constellation and the VHT-SIG-B constellation points are mapped to NSTS space-time streams by the first column of the PVHTLTF matrix as defined in clause 22.3.9.2.5 (VHT-LTF definition).

***Change:***

##### 11ac editor to change 22.3.4.7 (P104L15) as per highlighted text below.

g) Pilot Insertion and ~~Multiply with 1st Column of [P]u~~PVHTLTF matrix mapping: ~~Have~~Insert pilots ~~inserted~~ following the steps described in 22.3.11.9 and apply the mapping of the1st column of PVHTLTF matrix ~~calculation~~ as described in 22.3.9.2.6 ~~is applied~~. The total number of data and pilot subcarriers is the same as the data PSDU.

##### PHY

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| 852 | Perahia, Eldad | 22.3.9.2.3 | 102 | 26-32 | ER | This is not very clear. Maybe more details could be added to clarify why this is needed |

**Proposed resolution: Agree**

**Discussion**:

In 22.3.11.4.2 LDPC coding, the description about B3 of VHT-SIG-A2 is provided as follow:

“In addition, if NSYM computed in Equation (19-41) in step (d) of 19.3.11.7.5 (LDPC PPDU encoding

process)(Ed) is greater than NSYM,init, then B3 of VHT-SIG-A2 should be set to 1. Otherwise, B3 of VHTSIG-

A2 shall be set to 0.”

In 22.3.11.4.3 LDPC coding, the description about B3 of VHT-SIG-A2 is provided as follow:

“In addition, if NSYM computed in Equation (22-52) is greater than NSYM\_max\_init computed in Equation (22-

51), then B3 of VHT-SIG-A2 should be set to 1. Otherwise, B3 of VHT-SIG-A2 should be set to 0.”

***Change:***

##### 11ac editor to change 22.3.9.2.3 (P119L19~L23) as per highlighted text below.

B3: set to 1 if in the LDPC PPDU encoding process, ~~(or~~ at least one LPDC user’s PPDU encoding process~~)~~ results in an

extra OFDM symbol (or symbols) as described in ~~22.3.4(Overview of the PPDU encoding process)~~22.3.11.4.2 and 22.3.11.4.2. Set to 0 otherwise.

##### PHY

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| 1116 | Shi, Wei | 22.5 | 156 - 169 | All the no | ER | Definition of DR cannot be found in the context | Please define DR. |

**Proposed resolution: Agree**

**Discussion**:

Note that in the expression mod(NCBPS/NES),DR), DR means the denominator of the code rate R. The coded bit per symbol for each encoded should be divisible by the DR.

***Change:***

##### 11ac editor to change the statement in Tables 22.25, 22-26, 22-28, 22-29, 22-31, 22-32, 22-43, 22-46, 22-47, 22-48, 22-51, 22-52, 22-53, 22-54, 22-55, 22-56 in 22.5 as per highlighted text below.

due to mod(NCBPS/NES, DR) not being equal to 0~~.~~, where DR is the denominator of the code rate R.

##### PHY

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| 1572 | Zhao, Hui | 22.3.11.10.1 | 131 | 48 | ER | "Refer to the examples of listed in Section 20.3.11.10.1 for examples of that could be used for SU packets". Actually,when Ntx>4 for "spatial expansion",the examples listed in Section 20.3.11.10.1 is not practical,so we need to state more clearly . | When Ntx <=4, refer to the examples of listed in Section 20.3.11.10.1 for examples of that could be used for SU packets. When Ntx>=5, the spatial expansion may be performed by duplicating some of the streams to form the streams with each stream being scaled by the normalization factor sqrt(Nsts)/sqrt(Ntx) , or by set the Ntx-Nsts streams as zero. Note that implementations are not restricted to the spatial mapping matrix examples listed in Section 20.3.11.10.1. |

**Proposed resolution: Disagree**

**Discussion**:

There exist many other alternatives; implementation is not restricted to the spatial mapping matrices shown in 20.3.11.10.1. Note that suggested remedy is only applicable for spatial expansion matrix.

