IEEE P802.11  
Wireless LANs

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| D4 Comment Resolution, brianh, part 2 | | | | |
| Date: 2012-11-12 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Brian Hart | Cisco Systems | 170 W Tasman Dr, San Jose, CA 95134, USA |  | [brianh@cisco.com](mailto:brianh@cisco.com) |

##### Baseline is 11ac D4.0. Changes indicated by a mixture of Word track-changes and instructions. For equation changes, Tex notation is sometimes used. E.g. a\_{xyz}^b denotes axyzb .

PHY CIDs: 7170, 7260, 7035, 7036, 7311, 7037, 7261, 7038, 7040, 7312, 7039, 7041, 7042, 7344, 7262, 7313, 7222, 7085, 7043, 7044, 7045, 7048, 7083, 7177

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| --- | --- | --- | --- | --- | --- | --- |
| 7170 | David Hunter | 18.3.5.5 | 201.36 | Where is CBW\_IN\_NON\_HT\_TEMP defined? For instance, 18.2.3.7 defines CH\_BANDWIDTH\_IN\_NON\_HT, including what it indicates. | Need similar (to 18.2.3.7) definition of CBW\_IN\_NON\_HT\_TEMP. | Revised. See changes under this CID in 12/1379 r<motionedRev#> which change the case of this variable and adds extra explanation to avoid confusion |

***Discussion:***

CBW\_IN\_NON\_HT\_TEMP, as the name suggests, is a temporary variable that has no particular meaning, and never passes an interface so a definition does not belong in 18.2.3.7. The text in 18.3.5.5 provides sufficient definition, i.e.:

|  |
| --- |
| During reception by a VHT STA, the CBW\_IN\_NON\_HT\_TEMP variable shall be set to selected bits in the scrambling sequence as shown in Table 18-6a, then mapped as shown in Table 18-6c to the RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT |

However, a) by using capitals in the name, and b) using it in a “RXVECTOR” row, CBW\_IN\_NON\_HT\_TEMP does appear to be a RXVECTOR parameter. So to avoid confusion

***Change:***

Table 18-6a—Contents of the first 7 bits of the Scrambling Sequence

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RXVECTOR | CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NOT\_HT are present in RXVECTOR | - | DYN\_BANDWIDTH\_IN\_NON\_HT | CbwInNonHtTemp is set to this subfield of First 7 bits of Scrambling Sequence, then CbwInNonHtTemp is mapped according to Table 18-6c to CH\_BANDWIDTH\_IN\_NON\_HT |

Also change CBW\_IN\_NON\_HT\_TEMP to CbwInNonHtTemp two further times, in at P201L43 and in Table 18-6c.

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| 7260 | Sigurd Schelstraete | 22.2.2 | 210.55 | NON\_HT\_MODULATION appears to be a redundant parameter in Clause 22, since it is fully determined by FORMAT and CH\_BANDWIDTH (see Table 22-2). This was not the case for HT. | Either remove, or at the minimum add a note to point out consistency between values of different parameters of TXVECTOR | Rejected. Commenter is correct that this parameter \*could\* be removed from the VHT PHY clause in theory via extensive changes, yet a) the allowed values of CH\_BANDWIDTH parameter as defined at P214L53-57 depend on NON\_HT\_MODULATION in such a way that NON\_HT\_MODULATION is not redundant, b) in this way, VHT is following the interface framework introduced by 11n (where it was necessary) and so clarity seems maximized if VHT keeps the framework unchanged, and c) the NON\_HT\_MODULATION parameter is still used in the MAC clauses and they would need to be rewritten to avoid any unintentional side-effects. |

