IEEE P802.11
Wireless LANs

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| D2.0 Comment Resolution –Clause 22.3.8.2.3 ~ 22.3.8.2.5 |
| Date: May 9th 2012 |
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Abstract

This document provides resolutions for CID 4220, 5161, 4086, 4087, 4244, 4692, 5164, 5165, 5476, 5273, 5166, 5477, 5478, 5167, 5169 and 5168.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed change** | **Resolution** |
| 4220 | 206.01 | 22.3.8.2.3 | Relation between TXVECTOR fields and PLCP header fields should be made explicit in the PLCP header fields. E.G. relate the MCS in the PCLP header to the one specified in the TXVECTOR | Add a reference to the TXVECTOR fields, especially those who serve the MAC, such as Group ID | REVISED.See 12/0336r2. |
| <Discussion>It seems not needed again here because it is already described in clause 22.3.4.5 (Construction of VHT-SIG-A) that these sub-field values in VHT-SIG-A can be set by obtaining parameters from the TXVECTOR, that is, The VHT-SIG-A field consists of two symbols, VHT-SIG-A1 and VHT-SIG-A2, as defined in 22.3.8.2.3 (VHT-SIG-A definition.* Obtain the CH\_BANDWIDTH, STBC, GROUP\_ID, PARTIAL\_AID (SU only), NUM\_STS, GI\_TYPE, FEC\_CODING, MCS (SU only), BEAMFORMED (SU only), NUM\_USERS from the TXVECTOR. Add the reserved bits, append the calculated CRC, then append the  tail bits as shown in 22.3.8.2.3 (VHT-SIG-A definition)

Instead, I’ve found that there was a missing parameter in clause 22.3.4.5, that is, TXOP\_PS\_NOT\_ALLOWED in the TXVECTOR.  **TGac editor: modify the D2.1 text from P185L26, as follows**The VHT-SIG-A field consists of two symbols, VHT-SIG-A1 and VHT-SIG-A2, as defined in 22.3.8.2.3 (VHT-SIG-A definition.* Obtain the CH\_BANDWIDTH, STBC, GROUP\_ID, PARTIAL\_AID (SU only), NUM\_STS, GI\_TYPE, FEC\_CODING, MCS (SU only), BEAMFORMED (SU only), NUM\_USERS and TXOP\_PS\_NOT\_ALLOWED from the TXVECTOR. Add the reserved bits, append the calculated CRC, then append the  tail bits as shown in 22.3.8.2.3 (VHT-SIG-A definition)
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| 5161 | 206.07 | 22.3.8.2.3 | The fields in Table 22-11 are somewhat artificially defined to be able to keep both SU and MU information in single tabele | Several of the fields in Table 22-11 have a very artifical definition that is the result of trying to keep both SU and MU information in a single table. E.g: NSTS/Partial AID - there is no reason these should be in the same field.A better and more readable approach would be to have one table for VHT-SIG-A for the case of SU and one table for VHT-SIG-A for the case of MU.Split Table 22-1 accordingly. | REJECT.It is one of criticially important feature to keep both SU and MU information in a common table as possible to enable more efficient design of the transmitter, because a VHT STA can be used for either SU or MU depending on its environments.See 12/0336r2. |
| <Discussion>It is one of criticially important feature to keep both SU and MU information in a common table as possible to enable more efficient design of the transmitter, because a VHT STA can be used for either SU or MU depending on its environments. **TGac editor: No change** |
| 4086 | 206.18 | 22.3.8.2.3 | "NOTE--For some but not all users to have space time block coding is not allowed."It reads like this note is trying to be normative. | Add reference to subclause that defines this rule. | REVISED.See 12/0336r2. |
| <Discussion>Clause 22.3.10.4 (Space-time block coding) describes the followings in it:“In an MU transmission, if STBC is applied to any user, STBC shall be applied to all users.” **TGac editor: modify the D2.1 text from P206L15, as follows**Set to 1 if all spatial streams of all users have space time block coding and set to 0 if no spatial stream of any user has space time block coding.NOTE—For some but not all users to have space time block coding is not allowed as defined in 22.3.10.9.4 (Space-time block coding).  |
| 4087 | 206.21 | 22.3.8.2.3 | There's a lot of "In an SU PPDU" and "In an MU PPDU" in table 22-11, without defining how this condition is determined. | Add a note to the table indicating how the differentiation between SU and MU ppdu is determined, based on the contents of the VHT SIG field. | REJECT.Table 22-12 desribes how to set the sub-field values in the VHT-SIG-A field on transmitter’s side. How to differentiate between SU and MU PPDU based on the contents of the VHT-SIG-A field may be done at the receiver, which seems beyond the scope of Table 22-12 (definition of VHT-SIG-A field) in the specification.See 12/0336r2. |
