IEEE P802.11
Wireless LANs

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| 802.11 TGac WG Letter Ballot LB190Proposed resolutions on PHY Comments |
| Date: 2012-11-12 |
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##### Comments are based on 11ac D4.0. Proposed resolutions are based on 11ac D4.0 (as indicated in each resolution). Changes indicated by a mixture of Word track-changes and instructions. For equation changes, Latex notation is sometimes used. E.g. a\_{xyz}^b denotes axyzb

Following CIDs are covered in this document (total 10):

PHY: 7376, 7104, 7265, 7184, 7185, 7088, 7187, 7174, 7375, 7280,

Color coding:

GREEN : Strawpoll passed

YELLOW : Discussed but deferred

History:

R0: Initial revision

R1: Updated during presentation on 11/13/2012

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7376 | 248.41 | 22.3.8.1.4 | The ceil function is spurious as TXTIME is guaranteed to be a multiple of 4 us | Remove the ceil function"it may not do any harm to introduce the ceiling operator" (CID 6488 rejection) is not adequate justification for keeping the ceil function here. Or shall we just put ceiling operators on all expressions involving integers? It may not do any harm to do so... |

**Discussion:**

Context (P248)



Note that TXTIME is computed using either Equation (22-105) or (22-106).

P316:



Note that  are all multiples of 4 us, hence TXIME is also a multiple of 4 us. Note that 11n included signal extension (0 or 6 us) in computing TXTIME, thus TXTIME was not necessarily multiples of 4 us.

REVmc D0.4, P1930:



As VHT does not have signal extension, the ceiling function in Equation (22-20) does seem unnecessary.

**Proposed Resolution:**

ACCEPTED.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7104 | 251.56 | 22.3.8.2.3 | 9 Mbps 11a PPDU is also BPSK modulated, but does not require the QBPSK modulation in the second symbold of VHT-SIG-A for differentiation. | Change "differentiation of the VHT PPDU from a BPSK modulated non-HT and HT PPDU" to "differentiation of the VHT PPDU from non-HT PPDUs using 6 Mbps rate or HT PPDUs". |

**Discussion:**

Context (D4.0 P251)



It is true that a VHT PPDU needs to set the rate field in the L-SIG to be 6 Mbps. Furthermore, unlike HT PPDUs which have a separate length field in the HT-SIG, VHT PPDUs do not have a length field in VHT-SIG-A. Hence, L-SIG is the sole provider of information for the packet duration for VHT PPDUs, and thus the integrity of the L-SIG rate field being 6 Mbps is imperative.

However, there is no requirement in the draft mandating a receiver to not perform QBPSK check for the second VHT-SIG-A symbol if the L-SIG rate is not 6 Mbps. See (lack of such requirement in) 22.3.8.2.3 (VHT-SIG-A definition) and 22.3.21 (PHY receive procedure). For example, one could implement a VHT receiver which always checks QBPSK in the second symbol after L-SIG (assuming the first symbol after L-SIG did not have QBPSK). After the QBPSK is detected in the second symbol after the L-SIG, the receiver may then check the L-SIG rate field is 6 Mbps and then proceed accordingly. Note that Clause 20 also does not mention ‘BPSK modulated’ non-HT even though HT PPDUs also need to set the the L-SIG rate field to 6 Mbps.

REVmc D0.4 P1868:



Also, the current text is not clear on how HT and VHT PPDUs are distinguished. VHT-SIG-A1 is used to distinguish between HT and VHT, while VHT-SIG-A2 is used to distinguish between non-HT and VHT.

**Proposed Resolution:**

REVISED. See proposed text changes under CID 7104 in 11-12/1377r1 which clarifies how QBPSK modulation is used to distinguish VHT PPDUs from non-HT and HT PPDUs.