***Discussion:***

|  |  |  |
| --- | --- | --- |
| CH\_BANDWIDTH | FORMAT is NON\_HT | In TXVECTOR, indicates the channel width of the transmitted PPDU.  In RXVECTOR, indicates the estimated channel width of the received PPDU.  Enumerated type:  CBW40, CBW80, CBW160 or CBW80+80 if NON\_HT\_MODULATION equals NON\_HT\_DUP\_OFDM  CBW20 if NON\_HT\_MODULATION equals OFDM |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7035 | Brian Hart | 22.2.2 | 211.21 | "is derived from the TXTIME parameter returned by the PLME-TXTIME.confirm primitive" but architecturally this primitive is returned to entities outside the PHY. The \*equations\* are common, not the \*API\*. Also, the purpose of the note is to explain that a missing TXVECTOR L\_LENGTH parameter is not the end of the world ... because \*other\* TXVECTOR parameters fill the void ... which are? | Change to "Note - the Length field of the L-SIG inn VHT-PPDUs is determined using the TXTIME value defined in section 22.4.3. The TXTIME value depends in turn upon other TXVECTOR parameters including APEP\_LENGTH" | Revised. See changes under this CID in 12/1379 r<motionedRev#> which substantially make this change |

***Discussion:***

Commenter is being fairly pedantic, but it is true that the PLME-TXTIME.confirm is intended as an external interface, and it would be architecturally confusing to use it within the PHY.

***Change:***

NOTE—the Length field of the L-SIG in VHT PPDUs is defined in equation (22-20) using the TXTIME value defined by equations (22-105) and (22-106), which in turn depend on other parameters including the TXVECTOR parameter APEP\_LENGTH.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7036 | Brian Hart | 22.2.2 | 212.27 | N\_TX is defined in this interface and it is vaguely used in 9.28.3 but is never mentioned in clause 22 afterwards | If it is in an interface, it must be used - e.g. tie N\_{TX} in Table 22-6 to N\_TX here. And where is the MIB variable so the MAC won't set N\_TX to a crazy value? | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

Table 22-6—Frequently used parameters

|  |  |
| --- | --- |
| *NTX* | Number of transmit chains (equal to the TXVECTOR parameter N\_TX) |

Table 22-28—VHT PHY MIB attributes

dot11PHYVHTTable

***Insert new rows***

|  |  |  |
| --- | --- | --- |
| dot11VHTMaxNTxChainsImplemented | Implementation dependent | Static |
| dot11VHTMaxNTxChainsActivated | Implementation dependent | Dynamic |

Annex C

Dot11PhyVHTEntry ::=

SEQUENCE {

dot11VHTChannelWidthOptionImplemented INTEGER,

dot11CurrentChannelBandwidth INTEGER,

dot11CurrentChannelCenterFrequencyIndex0 Unsigned32,

dot11CurrentChannelCenterFrequencyIndex1 Unsigned32,

dot11VHTShortGIOptionIn80Implemented TruthValue,

dot11VHTShortGIOptionIn80Activated TruthValue,

dot11VHTShortGIOptionIn160and80p80Implemented TruthValue,

dot11VHTShortGIOptionIn160and80p80Activated TruthValue,

dot11VHTLDPCCodingOptionImplemented TruthValue,

dot11VHTLDPCCodingOptionActivated TruthValue,

dot11VHTTxSTBCOptionImplemented TruthValue,

dot11VHTTxSTBCOptionActivated TruthValue,

dot11VHTRxSTBCOptionImplemented TruthValue,

dot11VHTRxSTBCOptionActivated TruthValue,

dot11VHTMUMaxUsersImplemented Unsigned32,

dot11VHTMUMaxNSTSPerUserImplemented Unsigned32,

dot11VHTMUMaxNSTSTotalImplemented Unsigned32,

dot11VHTMaxNTxChainsImplemented Unsigned 32

dot11VHTMaxNTxChainsActivated Unsigned 32

}

dot11VHTMaxNTxChainsImplemented OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

" This is a capability variable.

Its value is determined by device capabilities.

This attribute indicates the maximum number of transmit chains within this device."

