IEEE P802.11
Wireless LANs

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| Comment Resolutions on Clause 28.2.2 (TXVECTOR and RXVECTOR parameters) Part 1 |
| Date: 2017-08-21 |
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Abstract

This submission provisions with resolutions to the following 81 CIDs on 28.2.2 (TXVECTOR and RXVECTOR parameters) of TGax D1.0, including suggested spec text modification to IEEE P802.11ax D1.4 to TGax editor :

* CIDs: 4094, 8744, 9968, 9545, 4857, 4940, 5244, 9546, 4858, 5245, 8746, 8747, 4941, 8748, 4943, 8749, 8750, 4944, 9721, 8751, 4861, 4945, 8752, 4946, 8753, 4947, 4949, 8754, 8755, 10199, 8756, 8757, 8758, 8759, 4862, 8760, 4860, 8761, 8762, 9138, 8763, 4859, 4950, 8764, 6111, 7680, 8765, 8766, 8767, 9139, 10083, 8768, 10363, 4951, 8769, 9140, 8531, 9141, 8770, 8771, 8772, 8773, 4954, 8776, 8777, 8778, 4955, 5247, 8779, 4957, 4958, 8780, 8781, 8782, 5248, 4959, 9144, 9145, 5389, 4960, 8783

The following 5 CIDs are not resolved in this CR document.

* CIDs: 4953, 8417, 8755, 5246, 5753

Revisions:

* R0: initial draft.
* R1: update based on D1.4
* R2: update based on comments to HE\_LTF\_TYPE and RCPI from Lochan and comments to CH\_BANDWIDTH and RU\_ALLOCATION from Yongho