| <Discussion>Table 22-12 desribes how to set the sub-field values in the VHT-SIG-A field on transmitter’s side. How to differentiate between SU and MU PPDU based on the contents of the VHT-SIG-A field may be done at the receiver, which seems beyond the scope of Table 22-12 (definition of VHT-SIG-A field) in the specification. **TGac editor: No change** |
| 4244 | 206.28 | 22.3.8.2.3 | The term MU[x] NSTS is used in Figure 22-12 VHT-SIG-A1 structure, while not explained in the Description part of NSTS in Table 22-11 | Explain MU[x] NSTS in the Description part of NSTS in Table 22-11. | REVISED.See 12/0336r2. |
| <Discussion>Strictly speaking, Figure 22-12 has some error in it regaring the order of representing array values of N\_STS for MU transmission if we assume that *x* value in MU[*x*] means conventionally the user index *u*. Bit positions of array values of N\_STS may not be mapped in the increasing order of *u*, because user index *u* may not match to USER\_POSITION array value *p*, whose relation to each other is already described in Table 22-11, that is, *p*=USER\_POSITION[*u*]. So, we need some change in Figure 22-12 (VHT-SIG-A1 structure) accordingly. **TGac editor: modify the D2.1 text from P205L29, as follows**

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|  | B0     B1 | B2 | B3 | B4    B9 | B10    B12 | B13    B15 | B16    B18 | B19    B21 | B22 | B23 |
| Composit Name:  | BW | Reserved | STBC | Group ID | NSTS/Partial AID | TXOP\_PS\_NOT\_ALLOWED | Reserved |
| SU Name: | SU NSTS | Partial AID |
| MU Name: | MU[0] NSTS | MU[1] NSTS | MU[2] NSTS | MU[3] NSTS |
| Bits: | 2 | 1 | 1 | 6 | 3 | 3 | 3 | 3 | 1 | 1 |
| * VHT-SIG-A1 structure

Note: in MU[*x*] for values listed in USER\_POSITION, *x* represents USER\_POSITION[*u*] where *u* is the user index described in Table 22-12. Otherwise MU[*x*]\_NSTS sets to 0 where *x* is not listed in USER\_POSITION.  |

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| 4692 | 206.50 | 22.3.8.2.3 | It is not clear how to match Partial AID to B13 -- B21. Does B13 match BSSID39/RA39/PID0 or BSSID47/RA47/PID8? | Clarify it. | REJECTSee 12/0336r2. |
| <Discussion>It can be easily known that PARTIAL\_AID[0:8] is mapped to B13 to B21 of VHT-SIG-A1 field from Table 9-19 (Settings for the TXVECTOR parameters GROUP\_ID and PARTIAL\_AID). Because there is already NOTE (which follows) related to the ordering, it seems not needed to clarify again. NOTE—Integer fields are represented in unsigned binary format with the least significant bit in the lowest numbered bitposition **TGac editor: No change** |
| 5164 | 208.03 | 22.3.8.2.3 | Clarify the 96 complex numbers do not include pilots | This paragraph mentions "96 complex numbers generated by these steps", where the "steps" includes pilot insertion. With pilots, there would be more than 96 numbers.Add the words "(before pilot insertion)" after "these steps" | ACCEPT.See 12/0336r2. |
| <Discussion>What the commenter pointed out is correct. 96 is the number before pilot insertion.  **TGac editor: modify the D2.1 text from P207L61, as follows**The VHT-SIG-A field is composed of two symbols, VHT-SIG-A1 and VHT-SIG-A2, each containing 24 data bits, as shown in Table 22-12 (Fields in the VHT-SIG-A field). VHT-SIG-A1 is transmitted before VHT-SIG-A2. The VHT-SIG-A symbols shall be BCC encoded at rate, R = 1/2, interleaved, mapped to a BPSK constellation, and have pilots inserted following the steps described in 18.3.5.6 (Convolutional encoder), 18.3.5.7 (Data interleaving), 18.3.5.8 (Subcarrier modulation mapping), and 18.3.5.9 (Pilot subcarriers), respectively. The first and second half of the stream of 96 complex numbers generated by these steps (before pilot insertion) is divided into two groups of 48 complex numbers, where  respectively. |
| 5165 | 208.14 | 22.3.8.2.3 | Mathematical description of VHT-SIG-A does not meet general format (24) | the general format does not include a summation over symbols.Specify first and second symbol instead (similar to VHT-LTF) | REJECT.See 12/0336r2. |