DEFVAL { 1 }

::= { dot11PhyVHTEntry 18 }

dot11VHTMaxNumTxChainsActivated OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by an external management entity.

Changes take effect as soon as practical in the implementation.

This attribute indicates the maximum number of transmit chains that can be activated within this device, unless this attribute exceeds dot11VHTMaxNTxChainsImplemented, in which case the maximum number of transmit chains that can be activated within this device is equal to dot11VHTMaxNTxChainsImplemented."

DEFVAL { 2147483647}

::= { dot11PhyVHTEntry 19 }

dot11PhyVHTComlianceGroup OBJECT-GROUP

OBJECTS {

dot11VHTChannelWidthOptionImplemented,

dot11CurrentChannelBandwidth,

dot11CurrentChannelCenterFrequencyIndex0,

dot11CurrentChannelCenterFrequencyIndex1,

dot11VHTShortGIOptionIn80Implemented,

dot11VHTShortGIOptionIn80Activated,

dot11VHTShortGIOptionIn160and80p80Implemented,

dot11VHTShortGIOptionIn160and80p80Activated,

dot11VHTLDPCCodingOptionImplemented,

dot11VHTLDPCCodingOptionActivated,

dot11VHTTxSTBCOptionImplemented,

dot11VHTTxSTBCOptionActivated,

dot11VHTRxSTBCOptionImplemented,

dot11VHTRxSTBCOptionActivated,

dot11VHTMUMaxUsersImplemented,

dot11VHTMUMaxNSTSPerUserImplemented,

dot11VHTMUMaxNSTSTotalImplemented,

dot11VHTMaxNTxChainsImplemented,

dot11VHTMaxNTxChainsActivated

}

STATUS current

DESCRIPTION

"Attributes that configure the VHT PHY."

::= { dot11Groups 77 }

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7311 | Bo Sun | 22.2.2 | 212.30 | The condition for EXPANSION\_MAT\_TYPE includes the presence of EXPANSION\_MAT, therefore EXPANSION\_MAT\_TYPE is not always necessary for TXVECTOR | Change "Y" to "O" or "MU" for TXVECTOR | Rejected. Considering the TXVECTOR “Y” case, with natural generalizations to the other cases, the logic of this table is “If Y in TXVECTOR column and if Condition is true then Parameter is present in the TXVECTOR”. Therefore, the condition on the presence of EXPANSION\_MAT in this row is a given, and so “Y” is appropriate. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7037 | Brian Hart | 22.2.2 | 212.44 | "all reported TX chains" ... why is this a report? ... the AP could choose to send to fewer TX chains that is reported by the BFee | Replace "All reported" by "N\_TX" | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which vague-ifies the definition, depending on the reference more and aligning it with CHAN\_MAT more |

***Discussion:***

Disagreeing with the commenter, the arch is such that EXPANSION\_MAT provides the raw material to compute Q within the PHY, and the PHY can create whatever Q it wants given that raw material, subject to TXVECTOR parameters such as NUM\_STS and N\_TX etc. In particular, the dimensions of Q could be unrelated to EXPANSION\_MAT.

Related to the text above (8-1), define H as channel matrix from BFee to BFer. H is *NRX,BFEE* x *NSTS,NDP*. V is a compression related to the LHS of the complex conjugate of H, of dimension Nr \* Nc where Nr = *NSTS,NDP* and Nc <= min(*NSTS,NDP*,*NRX,BFEE*) . Nc can loosely can be called “number of reported transmit chains” but in reality it could be number of reported spatial modes, etc etc.