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 4094 | 28.2.2 | 214.22 | RXVECTOR is also used in PHY-RXEND.indication primitive | Change to "....list in the PHY\_RXSTART.indication primitive and PHY\_RXEND.indication primitive." | **Revised**Agree in principle.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4094 in 11-17/1001r2  |
| 8744 | 28.2.2 | 214.25 | Table 28-1 stretches over several pages. Repeat header row for better readability. | See comment | **Revised**Agree in principle.The header row for table 28-1 on each page has been added in D1.4. Therefore no more modification needs to be implemented. |
| 9968 | 28.2.2 | 214.37 | In 2.4GHz band, legacy format needs to include non-OFDM frame format. So, NON\_HT format needs to include PPDU formats in Clause 15, 16, 17, and 18. | Modify the value description for NON\_HT to: "NON\_HT indicates Clause 15, Clause 16, Clause 17, or Clause 18 PPDU formats or non-HT duplicate PPDU format. In this case, the modulation is determined by the NON\_HT\_MODULATION parameter.". | **Accepted** |
| 9545 | 28.2.2 | 216.11 | TXVECTOR and RXVECTOR parameter N\_TX is defined for HE\_SU, HE\_MU, HE\_EXT\_SU and HE\_TRIG format to indicate the number of transmit chains. However, in the Table 28-1, it is set to "N" (not present) for both TXVECTOR and RXVECTOR. | It should be Y for TXVECTOR. | **Accepted** |
| 4857 | 28.2.2 | 216.12 | It looks like N\_TX is not present for the HE formats | please change "Indicates the number of transmit chains." to "Not present" in the value column | **Revised**N\_TX is needed for TXVECTOR. Therefore it’s proposed to change the request to TXVECTOR to “Y” instead of changing the parameter to “Not present” .TGax Editor: refer to resolution to CID 9545. |
| 4940 | 28.2.2 | 216.12 | N\_TX is incorrectly reported as not needed for 11ax | please change "Indicates the number of transmit chains." to "Not present" in the value column | **Revised**N\_TX is needed for TXVECTOR. Therefore it’s proposed to change the request to TXVECTOR to “Y” instead of changing the parameter to “Not present”TGax Editor: refer to resolution to CID 9545. |
| 5244 | 28.2.2 | 216.13 | Why does N\_TX have "N" for both TXVECTOR and RXVECTOR? | Change TXVECTOR to Y | **Accepted** |
| 9546 | 28.2.2 | 216.47 | CHAN\_MAT\_TYPE for HE\_SU, HE\_MU, HE\_EXT\_SU, or HE\_TRIG formats are defined to be "COMPRESSED\_SV" in the first low while CHAN\_MAT\_TYPE for HE\_MU, HE\_EXT\_SU, HE\_TRIG or HE\_SU and PSDU\_LENGTH is greater than 0 is defined to be "Not present" in the second low.Not sure how to set this parameter in HE\_MU, HE\_EXT\_SU and HE\_TRIG formats. | Double check the conditions on the format. | **Revised.**Agree in principle.The addressed issue has been resolved by CID 10198 and the modification reflected in D1.4. Therefore no further modification implements. |
| 4858 | 28.2.2 | 216.48 | Condition column seems to be in error | Change "FORMAT is HE\_SU,HE\_MU, HE\_EXT\_SU orHE\_TRIG" to "FORMAT is HE\_SU andPSDU\_LENGTH is 0" | **Revised.**Agree in principle.The addressed issue has been resolved by CID 10198 and the modification reflected in D1.4. Therefore no further modification implements. |
| 5245 | 28.2.2 | 216.48 | How can the Value be both COMPRESSED\_SV and Not present? | as in comment | **Revised.**Agree in principle.The addressed issue has been resolved by CID 10198 and the modification reflected in D1.4. Therefore no further modification implements. |
| 8746 | 28.2.2 | 217.05 | Wrong reference: 26.3.12.3.2 | Correct reference | **Revised**Agree in principle.The addressed issue has been resolved by CID 9137 and the modification reflected in D1.4. Therefore no further modification implements. |
| 8747 | 28.2.2 | 217.22 | "VHT NDP PPDU or HE NDP PPDU". Is it the intention to allow HE PPDUs to use sounding information from VHT PPDUs? If so, shouldn't VHT PPDUs also be allowed to use HE sounding information? | Clarify | **Revised**Using DELTA\_SNR derives from a VHT NDP PPDU into HE PPDU is not defined in the spec. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8747 in 11-17/1001r2 |
| 4941 | 28.2.2 | 217.30 | RCPI should be per RU in OFDMA | RCPI should be per RU in OFDMA | **Rejected**RCPI is the measure of the received RF power averaged over all of the receive chains. The RF power per RU cannot be identified.  |
| 8748 | 28.2.2 | 217.33 | Should SNR be defined per RU for HE MU PPDUSs? | Clarify | **Revised**Agreed in principle.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8748 in 11-17/1001r2 |
| 4943 | 28.2.2 | 217.38 | "for each SS" but should be RU-aware also | For the STA recipient, this should be for the STA's RU. "of the user" partly captures this, but not precisely enough. Ditto P217L43 | **Revised**Agreed in principle.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4943 in 11-17/1001r2 |
| 8749 | 28.2.2 | 217.38 | Clarify "each spatial stream of the receiver." to distinguish it more clearly from the SU case | E.g. "For the subset of spatial streams in the PPDU that is intended for the receiver" | **Revised**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8749 in 11-17/1001r2 |
| 8750 | 28.2.2 | 217.42 | Clarify "for each spatial stream per user.". Does this imply there is only one stream per user? Does "each spatial stream per user" mean "all streams across users"? | Clarify | **Revised**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8750 in 11-17/1001r2 |
| 4944 | 28.2.2 | 218.04 | NO\_SIG\_EXTN is marked at NN but needed for 2.4G - see P270L47 | Add for 2.4G | **Revised****Agreed in principle**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4944 in 11-17/1001r2 |
| 9721 | 28.2.2 | 218.05 | Because HE STA can operate in 2.4GHz band, parameter NO\_SIG\_EXTN is present when FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG. | As per comment. | **Revised**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 9721 in 11-17/1001r2 |
| 8751 | 28.2.2 | 218.11 | FEC\_CODING support shows MU for TXVECTOR and MU for RXVECTOR (4th and 5th column). However, this will depend on the PPDU format. It would be more correct to say:- For HE SU: Y/Y- For HE MU: MU/Y- For HE\_EXT\_SU: Y/Y- For HE\_TRIG: Y/MU | Specify per format | **Rejected**The meaning of MU in TXVECTOR and RXVECTOR has been clearly defined at the end of table 28-1. |
| 4861 | 28.2.2 | 218.14 | Is FEC\_CODING only present in the TXVECTOR and RXVECTOR in case of MU? | I'd say, like STBC, it is present always? Definitely for the TXVECTOR, because the rate decision comes from a higher layer. Is it needed for the RXVECTOR? | **Rejected**FEC\_CODING is present for each HE PPDU. It seems the commenter misunderstood the meansing of “MU” in column TXVECTOR and RXVECTOR. |
| 4945 | 28.2.2 | 218.14 | Named constants BCC\_CODING/LDPC\_CODING are defined but then all-but-never used later in this section | Use named constants in the PHY clause instead of loose language like "This figure also applies to the data field with LDPC encoding in an HE trigger-based PPDU." Or remove the named constants ... | **Rejected**Named constants BCC\_CODING/LDPC\_CODING follows exactly the IEEE 802.11-2016 style. |