***Change:***

none

##### PHY

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| 1104 | Seok, Yongho | 22.2.3 | 78 | 4 | TR | TBD | Fill descriptions. |
| 1617 | Zhu, Chunhui | 22.2.3 | 78 | 4 | TR | content of the whole section is TBD | fill in the missing content |
| 1218 | Stephens, Adrian | 22.2.3 | 78 | 5 | TR | There's a TBD | resolve it |

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| 1433 | Kang, Byeongwoo | 22.2.3 | 78 | 5 | ER | TBD' is remained. | Fill 'TBD' |

**Proposed resolution: Accept**

**Discussion**: The location of the operation channel within the BSS bandwidth is uniquely determined by the CH\_BANDWIDTH, dot11CurrentPrimary20MHzChannel, dot11CurrentChannelCenterFrequencyIndex1, dot11CurrentChannelCenterFrequencyIndex2 (for *80+80 MHz HT format* and *80+80MHz Non-HT duplicate format* only) from Table 22-23 (VHT PHY MIB attributes) and the the list of the allowable channel set based on regulatory domain as defined in Annex J.

For *20 MHz HT format* and *20 MHz non-HT format*, the 20MHz operating channel is defined by the dot11CurrentPrimary20MHzChannel.

For 4*0 MHz HT format* and 4*0 MHz non-HT duplicate format*, the 40MHz operating channel is from the list of the allowable channel set in the regulatory domain as defined in Annex J which contains the dot11CurrentPrimary20MHzChannel.

For 8*0 MHz HT format* and 8*0 MHz non-HT duplicate format*, the 80MHz operating channel is from the list of the channel center channel index in the regulatory domain as defined in Annex J which contains the dot11CurrentPrimary20MHzChannel.

For 16*0 MHz HT format* and 16*0 MHz non-HT duplicate format*, the 160MHz operating channel is defined by the dot11CurrentChannelCenterFrequencyIndex1.

For 80+80 *MHz HT format* and 80+80 *MHz non-HT duplicate format*, the 80MHz operating channel in the primary frequency segment is defined by the dot11CurrentChannelCenterFrequencyIndex1 and the 80MHz operating channel in the second frequency segment is defined by the dot11CurrentChannelCenterFrequencyIndex2.

The number of space time streams is determined by NUM\_STS and SU or MU-MIMO transmission is determined by NUM\_USERS. For MU-MIMO transmission, the PPDU is defined by TXVECTORs with different USER\_INDEXs corresponding to the same MU-MIMO transmission.

The phase rotation for *non-HT duplicate format* is defined by Equation 22-6 and 22-7 of 22.3.7.

***Change:***

##### 11ac editor to insert the text into 22.2.3 as per highlighted text below.

**22.2.3 Effects of CH\_BANDWIDTH, ~~CH\_OFFSET,~~ MCS and NUM\_ST~~REAM~~S parameters on**

**PPDU format**

~~TBD~~

The structure of the PPDU transmitted by a VHT STA is determined by the TXVECTOR FORMAT,

CH\_BANDWIDTH, NUM\_STS, NUM\_USERS, MCS parameters as defined in Table 22-1.

The operation of the PHY in the frequency domain is determined by the CH\_BANDWIDTH parameter and the dot11CurrentPrimary20MHzChannel, dot11CurrentChannelCenterFrequencyIndex1, and, for *80+80 MHz HT format* and *80+80MHz non-HT duplicate format* only, dot11CurrentChannelCenterFrequencyIndex2 from VHT PHY MIB attributes (see Table 22-23).Table 22-2 shows the PPDU format as a function of the CH\_BANDWIDTH, NUM\_STS, NUM\_USERS, and the VHT PHY MIB attributes.