So, agreeing with the commenter, “reported transmit chains” is incorrect, since it could be “spatial modes”. Easist is just to remove the descriptive text and depend on the reference, in order to align with the CHAN\_MAT description, which is:

|  |  |
| --- | --- |
| CHAN\_MAT | Contains a set of compressed beamforming feedback matrices as  defined in 22.3.11.2 (Beamforming Feedback Matrix V) based  on the channel measured during the training symbols of the  received PPDU. |

***Change:***

Table 22-1—TXVECTOR and RXVECTOR parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EXPANSION\_MAT | FORMAT is VHT | Contains a vector in the number of selected subcarriers containing feedback matrices as defined in 22.3.11.2 (Beamforming Feedback Matrix V) based on the channel measured during the training symbols of a previous VHT NDP PPDU. | MU | N |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7261 | Sigurd Schelstraete | 22.2.2 | 212.60 | CHAN\_MAT is present only for VHT NDP PPDUs | Copy the NOTE under "CHAN\_MAT\_TYPE" to include it in "CHAN\_MAT" as well | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which moves the VHT NDP PPDU note to the Condition 2x |
| 7038 | Brian Hart | 22.2.2 | 212.62 | Note at P212L52 is not echoed for CHAN\_MAT, implying they could be out of sync. Also, "received PPDU" is not the same as "VHT NDP PPDUs" | Dup the note at P212L52 to P212L62 and replace "received PPDU by "VHT NDP PPDUs" | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which moves the VHT NDP PPDU note to the Condition 2x, and clarifies “received PPDU” |

***Discussion:***

In agreement with the commenters, but the issue is bigger than just a NOTE so promote it to the Condition column. Also see CID 7344 as to why PSDU\_LENGTH is the best means to identify a VHT NDP PPDU in the RXVECTOR.

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CHAN\_MAT\_TYPE | FORMAT is VHT and PSDU\_LENGTH equals zero | Set to COMPRESSED\_SV | N | Y |
|  | FORMAT is VHT and PSDU\_LENGTH is greater than zero | Not present | N | N |
|  | Otherwise | See corresponding entry in Table 20-1 | | |
| CHAN\_MAT | FORMAT is VHT and PSDU\_LENGTH equals zero | Contains a set of compressed beamforming feedback matrices as defined in 22.3.11.2 (Beamforming Feedback Matrix V) based on the channel measured during the training symbols of the received VHT NDP PPDU. | N | Y |
|  | FORMAT is VHT and APEP\_LENGTH is greater than zero | Not present | N | N |
|  | Otherwise | See corresponding entry in Table 20-1 | | |

|  |  |  |  |  |  |  |
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| 7040 | Brian Hart | 22.2.2 | 213.10 | "Set of delta SNR values .." but sets are unordered | Mention "array" explicitly in the "Value" box | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |
| 7312 | Bo Sun | 22.2.2 | 213.10 | As the NOTE explains, DELTA\_SNR is present in RXVECTOR only for VHT NDP PPDUs for MU sounding. Therefore it should be "O" for RXVECTOR. | Change "Y" to "O" for RXVECTOR | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change and also clarifies text in the NOTE. |

***Discussion:***

Re CID 7312, the NOTE is really being used to modify the Condition – so we probably should move the NOTE to the condition. Bu the NOTE makes a change for the RXVECTOR only, and we don’t have precedents of saying “if TX” or “if RX” in the Condition, so ignore this issue and just just Y to O instead.

As well, the PHY is not aware of MU sounding or not, only whether it is MU BFer capable or not, so make a change to the NOTE too.

***Change***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DELTA\_SNR | FORMAT is VHT | Contains an array of delta SNR values as defined in 8.4.1.49 (MU Exclusive Beamforming Report field) based on the channel measured during the training symbols of the received VHT NDP PPDU. NOTE—In the RXVECTOR this parameter is present only for VHT NDP PPDUs if dot11MUBeamformerOptionImplemented is true | MU | O |
| Otherwise | Not present | N | N |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7039 | Brian Hart | 22.2.2 | 213.24 | "SNR per SS" so this is an array of values but only one value is reported | Mention "array" explicitly in the "Value" box | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

Agree with commenter.