| 8752 | 28.2.2 | 218.20 | "Indicates the presence of the extra OFDM symbol" should be symbol segment since no complete symbol is added. | Correct | **Revised**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8752 in 11-17/1001r2 |
| 4946 | 28.2.2 | 218.35 | "Payload" is loose | Replace by "Data field". 4x in this cell. Also check elsewhere | **Revised**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4946 in 11-17/1001r2 |
| 8753 | 28.2.2 | 218.37 | "all RUs are not STBC encoded" is ambiguous | Replace with "no RUs are STBC encoded". Similarly on line 44. | **Revised**Agree in principle.The addressed issue has been resolved by CID 4948 and the modification reflected in D1.4. Therefore no further modification implements. |
| 4947 | 28.2.2 | 218.43 | Loose language | Should be "STBC is not applied to an RU in a HE MU PPDU if the RU is assigned to more than 1 user. Also move after "HE MU PPDU" language ending at L37. | **Revised**Agree in principle.The addressed issue has been resolved by the resolution to CID 4948 and the modification reflected in D1.4. Therefore no further modification implements. |
| 4949 | 28.2.2 | 218.44 | Rogue language | "STBC is set ot 0 to indicate ... payload" Unclear what this sentence is doing. IS it clarification? Is it conflicting/overloading other defintions here? What PPDU format(s) does it apply to? Clarify | **Revised**Agree in principle.The addressed issue has been resolved by the resolution to CID 4948 and the modification reflected in D1.4. Therefore no further modification implements. |
| 8754 | 28.2.2 | 219.19 | "it is a monotonically increasing function of the received power" is a statement of fact. It probably should be a requirement instead. | Change to make it a requirement (shall or should) | **Rejected**This is exactly a statement of fact. |
| 8755 | 28.2.2 | 219.25 | RSSI\_LEGACY should be renamed to avoid the term "legacy" since this term is not used in the baseline document to refer to preamble types. | Rename | **Rejected**RSSI\_LEGACY is only present when FORMAT is HE format and will not cause confusion to legacy devices. |
| 10199 | 28.2.2 | 219.25 | The condition when RSSI\_LEGACY exists is not clear. In addition, "PHY legacy preamble" is not clear whether non-HE portion preamble in an HT/VHT/HE PPDU or PLCP preamble in a Non-HT PPDU. | Clarify it. | **Revised****Discussion:** the clarification of “PHY legacy preamble” has been addressed by resolution to CID #3609 and modified to “non-HE portion of the HE PPDU preamble” in D1.3.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 10199 in 11-17/1001r2 |
| 8756 | 28.2.2 | 219.28 | The term "PHY legacy preamble" should not be used. | Replace with "non-HE preamble fields" | **Revised**This issue has been resolved in D1.2 as resolution to CID 3609. No further modification needs to be implemented |
| 8757 | 28.2.2 | 219.31 | "it is a monotonically increasing function of the received power" is a statement of fact. It probably should be a requirement instead. | Change to make it a requirement (shall or should) | RejectedThe statement follows current IEEE 802.11-2016’s understanding, i.e. it’s a statement of fact. |
| 8758 | 28.2.2 | 219.33 | "modulation and coding scheme" can be plural | Replace with "modulation and coding scheme(s)" | **Revised**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8758 in 11-17/1001r2 |
| 8759 | 28.2.2 | 219.33 | MCS support shows MU for TXVECTOR and MU for RXVECTOR (4th and 5th column). However, this will depend on the PPDU format. It would be more correct to say:- For HE SU: Y/Y- For HE MU: MU/Y- For HE\_EXT\_SU: Y/Y- For HE\_TRIG: Y/MU | Correct | **Rejected.**MU indicates that the parameter is present once for an HE SU PPDU and HE ER SU PPDU and present per user for an HE MU PPDU. For an HE TB PPDU, MU in the TXVECTOR column indicates that the parameter is present once and MU in the RXVECTOR column indicates the parameter is present per user. |
| 4862 | 28.2.2 | 219.34 | Is MCS only present in the TXVECTOR and RXVECTOR in case of MU? | I'd say, like STBC, it is present always? Definitely for the TXVECTOR, because the rate decision comes from a higher layer. Is it needed for the RXVECTOR? | **Rejected**The commenter failed to provide an implementable solution. |
| 8760 | 28.2.2 | 219.40 | DCM support shows MU for TXVECTOR and MU for RXVECTOR (4th and 5th column). However, this will depend on the PPDU format. It would be more correct to say:- For HE SU: Y/Y- For HE MU: MU/Y- For HE\_EXT\_SU: Y/Y- For HE\_TRIG: Y/MU |  | **Rejected.**MU indicates that the parameter is present once for an HE SU PPDU and HE ER SU PPDU and present per user for an HE MU PPDU. For an HE TB PPDU, MU in the TXVECTOR column indicates that the parameter is present once and MU in the RXVECTOR column indicates the parameter is present per user. |
| 4860 | 28.2.2 | 219.41 | Is DCM only present in the TXVECTOR and RXVECTOR in case of MU? | I'd say, like STBC, it is present always? Definitely for the TXVECTOR, because the rate decision comes from a higher layer. Is it needed for the RXVECTOR? | **Rejected**The commenter failed to provide an implementable solution. |
| 8761 | 28.2.2 | 219.50 | "HE extend range SU" should be "HE extended range SU" | Correct | **Revised.**Agree in principle.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8761 in 11-17/1001r2 |
| 8762 | 28.2.2 | 219.51 | The term SU RU is not clearly defined | Rename or provide definition | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8762 in 11-17/1001r2 |
| 9138 | 28.2.2 | 219.51 | SU RU in HE MU PPDU is not an accurate term to describe for DCM |  | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 9138 in 11-17/1001r2 |
| 8763 | 28.2.2 | 219.53 | Replace "DCM is not applied to STBC" with "DCM is not applied in combination with STBC" | See comment | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8763 in 11-17/1001r2 |
| 4859 | 28.2.2 | 219.55 | There is no DCM entry in Table 21-1 | Change "See corresponding entry in Table 21-1 (TXVECTOR and RXVECTORparameters)." to "Not present." | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4859 in 11-17/1001r2 |
| 4950 | 28.2.2 | 219.60 | Loose language | Does integer 0 mean MCS0 and integer 5 mean MCS5? OR something else? Be specific | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4950 in 11-17/1001r2 |
| 8764 | 28.2.2 | 220.11 | SIG\_B\_COMPRESSION\_MODE is not an independent parameter. SIG-B compression is only used for full-BW MU-MIMO. Whether the PPDU is full BW MU-MIMO will follow from other fields in TXVECTOR. | Remove "SIG\_B\_COMPRESSION\_MODE" from the Table | **Rejected**.SIG\_B\_COMPRESSION\_MODE is a simple parameter for MAC to indicate full bandwidth MU MIMO, saving PHY’s effort to judge the case with several other parameters. |
| 6111 | 28.2.2 | 220.13 | OFDMA MU PPDU is not clear. | Define OFDMA MU PPDU or replace with a more clear terminology, say, non-full BW MU PPDU, or HE MU PPDU using OFDMA transmission as on page 230 | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 6111 in 11-17/1001r2 |