**Proposed Text Changes:**

***Change D4.0 P251L54 as follows:***

The first 48 complex numbers form the first symbol of VHT-SIG-A and the second 48 complex numbers form the second symbol of VHT-SIG-A after rotating by 90° counter-clockwise releative to the first symbol. The first symbol of VHT-SIG-A, which does not have the 90° rotation, is used to differentiate VHT PPDUs from HT PPDUs, while the second symbol of VHT-SIG-A, which has the 90° rotation, is used to differentiate VHT PPDUs from non-HT PPDUs. The time domain waveform for the VHT-SIG-A field in a VHT PPDU shall as specified in Equation (22-24).

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7265 | 253.15 | 22.3.8.2.3 | Description of MU[0] Coding is described as "indicating the coding used for user 0". This should be the user for which USER\_POSITION is 0. | MU[x] fields contain data for the user in USER\_POSITION x.Compare e.g to the description of the NSTS/Partial AID field: Bits 10+3p to 12+3p correspond to MU[p] NSTS and contain the number of space-time streams for user u at user position p=USER\_POSTION[u].MU[x] Coding fields should be described similarly.Similar comments for MU[1], MU[2], MU[3] on lines 30, 34 and 37 of page 253 |
| 7280 | 310.14 | 22.3.21 | Inaccurate description of SU/MU Coding fields | MU[x] does not refer to user x as implied in the text. MU[x] contains information for the user u with x=USER\_POSITION[u].Correct description accordingly. |

**Discussion:**

Context (D4.0 Table 22-12, P253L15)



Suppose there is an MU PPDU consisting of two users, and the Nsts vector in VHT-SIG-A is [1, 0, 2, 0]. In this case, *Nuser* = 2 and there are user 0 and user 1. However, the user position of user 0 is USER\_POSITION[0] = 0, and the user position of user 1 is USER\_POSITION[1] = 2. Hence, the commenter is correct.

**Proposed Resolution:**

CID 7256:

REVISED. See proposed text change under CID 7265 in 11-12/1377r1 which fixes the MU[x] field descriptions.

CID 7280:

REVISED. See proposed text change under CID 7280 in 11-12/1377r1 which fixes the MU[x] field descriptions.

**Proposed Text Changes:**

**CID 7256:**

***Change D4.0 Table 22-12 on P253 as follows:***

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| **Two parts of VHT-SIG-A** | **Bit** | **Field** | **Number of bits** | **Description** |
| VHT-SIG-A2 | B2 | SU/MU[0] Coding | 1 | For a VHT SU PPDU, B2 is set to 0 for BCC, 1 for LDPC. For a VHT MU PPDU, if the MU[0] NSTS field is nonzero, then B2 indicates the coding used for user *u* with USER\_POSITION[*u*] = 0; set to 0 for BCC and 1 for LDPC. If the MU[0] NSTS field is 0, then this field is reserved and set to 1. |
|  |  |  |  |
| B4-7 | SU VHT-MCS/MU[1-3] Coding | 4 | For a VHT SU PPDU: VHT-MCS indexFor a VHT MU PPDU:If the MU[1] NSTS field is nonzero, then B4 indicates coding for user *u* with USER\_POSITION[*u*] = 1: set to 0 for BCC, 1 for LDPC. If MU[1] NSTS field is 0, then B4 is reserved and set to 1.If the MU[2] NSTS field is nonzero, then B5 indicates coding for user *u* with USER\_POSITION[*u*] = 2: set to 0 for BCC, 1 for LDPC. If the MU[2] NSTS field is 0, then B5 is reserved and set to 1.If the MU[3] NSTS field is nonzero, then B6 indicates coding for user *u* with USER\_POSITION[*u*] = 3: set to 0 for BCC, 1 for LDPC. If the MU[3] NSTS field is 0, then B6 is reserved and set to 1.B7 is reserved and set to 1 |