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SNR | FORMAT is VHT | Contains an array of measures of the received SNR for each spatial stream. SNR indications of 8 bits are supported. SNR shall be the sum of the decibel values of SNR per tone divided by the number of tones represented in each stream as described in 8.4.1.48 (VHT Compressed Beamforming Report field) | N | Y |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7041 | Brian Hart | 22.2.2 | 214.27 | Definition works for TX but not RX - and RXVECTOR is a "Y" | Reword ... the better template is "Indicates the modulation and coding scheme ..." | Accepted |

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MCS | FORMAT is VHT | Indicates the modulation and coding scheme used in the transmission of the PPDU. Integer: range 0 to 9 | MU | Y |

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| --- | --- | --- | --- | --- | --- | --- |
| 7042 | Brian Hart | 22.2.2 | 215.20 | This note is helpful but CH\_BW\_IN\_NON\_HT doesn't have the benefit of this note | Dup the note to CH\_BW\_IN\_NON\_HT | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

Agree with commenter, albeit that CH\_BANDWIDTH\_IN\_NON\_HT is present in more frames including a CTS where the indication comes form the preceding RTS, so enlarge the basis of the validity.

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CH\_BANDWIDTH\_IN\_NON\_HT | FORMAT is NON\_HT | In TXVECTOR, if present, indicates the channel width of the transmitted PPDU, which is signalled via the scrambling sequence. In RXVECTOR, if valid, indicates the channel width of the received PPDU, which is signalled via the scrambling sequence. Enumerated type: CBW20, CBW40, CBW80, CBW160, CBW80+80  NOTE—In the RXVECTOR, the validity of this parameter is determined by the MAC based on the contents of the currently received MPDU or the previous MPDU in an exchange. | O | Y |

|  |  |  |  |  |  |  |
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| 7344 | Mark RISON | 22.2.2 | 215.45 | Why is the APEP\_LENGTH optional in the RXVECTOR? | Make it mandatory | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which leaves APEP\_LENGTH optional in RXVECTOR since VHT-SiG-B decoding is optional, and augments PSDU\_LENGTH for VHT-SIG-B indication |

***Discussion***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| APEP\_LENGTH | FORMAT is VHT | If equal to zero, indicates a VHT NDP PPDU for both RXVECTOR and TXVECTOR. If greater than zero, in the TXVECTOR indicates the number of octets in the range 1 to 1 048 575 in the A-MPDU pre-EOF padding (see 9.12.2 (A-MPDU length limit rules)) carried in the PSDU. This parameter is used to determine the number of OFDM symbols in the Data field and, after being rounded up to a 4 octet boundary with the two LSBs removed, is placed in the VHT-SIG-B Length field. NOTE—The rounding up of the APEP\_LENGTH parameter to a 4-octet word boundary could result in a value that is larger than the PSDU\_LENGTH calculated using the equations in 22.4.3 (TXTIME and PSDU\_LENGTH calculation). If greater than zero, in the RXVECTOR, this parameter is the value obtained from the VHT-SIG-B Length field multiplied by 4. | MU | O |

There is no explicit language in the MAC sections for consuming APEP\_LENGTH, hence “N” is actually the starting point. Obviously the MAC does not need to know or use VHT-SIG-B for SU PPDUs, and so it is optional to decode VHT-SIG-B, yet APEP\_LENGTH for non-NDP PPDUs comes from VHT-SIG-B. Hence we cannot have more than “O” here.

However, ther is implicit language in the MAC section since APEP\_LENGTH also indicates a VHT NDP, so its \*zero\* value is significant. Arguably a VHT NDP can be indicated on RX by the presence of CHAN\_MAT\_TYPE etc, but I feel this is weak. Therefore, for RX, it seems best to \*also\* allow the mandatory RXVECTOR parameter PSDU\_LENGTH to indicate a VHT NDP, and leave APEP\_LENGTH as O.