**Table 22-2 PPDU format as a function of CH\_BANDWIDTH, NUM\_STS, NUM\_USERS**

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| --- | --- |
| **CH\_BANDWIDTH** | **NUM\_STS, NUM\_USERS** |
| HT\_CBW20 | *20 MHz HT format*—A STA that has a 20 MHz operating channel width transmits an HT-mixed (when format is HT\_MF) or HT-greenfield format packet (when format is HT\_GF) or VHT format packet (when format is VHT) of 20 MHz bandwidth with the number of space time streams determined by NUM\_STS and SU or MU-MIMO transmission determined by NUM\_USERS at the 20MHz channel defined by the dot11CurrentPrimary20MHzChannel. For MU-MIMO transmission, the PPDU is defined by TXVECTORs with different USER\_INDEXs corresponding to the same MU-MIMO transmission. |
| HT\_CBW40 | *40 MHz HT format*—A STA that has a 40 MHz operating channel width transmits an HT-mixed (when format is HT\_MF) or HT-greenfield format packet (when format is HT\_GF) or VHT format packet (when format is VHT) of 40 MHz bandwidth with the number of space time streams determined by NUM\_STS and SU or MU-MIMO transmission determined by NUM\_USERS. For MU-MIMO transmission, the PPDU is defined by TXVECTORs with different USER\_INDEXs corresponding to the same MU-MIMO transmission.  The 40MHz operating channel is a valid operating channel from the list of the allowable channel set in the regulatory domain as defined in Annex J which contains the dot11CurrentPrimary20MHzChannel. |
| HT\_CBW80 | *80 MHz HT format*—A STA that has a 80 MHz operating channel width transmits a VHT format packet of 80 MHz bandwidth with the number of space time streams determined by NUM\_STS and SU or MU-MIMO transmission determined by NUM\_USERS. For MU-MIMO transmission, the PPDU is defined by TXVECTORs with different USER\_INDEXs corresponding to the same MU-MIMO transmission.  The 80MHz operating channel is a valid operating channel from the list of the channel center channel index in the regulatory domain as defined in Annex J which contains the dot11CurrentPrimary20MHzChannel. |
| HT\_CBW160 | *160 MHz HT format*—A STA that has a 160 MHz operating channel width transmits a VHT format packet of 160 MHz bandwidth with the number of space time streams determined by NUM\_STS and SU or MU-MIMO transmission determined by NUM\_USERS. For MU-MIMO transmission, the PPDU is defined by TXVECTORs with different USER\_INDEXs corresponding to the same MU-MIMO transmission.  The 160MHz operating channel is a valid operating channel defined by the dot11CurrentChannelCenterFrequencyIndex1. |
| HT\_CBW80+80 | *80+80 MHz HT format*—A STA that has a 80+80 MHz operating channel width transmits a VHT format packet of 80+80 MHz bandwidth with the number of space time streams determined by NUM\_STS and SU or MU-MIMO transmission determined by NUM\_USERS. For MU-MIMO transmission, the PPDU is defined by TXVECTORs with different USER\_INDEXs corresponding to the same MU-MIMO transmission.  The 80MHz operating channel in the primary frequency segment is a valid operating channel defined by the dot11CurrentChannelCenterFrequencyIndex1 and the 80MHz operating channel in the secondary frequency segment is defined by the dot11CurrentChannelCenterFrequencyIndex2. |
| NON\_HT\_CBW20 | *20 MHz non-HT format*—A STA that has a 20 MHz operating channel width transmits a non-HT format packet according to Clause 17 operation. |
| NON\_HT\_CBW40 | *40MHz non-HT duplicate format*—The STA operates in a 40 MHz channel  composed of two adjacent 20 MHz channels. The packets to be sent are in the Clause  17 format in each of the 20 MHz channels.  The 40MHz operating channel is a valid operating channel from the list of the allowable channel set in the regulatory domain as defined in Annex J which contains the dot11CurrentPrimary20MHzChannel.  The upper channel (higher frequency) is rotated by +90º relative to the lower channel. See 20.3.11.11. |
| NON\_HT\_CBW80 | *80MHz non-HT duplicate format*—The STA operates in a 80 MHz channel  composed of four adjacent 20 MHz channels. The packets to be sent are in the Clause  17 format in each of the 20 MHz channels.  The 80MHz operating channel is a valid operating channel from the list of the channel center channel index in the regulatory domain as defined in Annex J which contains the dot11CurrentPrimary20MHzChannel.  The upper three channels (higher frequency) are rotated by +180º relative to the lowest channel as defined by Equation 22-6 of 22.3.7. |
| NON\_HT\_CBW160 | *160MHz non-HT duplicate format*—The STA operates in a 160 MHz channel  composed of eigent adjacent 20 MHz channels. The packets to be sent are in the Clause  17 format in each of the 20 MHz channels.  The 160MHz operating channel is a valid operating channel defined by the dot11CurrentChannelCenterFrequencyIndex1.  The second, third, fourth, sixth, seventh, eighth channels (higher frequency) are rotated by +180º relative to the lowest channel as defined by Equation 22-7 of 22.3.7. |
| NON\_HT\_CBW80+80 | *80+80MHz Non-HT duplicate format*—The STA operates in a 80+80 MHz channel  composed of two 80 MHz channels. The packets to be sent are in the Clause  17 format in each of the 20 MHz channels.  The 80MHz operating channel in the primary frequency segment is a valid operating channel defined by the dot11CurrentChannelCenterFrequencyIndex1 and the 80MHz operating channel in the secondary frequency segment is defined by the dot11CurrentChannelCenterFrequencyIndex2.  In each frequency segment, the upper three channels (higher frequency) are rotated by +180º relative to the lowest channel as defined by Equation 22-6 of 22.3.7. |

Straw Poll: Do you agree to comment resolution presented in 0631