| <Discussion>It is better to check for consistent expressions considering the general equation (22-8) and multi-symbol field representation such as VHT-LTF and VHT-Data. Since the general equation (22-8) simply describes VHT-SIG-A and VHT-Data (which requires summation in their special equation) and describes VHT-LTF differently with the use of summation, additional change may result in changes in general equation (22-8) and Figure (22-10) as well. So, I also think that it may be better to keep the current equations to exactly match to (22-8) and Figure (22-10).  **TGac editor: No change** |
| 5476 | 209.22 | 22.3.8.2.4 | In addition to improving AGC, VHT-STF field can be used for another purposes. | Change "The purpose of the VHT-STF field" to "The main purpose of the VHT-STF field" | ACCEPT. See 12/0336r1. |
| <Discussion>It seems a little better not to strictly limit its purpose as the commenter pointed out, because it may be kind of implementation issue. **TGac editor: modify the D2.1 text from P209L20, as follows**The main purpose of the VHT-STF field is to improve automatic gain control estimation in a MIMO transmission. |
| 5273 | 210.28 | 22.3.8.2.4 | The parameter N(sub-script)SR is not defined for equation (44) | Copy definition of N(sub-script)SR from P197L58. or state "N(sub-script)SR is defined in 22.3.7" | REVISED.See 12/0336r1. |
| <Discussion>It seems better to refer to the definition of *NSR* here as the commenter pointed out. In addition, there are additional places which also need this, that is, for the waveform of the L-STF, L-LTF, VHT-LTF, VHT-SIG-B and Data packet of VHT format. **TGac editor: modify the D2.1 text from P210L14, as follows**(22-29)where  *NSR* is defined in Table 22-5 (Timing-related constants) is defined in Table 22-6 (Frequently used parameters)**TGac editor: modify the D2.1 text from P201L18, as follows** (22-16)where *NSR* is defined in Table 22-5 (Timing-related constants) represents the cyclic shift for transmit chain  with a value given in Table 22-10 (Cyclic shift values for L-STF, L-LTF, L-SIG and VHT-SIG-A fields of the PPDU)**TGac editor: modify the D2.1 text from P202L09, as follows**(22-19)where*NSR* is defined in Table 22-5 (Timing-related constants) represents the cyclic shift for transmitter chain  with a value given in Table 22-10 (Cyclic shift values for L-STF, L-LTF, L-SIG and VHT-SIG-A fields of the PPDU)**TGac editor: modify the D2.1 text from P213L30, as follows**(22-38)where*NSR* is defined in Table 22-5 (Timing-related constants) is defined in Table 22-6 (Frequently used parameters)**TGac editor: modify the D2.1 text from P216L45, as follows**(22-43)where*NSR* is defined in Table 22-5 (Timing-related constants) is defined in Table 22-6 (Frequently used parameters)**TGac editor: modify the D2.1 text from P239L34, as follows**(22-92)where*NSR* is defined in Table 22-5 (Timing-related constants)*pn* is defined in 18.3.5.10 (OFDM modulation) |
| 5166 | 211.08 | 22.3.8.2.5 | Unclear sentence | The meaning of the sentence "The transmitter provides training for the space time streams (spatial mapper inputs) used for the transmission of the PSDU" is not clear.Propose to delete the sentence and replace with "For each tone, the MIMO channel is an N\_RX x N\_STS matrix, with N\_RX the number of receive antennas and N\_STS the number of space-time streams used for transmission of the PSDU". | REVISED.See 12/0336r1. |
| 5477 | 211.12 | 22.3.8.2.5 | Matrix P is not defined. | Change "matrix P" to "matrix P\_VHTLTF". The same problem is also in Line 14. | ACCEPT.See 12/0336r1. |
| 5478 | 211.13 | 22.3.8.2.5 | Matrix R is not defined. | Change "matrix R" to "matrix R\_VHTLTF". The same problem is also in Line 14 | ACCEPT.See 12/0336r1. |