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PSDU\_LENGTH | FORMAT is VHT | Indicates the number of octets in the VHT PSDU in the range of 0 to 1 048 575 octets. A value of 0 indicates a VHT NDP PPDU. | N | Y |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7262 | Sigurd Schelstraete | 22.2.2 | 216.20 | Under "USER\_POSITION", the NOTE states that "The entries in the USER\_POSITION array are in ascending order".Which part of the spec assures that the statement "The entries in the USER\_POSITION array are in ascending order" is true?   I think this actually has to be a requirement, but I'm not sure it is captured anywhere in the draft. | USER\_POSITION in TXVECTOR has to be in ascending order. This imposes a restriction on how user index u has to be chosen for MU PPDUs. This requirement should be reflected in the standard. | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

MU indexes works properly when 3 things operate in sync:

1. The construction of Q concatenates individual users’ Q submatrices in **ascending** order so that the uth user’s Q submatrix resides at columns *Mu*+1 … *Mu*+*NSTSu* as per:



1. The Q submatrix of user u matches up with “speading code” for user u’s STSs applied by the “speading matrix” A. This happens at (22-38), where user u’s VHT-LTF training is in the *Mu*+1…*Mu*+*NSTS,u* rows of A as precoded by the *Mu*+1…*Mu*+*NSTS,u* columns of Q, sa per: 
2. User u’s data STSs are precoded by the *Mu*+1…*Mu*+*NSTS,u* columns of Q as per:



1. The USER\_POSITIONs are in **ascending** order, so the RX knows how to “despread” the training for its STSs so as to extract *Mu*+1…*Mu*+*NSTS,u* streams

The headache is where to apply shall’s to the MAC on its usage of the TXVECTOR? Sadly, we oftentimes use a NOTE in the TXVECTOR/RXECTOR interface to indicate normative behavior – not really good enough.

Below a “shall” is created on a STA, whether or not it is MU-capable, but obviously in a non-MU PPDU with 1 USER\_POSITION, then the list cannot be other than in ascending order (or descending order or …).

***Change:***

9.29.4 VHT MU Beamforming

A MU Beamformer may transmit a VHT MU PPDU with a single nonzero TXVECTOR parameter

NUM\_STS[p], where .

A MU Beamformer shall not transmit a VHT MU PPDU with a nonzero TXVECTOR parameter

NUM\_STS[p], where , to a STA whose MU Beamformee Capable field is equal to 0.

When transmitting a MU PPDU, a MU Beamformer shall order the per-user arrays of TXVECTOR parameters so that the per-user USER\_POSITION array is in ascending order.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| USER\_POSITION | FORMAT is VHT and 1<= GROUP\_ID <= 62 | Index for user in MU transmission. Integer: range 0-3. NOTE.The entries in the USER\_POSITION array are in ascending order (see 9.29.4). | MU | O |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7313 | Bo Sun | 22.2.2 | 216.21 | No definition for the value of TXOP\_PS\_NOT\_ALLOWED in non-VHT cases. | Add "Otherwise" condition to this parameter. | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

Agree with commenter.

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TXOP\_PS\_NOT\_ALLOWED | FORMAT is VHT | Indicates whether or not a VHT AP allows non-AP VHT STAs in TXOP power save mode to enter Doze state during the TXOP. 0 indicates that the VHT AP allows non-AP VHT STAs to enter doze mode during a TXOP. 1 indicates that the VHT AP does not allow non-AP VHT STAs to enter doze mode during a TXOP. | Y | Y |
| Otherwise | Not present | N | N |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7222 | Youhan Kim | 22.2.2 | 216.29 | "NUM\_STS summed over all users is between 1 and 8." isn't very clear. Some people think this doesní»t include 1 and 8, see, e.g., http://answers.yahoo.com/question/index?qid=20110704113440AAJ829x. | Change to "NUM\_STS summed over all users is in the range 1 to 8." | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