| 7680 | 28.2.2 | 221.15 | define in spec meaning of "right" 106-tone RU | refer to comment | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 7680 in 11-17/1001r2 |
| 8765 | 28.2.2 | 221.15 | Replace "Right 106-tone RU" with "higher in frequency" | See comment | **Revised.**TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8765 in 11-17/1001r2 |
| 8766 | 28.2.2 | 221.15 | The term "channel bonding" has been replaced with "preamble puncturing" | Replace wording | **Revised**Agree in principle.The addressed issue has been resolved by the resolution to CID 6126 and the modification reflected in D1.4. Therefore no further modification implements. |
| 8767 | 28.2.2 | 221.18 | The values for CH\_BANDWIDTH for HE\_MU format should be included in this table. Values in SIG-A should reference the values in this table, not the other way around. | Provided enumerated list with possible values. | **Revised.**Agree in principle.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8767 in 11-17/1001r2 |
| 9139 | 28.2.2 | 221.18 | The terminology 'preamble supporting channel bonding' is not precise | Replace 'preamble supporting channel bonding' to 'preamble puncturing' | **Revised**Agree in principle.The addressed issue has been resolved by the resolution to CID 6126 and the modification reflected in D1.4. Therefore no further modification implements. |
| 10083 | 28.2.2 | 221.18 | The definition of channel bonding is not existed in the spec. In order to be consistent through the spec, channel bonding should be replaced with preamble puncturing. | As in the comment. | **Revised**Agree in principle.The addressed issue has been resolved by the resolution to CID 6126 and the modification reflected in D1.4. Therefore no further modification implements. |
| 8768 | 28.2.2 | 221.24 | What is the estimated channel width of an HE\_TRIG PPDU in RXVECTOR? Isn't it already known at the AP? What would be the bandwidth if not all triggered STAs respond to the trigger? There could be many more possibilities than the ones listed. | Clarify | **Revised.**Agree part of the comment. The CH\_BANDWIDTH parameter is to set or read from the BW subfield of HE-SIG-A field. But the spec text could be improved for better understanding.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8768 in 11-17/1001r2 |
| 10363 | 28.2.2 | 221.32 | "NOTE—The TXVECTOR parameter CH\_BANDWIDTHdoes not represent the channel width of the transmitted PPDU." Is there a parameter that does ? If so reference it. | Reference to parameter that represents channel width of transmitted PPDU | **Rejected.**This statement is explanation of CH\_BANDWIDTH. It’s not a right place to explain how to indicate the bandwidth of transmitted PPDU. Actually, the bandwidth of a transmitted HE\_TRIG PPDU is indicated by RU\_ALLOCATION.  |
| 4951 | 28.2.2 | 221.33 | Note is unsupported | Add a xref to the stmt that "CH\_BANDWIDTH does not represent" ... e.g .ensure it is clear what does represent the chanel width | **Rejected.**This statement is explanation of CH\_BANDWIDTH. It’s not a right place to explain how to indicate the bandwidth of transmitted PPDU. Actually, the bandwidth of a transmitted HE\_TRIG PPDU is indicated by RU\_ALLOCATION.  |
| 8769 | 28.2.2 | 221.33 | "The TXVECTOR parameter CH\_BANDWIDTH does not represent the channel width of the transmitted PPDU.". It might. | Replace with "The TXVECTOR parameter CH\_BANDWIDTH does not necessarily represent the channel width of the transmitted PPDU." | **Rejected.**The TXVECTOR parameter CH\_BANDWIDTH is NOT designed to represent the channel width of the transmitted PPDU, even in some cases they may have the same value.  |
| 9140 | 28.2.2 | 222.11 | HE NDP PPDU only uses HE SU PPDU format without the Data field, therefore, it is not precise to describe HE NDP PPDU in HE\_SU,HE\_MU,HE\_EXT\_SU or HE\_TRIG format row. | Separate the row into two rows, one is 'FORMAT is HE\_SU', the other is 'FORMAT is HE\_MU,HE\_EXT\_SU or HE\_TRIG', and includes HE\_NDP\_PPDU description only in 'FORMAT is HE\_SU' row. | **Revised.**Agree in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 9140 in 11-17/1001r2 |
| 8531 | 28.2.2 | 222.14 | APEP\_LENGTH is defined in the range 1 to 1048575 while the maximum allowed A-MPDU in HE is 6500531 octets, need to fix it | Change to 6,500,531 | **Revised.**Agree in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8531 in 11-17/1001r2 |
| 9141 | 28.2.2 | 222.22 | HD NDP PPDU only uses HE SU PPDU format with 0 octet in the PSDU\_LENGTH. Therefore, it is not precise to describe HE NDP PPDU in HE\_SU,HE\_MU,HE\_EXT\_SU or HE\_TRIG format row. | First, separate the row into two rows, one is 'FORMAT is HE\_SU', the other is 'FORMAT is HE\_MU,HE\_EXT\_SU or HE\_TRIG'. In 'FORMAT is HE\_SU' row. Include the description of HE NDP PPDU. In 'FORMAT is HE\_MU,HE\_EXT\_SU or HE\_TRIG', change the minimum octet size from 0 to 1 describing the number of octets in the HE PSDU. | **Rejected**The RXVECTOR parameter APEP\_LENGTH only makes sense to receiver side and the original spec text doesn’t cause any confusing.  |
| 8770 | 28.2.2 | 222.42 | NUM\_STS support in RXVECTOR is indicated as MU (column 5) for HE\_MU. Does this mean that each receiver has to indicate the NUM\_STS for all users in the MU PPDU? Why? | Clarify | **Revised.**Agree in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8770 in 11-17/1001r2 |
| 8771 | 28.2.2 | 222.46 | "non MU-MIMO RU". Previously "SU RU" was used. Need a clear term for this type of RU. | Use unique terminology to refer to RU with only one user | **Revised.**Agree in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8771 in 11-17/1001r2 |
| 8772 | 28.2.2 | 222.49 | "NUM\_STS summed over all users per RU is not greater than 8." is a statement of fact. It should be a requirement. | Replace with "NUM\_STS summed over all users per RU shall not be greater than 8." | **Rejected.**It’s a statement of fact and it follows IEEE 802.11-2016’s format. |
| 8773 | 28.2.2 | 222.51 | NUM\_STS support in TXVECTOR is indicated as MU (column 4) for HE\_TRIG. Each Trigger-based frame has only one user. | Change "MU" to "Y" | **Rejected.**As described in the Notes later in Table 21-1 TXVECTOR and RXVECTOR parameters, “MU” in TXVECTOR for HE\_TRIG means the parameter presents once. |
| 4953 | 28.2.2 | 223.51 | Missing detail | I've searched the spec for the impact of this parameter and nowhere can I find it defined. "B20 indicates transmitting STA supports transmitting HE PPDUs with Doppler procedure" and "The Doppler subfield indicates a high doppler mode of transmission." are uselessly vague. Add detail. Write exactly what does the TX PHY do differently when this parameter is true |  |
| 8417 | 28.2.2 | 223.51 | What is "the doppler effect" and how should it be considered? The spec does not define such an effect and there is no text defining a) how this a prameter should be set and b) what the PHY does with this parameter | Remove the DOPPLER parameter from Table 28-1 |  |