| <Discussion>Regarding CID 5166, It may be helpful to mention the size of the MIMO channel matrix to be estimated by receiving the VHT-LTF field as the commenter pointed out. But, some modifications are also needed to make it more readable. Resolutions to CID 5477 and CID 5478 are quite straightforward.  **TGac editor: modify the D2.1 text from P210L52, as follows**The VHT Long Training (VHT-LTF) field provides a means for the receiver to estimate the MIMO channel between the set of constellation mapper outputs (or, if STBC is applied, the STBC encoder outputs) and the receive chains. The transmitter provides training for *NSTS, total* space time streams (spatial mapper inputs) used for the transmission of the PSDU. For each tone, the MIMO channel that can be estimated is an *NRX* x *NSTS, total* matrix. All VHT transmissions have a preamble that contains a single section of VHT-LTF symbols, where the data tones of each VHT-LTF symbol are multiplied by entries belonging to a matrix *PVHTLTF*, to enable channel estimation at the receiver. The pilot tones of each VHT-LTF symbol are multiplied by the entries of a matrix *RVHTLTF* defined in the following text. The multiplication of the pilot tones in the VHT-LTF symbol by the *RVHTLTF* matrix instead of the *PVHTLTF* matrix is to allow receivers to track phase and frequency offset during MIMO channel estimation using the VHT-LTF. The number of VHT-LTF symbols, *NVHTLTF*, is a function of the total number of space-time streams  as shown in Table 22-13 (Number of VHT-LTFs required for different numbers of space time streams). As a result, the VHT-LTF field consists of one, two, four, six or eight symbols that are necessary for the demodulation of the VHT-SIG-B and Data fields in the PPDU or for channel estimation in an NDP.  |
| 5167 | 213.22 | 22.3.8.2.5 | Improve Figure 22-15 | Make following change:- Add curly bracket under the IFFT blocks stating that these are N\_TX transmit chains- Replace [Qk]\_NSTS with [Qk]\_(1:N\_STS,total) | ACCEPT.See 12/0336r1. Refer to 12/0335r1. |
| <Discussion>As the commenter pointed out, [Qk] 1:NSTS,total is the correct expression.FYI, this resolution is already covered by that of CID 5155, which was already passed in task group motion in March 2012. Refer to 12/0335r1 (D2.0-comment-resolution-clause-22.3.8.2.1~22.3.8.2.2).  **TGac editor: modify the D2.1 text from P213L01, as follows**Change [Qk] 1:NSTS in Figure 22-15 into [Qk] 1:NSTS,total. |
| 5169 | 215.05 | 22.3.8.2.5 | Number of bits in VHT-SIG-B is ambiguous for MU | The number of bits listed here are per user. Clarify the text accordingly. | ACCEPT.See 12/0336r1. |
| <Discussion>It seems helpful for clearer understanding to modify as suggested. **TGac editor: modify the D2.1 text from P214L42, as follows**The VHT-SIG-B field is one symbol and contains 26 bits in a 20 MHz PPDU, 27 bits in a 40 MHz PPDU and 29 bits in 80 MHz, 160 MHz and 80+80 MHz PPDUs for each user. |
| 5168 | 215.06 | 22.3.8.2.5 | Confusing terminology fields/subfields | This paragraph refers to both the "fields in the VHT-SIG-B field" and "subfields" as meaning the same thing.Harmonize terminology. | REVISEDI think it may be better to keep the naming for those on the basis of consistency with the other PHY clauses.  Clauses 16-20 only use “subfield” when referring to MAC frame formats. See 12/0336r1. |
| <Discussion>FYI, current terminology for “field” and “subfield” are suggested by Brian and agreed in task group during the comment resolution on D0.1 in 2011, which is described in detail in Figure 22-10, Equation (22-8) and Equation (22-9), that is, **Field** : L-STF, L-LTF, L-SIG, VHT-SIG-A, VHT-STF, VHT-LTF, VHT-SIG-B, (Service), Data packet**Fields** : Pre-VHT modulated fields (L-STF, L-LTF, L-SIG, VHT-SIG-A), VHT modulated fields (VHT-LTF, VHT-SIG-B, (Service), Data packet), when mentioning any kind of multiple fields.**Subfield** : each symbol of VHT-SIG-A field, each symbol of VHT-LTF field (from Equation (22-9)), Some bits portion in a Field (e.g., Group ID in the VHT-SIG-A field)Even though it has not been determined clearly yet about naming of some bits portion in a Field (e.g., RATE in the L-SIG field, Group ID in the VHT-SIG-A field, MCS in the VHT-SIG-B field, CRC in the Service field) and still have used the name “Field” for those, I think it may be better to keep the naming for those on the basis of consistency with the other PHY clauses.  Clauses 16-20 only use “subfield” when referring to MAC frame formats. See one of examples as the following:http://umail.etri.re.kr/exchange/minho/%EB%B0%9B%EC%9D%80%20%ED%8E%B8%EC%A7%80%ED%95%A8/Doc%20336r0.EML/1_multipart_xF8FF_image001.png **TGac editor: modify the D2.1 text from P214L45, as follows**For fields consisting of multiple bits, the LSB of the value occupies the lowest numbered bit of the field. |