“in the range from x to y” is a common template and is less ambiguous

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NUM\_STS | FORMAT is VHT | Indicates the number of space-time streams. Integer: range 1-8 for SU, 1-4 per user in the TXVECTOR and 0-4 in the RXVECTOR for MU. NUM\_STS summed over all users is in the range from 1 to 8. | MU | Y |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7085 | Mitsuru Iwaoka | 22.2.2 | 217.39 | In Table 20-1 of IEEE Std 802.11-2012, RX\_START\_OF\_FRAME\_OFFSET is "O (Optional)" for RXVECTOR. In Table 22-1, RX\_START\_OF\_FRAME\_OFFSET is defined as "Y (Present)". If dot11MgmtOptionTimingMsmtActivated is false and VHT STA receives HT PPDU format, RX\_START\_OF\_FRAME\_OFFSET wil not present. So, RX\_START\_OF\_FRAME\_OFFSET shall be optional in Table 22-1. | Change RX\_START\_OF\_FRAME\_OFFSET to "O" in Table 22-1 RXVECTOR row. | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which make it clear that this parameter is not present if the MIB variable is false |

***Discussion:***

Agreed that this is present only if dot11MgmtOptionTimingMsmtActivated is true. This can be handled most precisely using the Condition column.

***Change:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RX\_START\_OF\_FRAME\_OFFSET | dot11MgmtOptionTimingMsmtActivated is true | 0 to 232– 1. An estimate of the offset (in 10 ns units) from the point in time at which the start of the preamble corresponding to the incoming frame arrived at the receive antenna port to the point in time at which this primitive is issued to the MAC. | N | Y |
| Otherwise | Not present | N | N |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7043 | Brian Hart | 22.2.3 | 218.38 | Too much information ... say this once in the rigth place and not elsewhere when not strictly necessary. Change "If the operating ch width is wider than XX MHz then ... as defined in Equaiton (22-11) | 4x in this table, replace this kind of langauge by "After duplicaiton, each 20 MHz channel is rotated as defined by Gamma\_{k,BW} as defined in LSTF section, LLTF section, LSIG section and /22.3.10.12" | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

Agreed – too much information

***Change:***

Table 22-2— PPDU format as a function of CH\_BANDWIDTH parameter

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| --- | --- | --- |
| NON\_HT | CBW40 | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using two adjacent 20 MHz channels as defined in 22.3.10.12 (Non-HT duplicate transmission). If the operating channel width is wider than 40 MHz, then the transmission shall use the primary 40 MHz channel. Each 20 MHz within the transmission is rotated using the function defined in Equation (22-11). |
| NON\_HT | CBW80 | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using four adjacent 20 MHz channels as defined in 22.3.10.12 (Non-HT duplicate transmission). If the BSS operating channel width is 160 MHz or 80+80 MHz, then the transmission shall use the primary 80 MHz channel. Each 20 MHz within the transmission is rotated using the function defined in Equation (22-12). |
| NON\_HT | CBW160 | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using eight adjacent 20 MHz channels as defined in 22.3.10.12 (Non-HT duplicate transmission). Each 20 MHz within the transmission is rotated using the function defined in Equation (22-13). |
| NON\_HT | CBW80+80 | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using two non-adjacent frequency segments, with each frequency segment consisting of four adjacent 20 MHz channels as defined in 22.3.10.12 (Non-HT duplicate transmission). Each 20 MHz within each frequency segment is rotated using the function defined in Equation (22-12). |

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| 7044 | Brian Hart | 22.2.4.1 | 219.15 | Not entirely delarwhat the text HT/NON\_HT+OFDM/ NON\_HT+NON\_HT\_DUP\_OFDM/VHT refers to | Associate these with "FORMAT [+NON\_HT\_MODULATION]" | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Change Fig 22-1 by the new figure below, that includes***"FORMAT [+NON\_HT\_MODULATION]:" ***and updated section numbers***