| 8755 | 28.2.2 | 223.51 | "Indicates whether the doppler effect should be considered for the PPDU." There is no indication anywhere in the document what this means. This requirement is not actionable. | Clarify or remove parameter. |  |
| 5246 | 28.2.2 | 223.52 | Clarify whether 0 indicates that dopper should or should not considered | as in comment |  |
| 5753 | 28.2.2 | 223.53 | Though obvious, it is better to spell out what does 0 indicates and what does 1 indicates | Specify what does 0 and 1 indicates, respecetively. |  |
| 4954 | 28.2.2 | 224.51 | Cannot parse this description "Each 8 bit per 20MHz PPDU BW for singlaling | The RU assignment ......" | Clarify | RevisedAgreed in principle. The spec text should be improved for better understanding. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4954 in 11-17/1001r2 |
| 8776 | 28.2.2 | 224.20 | RU\_ALLOCATION is not explicitly indicated in the PPDU for HE\_TRIG, so it can not be part of RXVECTOR. | Replace "MU" in column 5 with "N" | RejectedEven RU\_ALLOCATION cannot be generated by directly reading the received HE\_TB PPDU, the PHY still can generate this parameter in RXVECTOR for MAC in the way similar to MCS. |
| 8777 | 28.2.2 | 224.29 | "a single user allocation in an RU". Previously terms "SU RU and "non MU-MIMO RU" were used. | Use unique terminology to refer to RU with only one user | Revised Agree in principle.TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8777 in 11-17/1001r2 |
| 8778 | 28.2.2 | 224.38 | The value of HE\_LTF\_MODE can not be chose independently from the GI\_TYPE | Restrict the number of possible combinations of GI and LTF type. Either have a single parameter to list the combinations or add NOTE. | Revised Agreed in principle. Notes, the commenter mentioned “HE\_LTF\_MODE” and it should be “HE\_LTF\_TYPE”. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8778 in 11-17/1001r2 |
| 4955 | 28.2.2 | 224.49 | Allowed values of HE\_LTF\_MODE are unspcified. True/false, or other? | Define allows values, then use them in rest of section. Also P224L51, does the "It" refer to HE\_LTF\_MODE or "a mask on each SS". Basically, replace the "it" | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4955 in 11-17/1001r2 |
| 5247 | 28.2.2 | 224.52 | What are the values for HE\_LTF\_MODE? | as in comment | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 5247 in 11-17/1001r2 |
| 8779 | 28.2.2 | 224.56 | NUM\_HE\_LTF also needs to be be supported for format "HE\_MU". The value is needed in HE-SIG-A for MU format. | Change "FORMAT is HE\_TRIG" to "FORMAT is HE\_TRIG or HE\_MU" | Accepted |
| 4957 | 28.2.2 | 225.04 | "Reserved" is the wrong name for a field that is not set to 0 on TX according to 27.5.2.3. | Rename the PLCP bit from "HE-SIG-A Reserved", and probably rename this parameter - too e.g. HE\_SIGA\_COPIED\_FIELD or something | Rejected “Reserved” is a correct description of the function of the corresponding field and parameter. The reason to set the value to “1” is to avoid conflict caused by different values from multiple users in the HE\_TRIG PPDU. |
| 4958 | 28.2.2 | 225.15 | "global space time streams" is used in this one place and never defined | Define what this means, or reword using standard/used/defined words | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4958 in 11-17/1001r2 |
| 8780 | 28.2.2 | 225.52 | Why is PREAMBLE\_TYPE only specified for HE? Shouldn't TX/RXVECTOR also be updated for other types? | Clarify | RejectedPREAMBLE\_TYPE are specified for both HT and HE for compliance with ERP operating on 2.4GHz.  |
| 8781 | 28.2.2 | 226.04 | The parameter "PE\_DURATION" should be renamed "MAX\_PE\_DURATION", since it doesn't give the actual value of the PE field. | See Comment. Also updated\ decription. | Rejected.The parameter “PE\_DURATION” is exactly the actual value of the PE field. Refer to *28.3.12 Packet extension* for more details.. |
| 8782 | 28.2.2 | 226.13 | BEAM\_CHANGE is described as boolean value (true/false). In most other binary cases, 0/1 is used. Which is correct? | Use either boolean or 0/1 consistently. | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 8782 in 11-17/1001r2 |
| 5248 | 28.2.2 | 226.14 | In 27.11.3 "The TXVECTOR parameter BEAM\_CHANGE of an HE SU PPDU, HE extended range SU PPDU shall be set to 1 if the number of spatial streams is greater than 2 or the PPDU is the first PPDU in a TXOP." | These two definitions seem in conflict and need to be unified. | RejectedThe two statements are not conflicting with each other. The statement in clause 27.11.3 describes the condition to set the parameter BEACH\_CHANGE to 1. While the statement in Table 28-1 is explaining the meaning of the value of the parameters.  |
| 4959 | 28.2.2 | 226.15 | "mapped differently" is vague | Needs additional detail (e.g. in the same way as the pre-VHT portion of a VHT PPDU) or a xref | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4959 in 11-17/1001r2 |
| 9144 | 28.2.2 | 226.15 | HE-LTF1 is not clearly defined in the specification, so detailed description for the first symbol of HE-LTF is required to be added | Change HE-LTF1 into the first symbol of HE-LTF | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 9144 in 11-17/1001r2 |
| 9145 | 28.2.2 | 226.17 | HE-LTF1 is not clearly defined in the specification, so detailed description for the first symbol of HE-LTF is required to be added | Change HE-LTF1 into the first symbol of HE-LTF | Revised Agreed in principle. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 9145 in 11-17/1001r2 |
| 5389 | 28.2.2 | 226.22 | BSS\_COLOR can be set to the value within the range 0 to 63, but sometimes the usage of value 0 is not the AP's choice. For example, if the intended recipient of a PPDU is not a member of a transmitting STA's BSS, then BSS\_COLOR is set to 0 (Subclause 27.11.4 BSS\_COLOR). | As per comment | **Revised**Agree in principle.The addressed issue has been resolved by the resolution to CID 5752 and the modification reflected in D1.4. Therefore no further modification implements. |
| 4960 | 28.2.2 | 226.37 | Is this still a list on RX? And by saying "MU" under TX, isn't this entry a single STA ID; and the list comes form tnhe "MU" semantics? | Change to "one STA ID that is an intended recipient of the HE MU PPDU ..." | Revised The parameter STA\_ID\_LIST is used to set or report the values of one or multiple STA-ID fields in User Info field in HE-SIG-B. It’s not a per-user parameter therefore it should not be marked as “MU” in TXVECTOR. TGax Editor: please make changes to IEEE P802.11ax D1.4 according to the proposed text changes as resolution to CID 4960 in 11-17/1001r2 |
| 8783 | 28.2.2 | 227.04 | Why does the MAC need to know the Scrambler Initialization value? RXVECTOR already contains CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT for NON\_HT format. For other formats, this value carries no information. | Remove "SCRAMBLER\_INITIAL\_STATE" from the Table | Rejected The scrambler initial state is used in MU-RTS operation. Refer to 11-16-0815-02-00ax-comment-resolution-mu-rts-scrambler-seed.docx for more information. |