**CID 7280:**

***Change D4.0 P310L14 as follows:***

For a VHT SU PPDU, the SU/MU[0] Coding field of VHT-SIG-A2 indicates the type of coding. The PHY entity shall use an LDPC decoder to decode the C-PSDU if this bit is 1, otherwise BCC decoding shall be used. For an MU transmission, the SU/MU[0] Coding, MU[1] Coding, MU[2] Coding and MU[3] Coding fields of VHT-SIG-A2 indicate the type of coding for user *u* with USER\_POSITION[*u*] = 0, 1, 2 and 3, respectively.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7184 | 254.10 | 22.3.8.2.3 | The definition of D\_{k,n,BW} has a parameters of BW; however, in VHT-SIG-A, each element in summation is defined by per 20 MHz channel basis and D\_{k,n,BW} does not depend on the bandwidth parameter of BW. | Change D\_{k,n,BW} to D\_{k,n,20}. Ditto in P254L23. |
| 7185 | 254.24 | 22.3.8.2.3 | The definition of M^r\_{BW}(k) is referred to Equation (22-23); however, the equation only defines M^r\_{20}(k). In VHT-SIG-A, the subcarrier allocation is identical to that in non-HT PPDU; therefore, M^r\_{BW}(k) is always equal to M^r\_{20}(k) in this equation. | Change M^r\_{BW}(k) to M^r\_{20}(k). Ditto in Equation (22-24). |

**Discussion:**

Context

(D4.0 P254)

VHT-SIG-A:



(D4.0 P249)

L-SIG:



Similar to L-SIG, VHT-SIG-A is modulate over 20 MHz, and then replicated over 40, 80, 160 or 80+80 MHz. D­\_{k,n,BW} is the function which maps the data tones to the appropriate IFFT tone index, and should be performed over 20 MHz only as the replication over 40, 80, 160 or 80+80 MHz is done by the summation sum\_{i\_BW = 0}^{N\_20MHz – 1}. Also note that the corresponding equations in the L-SIG section, namely Equations (22-21) and (22-22), uses the notation D\_{k,20}, not D\_{k,BW}. Hence, the commenter is correct. Similarly, M^r\_{BW}(k) should be M^r\_{20}(k).

**Proposed Resolution:**

CID 7184: ACCEPTED.

CID 7185: ACCEPTED.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7088 | 255.06 | 22.3.8.2.4 | "a 40 and 80 MHz transmission" may lead to a misunderstanding that the transmission has two bandwidth (40 MHz and 80 MHz). | Change "a 40 and 80 MHz transmission" to "a 40 or 80 MHz transmission" |

**Discussion:**

Context (P255):



Note that the L-STF section uses ‘or’ as the commenter suggests (P246):



**Proposed Resolution:**

ACCEPTED.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7187 | 256.51 | 22.3.8.2.5 | When an AP transmits a VHT MU PPDU, it includes two or more PSDUs are incuded. | Change "the PSDU" to "the PSDU(s)". |

**Discussion:**

Context (P256):



Commenter is correct that a VHT MU PPDU carries on or more PSDUs as written on P210:



**Proposed Resolution:**

ACCEPTED.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7174 | 256.53 | 22.3.8.2.5 | "All VHT transmissions have a preamble" literally states that they all have the same preamble. | Replace "All VHT transmissions have" with "Each VHT transmission has" (which, by the way, is just as universal as the 'all' version). |

**Discussion:**

Context (P256):



No contest.

**Proposed Resolution:**

REVISED. See proposed text change under CID 7174 in 11-12/1377r1 which clarifies this.