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| --- | --- | --- | --- | --- | --- | --- |
| 7045 | Brian Hart | 22.2.4.1 | 219.33 | Clause 22 deals with the TX spectral mask for all PHYs now | Clause 22 defines with the VHT TX spectral mask for all PHYs now, so apply similar "exception" language for 22.3.18 in two bottom LHS boxes in fig 22-1, the para at P219L48 and the para at P221L37 | Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change, except the section is 22.3.8.1 and the figure is already in this respect. |

***Change:***

**22.2.4.2 Support for NON\_HT format when NON\_HT\_MODULATION is OFDM**

When a PHY-TXSTART.request(TXVECTOR) primitive with the FORMAT parameter equal to NON\_HT and the NON\_HT\_MODULATION parameter equal to OFDM is issued, the behavior of the VHT PHY is defined in Clause 18 with additional requirements described in

* 22.3.9.1 (Transmission of 20 MHz NON\_HT PPDUs with more than one antenna) and
* 22.3.18.1 instead of 18.3.9.3, and
* 22.3.18.4.2 (Transmit center frequency leakage) instead of 18.3.9.7.2 (Transmitter center frequency leakage).

The Clause 22 TXVECTOR parameters in Table 22-1 (TXVECTOR and RXVECTOR parameters) are mapped to Clause 18 TXVECTOR parameters in Table 18-1 according to Table 22-3 (Mapping of the VHT PHY parameters for NON\_HT operation) and the Clause 18 PHY-TXSTART.request(TXVECTOR) primitive is issued.

**22.2.4.3 Support for HT formats**

When a PHY-TXSTART.request(TXVECTOR) primitive with the TXVECTOR parameter FORMAT in a

PHY-TXSTART.request equal to HT\_MF or HT\_GF, the behavior of the PHY is defined by Clause 20 with

additional requirements defined in

* 22.3.9.2 (Transmission of HT PPDUs with more than four antennas) and
* 22.3.18.1 instead of 20.3.20.1, and
* 22.3.18.4.2 (Transmit center frequency leakage) instead of 20.3.20.4 (Transmit center frequency tolerance).

The Clause 22 TXVECTOR parameters in Table 22-1 (TXVECTOR and RXVECTOR parameters) are mapped directly to Clause 20 TXVECTOR parameters in Table 20-1 (TXVECTOR and RXVECTOR parameters) and the Clause 20 PHY-TXSTART.request(TXVECTOR) primitive is issued.

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| 7048 | Brian Hart | 22.3.6 | 217.36 | What is NCBPSSI in a MU PPDU | Should be undefined, e.g. as per P237L21 as a template | Page# should be 237 not 217. Revised. See changes under this CID in 12/1379 r<motionedRev#>, which substantially make this change |

***Discussion:***

Seems to be a simple oversight.

***Change:***

Table 22-6—Frequently used parameters

|  |  |
| --- | --- |
| *NCBPSSSI*, *NCBPSSSI,u* | Number of coded bits per symbol per spatial stream per BCC interleaver block.  For a VHT SU PPDU,  *NCBPSSI* = ….  For a VHT MU PPDU for user *u*, *u* = 0, ..., *Nu*-1  *NCBPSSSI,u* = …  For a VHT MU PPDU, *NCBPSSSI* is undefined |

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| 7083 | Brian Hart | 22.4.1 | 313.10 | "and the intralayer of higher level LMEs" seems complicated,also are we omitting the SME? | Change to ", the higher level LMEs and the SME" | Withdrawn by commenter via email 2012-11-12 |

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| 7177 | David Hunter | 22.4.2 | 313.20 | This "cannot" really is a restriction of permission, not a statement of physical impossibility. | Replace "cannot" with "shall not". | Rejected. 1) This language follows a template used in 802.11-2012 in Clauses 14,16,17,18,20. 2) Consider for example dot11VHTLDPCCodingOptionImplemented. If a device does not implement LDPC decoding, it really is a physical impossibility for the device to receive LDPC coded PPDUs. This is true in general |