***TGax Editor: please modify the first paragraph in page 296 line 30 under clause 28.2.2 TXVECTOR and RXVECTOR parameters as below as resolution to CID 4094:***

28.2.2 TXVECTOR and RXVECTOR parameters

The parameters in Table 28-1 (TXVECTOR and RXVECTOR parameters) are defined as part of the TXVECTOR parameter list in the PHY-TXSTART.request primitive and/or as part of the RXVECTOR parameter list in the PHY-RXSTART.indication primitive and PHY\_RXEND.indication primitive.*[CID #4094]*

***TGax Editor: please modify the Table 28-1 – TXVECTOR and RXVECTOR parameters from page 296 line 42 in P802.11ax D1.4 as proposed below as resolution to CID*** *8747, 8748, 4943, 8749, 8750, 4944, 9721, 8752, 4946, 10199, 8758, 8761, 8762, 9138, 8763, 4859, 4950, 6111, 7680, 8765, 8767, 8768, 9140, 8531, 8770, 8771, 4954, 8777, 8778, 4955, 5247, 4958, 8782, 4959, 9144, 9145, 4960****.***

**Table 28-1 – TXVECTOR and RXVECTOR parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| … | … | … | … | … |
| DELTA\_SNR | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG  | Contains an array of delta SNR values as defined in 9.4.1.64 (HE MU Exclusive Beamforming Report field) based on the channel measured during the training symbols of the received ~~VHT NDP PPDU or~~ HE NDP PPDU. NOTE—In the RXVECTOR this parameter is present only for HE NDP PPDUs for MU sounding. *[CID 8747]* | MU | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters).  |
| … | … | … | … | … |
| SNR | FORMAT is HE\_SU, HE\_MU, or HE\_EXT\_SU or HE\_TRIG | For an HE SU PPDU and HE ER SU PPDU, contains an array of average values of received SNR measurements for each spatial stream. For an HE MU PPDU, contains an array of average values of received SNR measurements for each and every spatial stream of the receiver on allocated RU.*[CID #8749/8748]*For an HE TB PPDU, contains an array of average values of received SNR measurements for each and every spatial stream per user on allocated RU. *[CID #8750/4943]*SNR indications of 8 bits are supported. Average value of 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 9.4.1.63 (HE Compressed Beamforming Report field). | N | ~~Y~~MU |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters). |
| … | … | … | … | … |
| NO\_SIG\_EXTIN | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG | ~~Not present~~Indicates whether signal extension needs to be applied at the end of transmission.Set to 1 to indicate no signal extension is present.Set to 0 to indicate signal extension may be present depending on otherTXVECTOR parameters (see 28.2.2). *[CID #4944/9721]* | ~~N~~Y | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters). |
| … | … | … | … | … |
| LDPC\_EXTRA\_SYMBOL | FORMAT is HE\_TRIG and FEC\_CODING is LDPC\_ CODING | Indicates the presence of the extra OFDM symbol segment for LDPC in an HE TB PPDU. *[CID #8752]*Set to 1 if an extra OFDM symbol for LDPC is present. Set to 0 if an extra OFDM symbol for LDPC is not present. See 27.5.2.3 (STA behavior for UL MU operation(#8151)) for details | Y | N |
| Otherwise | Not present | N | N |
| STBC | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG | Indicates if STBC is used. In an HE MU PPDU where each RU includes no more than 1 user: Set to 1 to indicate all RUs are STBC encoded in the ~~pay-load~~Data field Set to 0 to indicate that no RU is STBC encoded in the ~~payload~~Data field In an HE SU PPDU, HE ER SU PPDU or HE TB PPDU: Set to 1 to indicate that STBC is used in the ~~payload~~Data field Set to 0 to indicate that STBC is not used in the ~~payload~~Data field STBC is not applied in MU-MIMO RUs; in an HE MU PPDU if any RU is assigned to more than 1 user then STBC is 0 to indicate that no RU is STBC encoded in the ~~payload~~Data field. STBC is applied only for a single spatial stream (*NSS* = 1). DCM is not used in conjunction with STBC.*[cid #4946]* | Y | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters). |
| … | … | … | … | … |
| RSSI\_LEGACY | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG | The allowed values for the RSSI\_LEGACY parameter are in the range 0 to 255 inclusive. This parameter is a measure by the PHY of the power observed at the antennas used to receive the current PPDU measured during the reception of non-HE portion of the HE PPDU preamble(#3609). RSSI\_LEGACY is intended to be used in a relative manner, and it is a monotonically increasing function of the received power. | N | Y |
| Otherwise | Not present *[CID #10199]* | N | N |
| MCS | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG | Indicates the modulation and coding scheme(s) used in the transmission of the PPDU. *[CID #8758]*Integer: range 0 to 11 | MU | MU |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters). |