**Proposed Text Change:**

***Change D4.0 P256L53 as follows:***

A VHT transmission has a preamble that contains

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 7375 | 261.00 | 22.3.8.2.6 | Since the maximum useful pre-EOF pad PSDU size is 2\*\*20-1 octets, you can't need more than 19 bits to represent this.The rejection to CIDs 4703 and 6477 refers to 11/609r5 as the justification for the extra two bits. However, the only justification given there is "Bigger PHY layer maximal PSDU length makes future extention easier." This is not a valid justification as (a) there is no problem extending the field in the future if there are reserved bits after it and (b) none of the other lengths have "future extension" padding | In the penultimate column of Table 22-14, change the Length field to read "B0-B18 (19)" and the Reserved field to read "B19-B22 (4)"N.B.: THIS COMMENT CANNOT BE "RESOLVED" BY REFERRING BACK TO 11/609R5 BECAUSE 11/609R5 MAKES THE UNSUPPORTED ASSERTION THAT "BIGGER PHY LAYER MAXIMAL PSDU LENGTH MAKES FUTURE EXTENSION EASIER". INSTEAD, THAT ASSERTION NEEDS TO BE SUPPORTED (AND THE FACT THAT IN NO OTHER PLACES DO WE MAKE FIELDS BIGGER THAN THEY NEED BE "FOR FUTURE EXTENSION" NEEDS TO BE ADDRESSED -- SEE FOR EXAMPLE THE 17-BIT LENGTH FOR 20M SU PPDUS). A REFERENCE TO 12/337R0 IS EVEN MORE SPURIOUS AS THAT JUST REFERS BACK TO 11/609R5 WITHOUT ADDUCING ANYTHING |

**Discussion:**

Context (P261):



The Maximum A-MPDU Length Exponent subfield in the VHT Capabilities info field is 3 bits (0~7), thus the maximum A-MPDU pre-EOF padding length (APEP\_LENGTH) is 2^(13 + 7) – 1 = 1,048,575 bytes. Note that the VHT-SIG-B length is defined as (P261):



Hence, 19 bits of VHT-SIG-B Length field is sufficient to cover the maximum APEP\_LENGTH value of 1,048,575 bytes.

However, adopting the commenter’s proposed resolution of changing B19-20 of VHT-SIG-B to be reserved in case of VHT SU PPDU of 80/160/80+80 MHz would result in interoperability issues with the existing VHT devices. This is because reserved bits are set to 1. For example, a VHT SU PPDU of 80 MHz with APEP\_LENGTH = 1,000 bytes would now seem to have a VHT-SIG-B length of

 

instead of the expected 250 dwords to an existing VHT receiver. Hence, the proposed resolution does not seem appropriate.

An alternative one could think of is to declare B19-20 for VHT SU PPDU of 80/160/80+80 MHz to be special reserved bits with values 0. However, if some other changes come along later which tries to make use of these special reserved bits and start setting them to 1, then the aforementioned interoperability issue would arise again. Hence, these special reserved bits would also need to be marked as ‘never use’ bits.

Note that by leaving the VHT-SIG-B Length field as it is currently, the above goal is automatically achieved – no other feature in the will be able to make use of the bits B19-20, hence we will never be in danger of interoperability issues. Furthermore, this is a much cleaner approach than to define B19-20 as ‘special’ reserved bits which need to be set to 0 (instead of the normal 1) and need to be marked as ‘never use’.

Hence, while the commenter’s point on the maximum A-MPDU length is well taken, the best resolution at this point seems to leave the current VHT-SIG-B Length field as is.

**Proposed Resolution:**

REVISED. While the commenter’s point on the maximum A-MPDU length is well taken, converting B19-20 to reserved bits would result in erroneous VHT-SIG-B length information to existing VHT devices and cause interoperability issues. Leaving the current VHT-SIG-B Length field definition unchanged seems to be the best way to ensure that no features in the future inadventantly use B19-20 causing interoperability issues with existing VHT devices. See proposed text change under CID 7375 in 11-12/1377r1 which adds a note to clarify this.

**Proposed Text Change:**

***Rename the NOTE under Table 22-14 as ‘NOTE1’.***

***Add the following note after the NOTE under Table 22-14 on P261 in D4.0:***

NOTE2 – Due to the limitations in the maximum A-MPDU length, B19-20 will always be 0 in case of VHT SU PPDUs of 80/160/80+80 MHz.

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