| DCM | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG | Set to 1 to indicate that dual carrier modulation is used for the HE-Data field.Set to 0 to indicate that dual carrier modulation is not used for the HE-Data field. NOTE—DCM is only applied to MCS0, MCS1, MCS3 and MCS4. DCM is only applied to 1 and 2 spatial streams. DCM is only applied to HE SU PPDU, HE ~~extend range~~ER SU PPDU*[CID #8761]*, and ~~SU~~RUs assigned to no more than 1 user individually in HE MU PPDU.*[CID #8762/9138]* DCM is not applied to MU-MIMO. DCM is not applied ~~to STBC~~in combination with STBC.*[CID #8763]* | MU | MU |
| Otherwise | ~~See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters)~~Not present. *[CID #4859]* | N | N |
| MCS\_SIG\_B | FORMAT is HE\_MU | Indicates the modulation and coding scheme used for HE-SIG-B field.Integer in the range 0 to 5.Set to 0 indicates MCS0;Set to 1 indicates MCS1;Set to 2 indicates MCS2;Set to 3 indicates MCS3;Set to 4 indicates MCS4;Set to 5 indicates MCS5; *[CID #4950]* | Y | Y |
| Otherwise | Not present | N | N |
| … | … | … | … | … |
| SIG\_ B\_ COMPRE SSION\_ M ODE | FORMAT is HE\_MU | Used to differentiate HE MU PPDU using full bandwidth MU-MIMO transmission from an HE ~~OFDMA~~ MU PPDU using OFDMA transmission. In case of HE MU PPDU using full bandwidth MU-MIMO transmission set to 1; otherwise, set to 0. *[CID #6111*] | Y | N |
| Otherwise | Not present. | N | N |
| … | … | … | … | … |
| CH\_BANDWIDTH | FORMAT is HE\_SU | Indicates the channel width of the transmitted PPDU. Enumerated type: CBW20 for 20 MHz CBW40 for 40 MHz CBW80 for 80 MHz CBW160 for 160 MHz CBW80+80 for 80+80 MHz | Y | Y |
| FORMAT is HE\_EXT\_SU | Indicates the channel width of the transmitted PPDU. Enumerated type: 242-tone RU ~~Right~~Higher 106-tone RU within the primary 20 MHz *[CID #7680/8765]* | Y | Y |
| FORMAT is HE\_MU | Indicates the channel width occupied by the preamble supporting preamble puncturing. See the Bandwidth field in Table 28-17 (HE-SIG-A field of an HE MU PPDU)Enumerated type:CBW20 for full 20 MHz CBW40 for full 40 MHz CBW80 for full 80 MHz CBW160 for full 160 MHz and 80+80 MHz HE-CBW-PUNC80-PRI for preamble puncturing in 80 MHz, where in the preamble only the secondary 20 MHz is punctured HE-CBW-PUNC80-SEC for preamble puncturing in 80 MHz, where in the preamble only one of the two 20 MHz sub-channels in secondary 40 MHz is punctured HE-CBW-PUNC160-PRI20 for preamble puncturing in 160 MHz or 80+80 MHz, where in the primary 80 MHz of the preamble only the secondary 20 MHz is puncturedHE-CBW-PUNC160-SEC40 for preamble puncturing in 160 MHz or 80+80 MHz, where in the primary 80 MHz of the preamble the primary 40 MHz is present.*[CID8767]* | Y | Y |
| FORMAT is HE\_TRIG | ~~In TXVECTOR,~~ I~~i~~ndicates the Bandwidth field of the HE-SIG-A in the transmitted or received PPDU. ~~In RXVECTOR, indicates the estimated channel width of the received PPDU.~~*[CID 8768]* Enumerated type: CBW20 for 20 MHz CBW40 for 40 MHz CBW80 for 80 MHz CBW160 for 160 MHz CBW80+80 for 80+80 MHz NOTE—The TXVECTOR parameter CH\_BANDWIDTH does not represent the channel width of the transmitted PPDU. | Y | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters). |  |  |
| ... | ... | ... | ... | ... |
| APEP\_LENGTH | FORMAT is HE\_SU | If equals to 0, indicates an HE NDP PPDU.If greater than 0, indicates the number of octets in the range 1 to 6,500,531 in the A-MPDU pre-EOF padding (see 10.13.2) carried in the PSDU. *[CID 9140/8531 ]* | Y | O |
| FORMAT is ~~HE\_SU,~~ HE\_MU,HE\_EXT\_SU or HE\_TRIG | ~~If equal to 0, indicates an HE NDP PPDU.~~~~If~~ Set to a value greater than 0, indicat~~es~~ing the number of octets in the range 1 to ~~1 048 575~~ 6,500,531 in the A-MPDU pre-EOF padding (see 10.13.2 (A-MPDU length limit rules)) carried in the PSDU.*[CID 9140/8531]* | MU | O |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters).  |
| ... | ... | .... |
| NUM\_STS | FORMAT is HE\_SU | Indicates the number of space-time streams.Integer in the range 1-8. | Y | Y |
| FORMAT is HE\_EXT\_SU | Indicates the number of space-time streams.Integer in the range 1-2. | Y | Y |
| FORMAT is HE\_MU | Indicates the number of space-time streams. Integer in the range:1-4 per user per MU-MIMO RU in the TXVECTOR1-4 per MU-MIMO RU in the RXVECTOR1-8 per  ~~non MU-MIMO~~ RU assigned to no more than 1 user in the TXVECTOR and RXVECTORNUM\_STS summed over all users per RU is not greater than 8. *[CID 8771]* | MU | ~~MU~~Y *[CID 8770]* |
| FORMAT is HE\_TRIG | Indicates the number of space-time streams. Integer in the range:1-4 for a MU-MIMO RU in the TXVECTOR1-4 per user per MU-MIMO RU in the RXVECTOR1-8 for a ~~non MU-MIMO~~ RU assigned to no more than 1 user in the TXVECTOR and RXVECTORNUM\_STS summed over all users per RU is not greater than 8. *[CID 8771]* | MU | MU |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters). |
| ... | ... | ... | ... | ... |
| RU\_ALLOCATION | FORMAT is HE\_MU | ~~Every 8 bits per 20 MHz PPDU BW for signalling the RU assignment in the frequency domain and the number of MU-MIMO allocations.~~ For TXVECTOR, indicate the RU\_Allocation subfield of common field in the HE-SIG-B of the transmitted PPDU.8 bits for 20 MHz and 40 MHz PPDU;16 bits for 80 MHz PPDU;32 bits for 160 MHz and 80+80 MHz PPDU.See 28.3.10.8.~~4~~5 (HE-SIG-B common content) for details.For RXVECTOR, 8 bits are used to indicate the RU allocated in the whole bandwidth with the same encoding scheme as in Table 9-25g (The encoding of B19-B13 of the RU Allocation subfield) .See 9.3.1.23 (Trigger frame format) for details.*[CID 4954]* | Y | Y |
| FORMAT is HE\_TRIG | ~~8 bit for RU allocation in the whole bandwidth~~.8 bits are used to indicate the RU allocated in the whole bandwidth per user with the same encoding scheme as in Table 9-25g (The encoding of B19-B13 of the RU Allocation subfield). *[CID 4954]*See 9.3.1.23 (Trigger frame format) for details. | Y | ~~Y~~MU *[CID 4954]* |
| Otherwise | Not present. | N | N |
| CENTER\_26\_TONE\_RU*[CID #4954]* | FORMAT is HE\_MU  | Indicate the presence of the center 26-tone RU with regard to bandwidth.When the CH\_BANDWIDTH parameter is set to CBW80, HE-CBW-PUNC80-PRI or HE-CBW-PUNC80-SEC:Set to 1 to indicate that a user is allocated to the center 26-tone RU (see Figure 28-7 (RU locations in an 80 MHz HE PPDU)); Set to 0 to indicate that no user is allocated to the center 26-tone RU.When the CH\_BANDWIDTH parameter is set to CBW160, HE-CBW-PUNC160-PRI20 or HE-CBW-PUNC160-SEC40:Set to 0 to indicate that no user is allocated to either the center 26-tone RU of the lower frequency 80 MHz or that of the higher frequency 80 MHz;Set to 1 to indicate that a user is allocated to the center 26-tone RU of the lower frequency 80 MHz;Set to 2 to indicate that a user is allocated to the center 26-tone RU of the higher frequency 80 MHz;Set to 3 to indicate that a user is allocated to each of the center 26-tone RU of the lower frequency 80 MHz and that of the higher frequency 80 MHz individually;See 28.3.10.8.5 (HE-SIG-B common content) for details.Note, this parameter only presents when CH\_BANDWIDTH is set to CBW80, CBW160, HE-CBW-PUNC80-PRI, HE-CBW-PUNC80-SEC, HE-CBW-PUNC160-PRI20 or HE-CBW-PUNC160-SEC40. | Y | N |
| Otherwise | Not present. | N | N |
| ... |  |  |  |  |
| BEAMFORMED | FORMAT is HE\_SU or HE\_EXT\_SU | Set to 1 if a beamforming steering matrix is applied to the waveform in an SU transmission. Set to 0 otherwise.  | Y | Y |
| FORMAT is HE\_MU or HE\_TRIG | For ~~a single user allocation in an~~  RU assigned to no more than 1 user, set to 1 if a beamforming steering matrix is applied, and set to 0 otherwise. For each user in a ~~multi-user allocation in an~~  RU assigned to more than 2 users, always set to 0. *[CID 8777]* | MU | O |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters).  |
| ... |  |  |  |  |
| HE\_LTF\_TYPE | FORMAT is HE\_SU, HE\_MU, HE\_EXT\_SU or HE\_TRIG  | Indicates the type of HE-LTF. Enumerated type: 1x HE-LTF for 3.2 μs with 0.8 us or 1.6 us GI; 2x HE-LTF for 6.4 μs with 0.8 us or 1.6 us GI;4x HE-LTF for 12.8 μs with 0.8 us or 3.2 us GI.*[CID 8778]*See 28.3.10.10 (HE-LTF) for details.  | Y | Y |
| Otherwise | Not present | N | N |
| HE\_LTF\_MODE | FORMAT is HE\_TRIG | ~~Indicates whether the UL MU MIMO transmission uses HE single stream pilots HE LTF mode or HE masked HE LTF sequence mode. It is only present for full bandwidth MU-MIMO.~~ Set to 0 to indicate the transmitted PPDU uses HE single stream pilots HE-LTF mode.Set to 1 to indicate the transmitted PPDU uses HE masked HE LTF sequence mode. It is only present for full bandwidth MU-MIMO.See 28.3.10.10 (HE-LTF) for details.*[CID 4955/5247]* | Y | N |
| Otherwise | Not present | N | N |
| ... | ... |  |  |  |
| STARTING\_STS\_NUM | FORMAT is HE\_TRIG | Indicates the starting STS ~~number~~index in the ~~global~~ space-time streams ~~for~~of the UL MU-MIMO in the allocated RU. *[CID4958]* | Y | N |
| Otherwise | Not present | N | N |
| ... | ... | ... | ... | ... |
| BEAM\_CHANGE | FORMAT is HE\_SU or HE\_EXT\_SU  | ~~Boolean value:~~ ~~true indicates that the pre-HE-STF portion of the PPDU is spatially mapped differently from HE-LTF1.~~ ~~false indicates that the pre-HE-STF portion of the PPDU is spatially mapped the same way as HE-LTF1 on each tone.~~ Set to 0 to indicate that the pre-HE-STF portion of the PPDU is spatially mapped the same way as the first symbol of HE-LTF on each tone.Set to 1 to indicate that the pre-HE-STF portion of the PPDU is spatially mapped not the same way as the first symbol of HE-LTF. *[CID 8782/4959/9144/9145]* | Y | Y |
| Otherwise | Not present | N | N |
|  |  |  |  |  |
| STA\_ID\_LIST | FORMAT is HE\_MU | Indicates the list of STA IDs for an HE MU PPDU (see 27.11 (Setting TXVECTOR parameters for an HE PPDU)).  | ~~MU~~Y*[CID 4960]* | Y |
| Otherwise | Not present | N | N |
|  |  |  |  |  |
|  |  |  |  |  |

**References:**

1. **IEEE P802.11axTM/D1.0, Nov 2016.**
2. **IEEE P802.11axTM/D1.3, Jun 2017**
3. **IEEE P802.11axTM/D1.4, Aug 2017**