IEEE P802.11  
Wireless LANs

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| Comment Resolutions for xVECTORs | | | | |
| Date: 2019-03-10 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Bo Sun | ZTE | ZTE R&D center, #9 Wuxingduan, Xifeng Rd., Chang’an district, Xi’an, China | +86-29-68700944 | Sun.bo1@zte.com.cn |
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Abstract

This submission provisions with resolutions to the following 20 CIDs for sub-clause 27.2.2 (TXVECTOR and RXVECTOR parameters), 27.2.3 (TRIGVECTOR parameters) and 27.2.4 (PHYCONFIG\_VECTOR parameters) of IEEE P802.11ax D4.0, including suggested spec text modification to IEEE P802.11ax D4.0 to TGax editor:

* CIDs: 20477, 20557, 20707, ~~20711~~, 20726, 20731, 20775, 20787, 20894, 20899, 21020, 21025, ~~21026~~, 21363, 21382, ~~21383~~, 21384, ~~21406~~, ~~21409~~, 21407

Revisions:

* R0, comment resolutions initial draft.
* R1, resolution updated
* R2, CID 21026 not resolved; CID 21383 and 21406 transferred to Youhan; CID 20711 and 21409 need more check
* R3, resolution to CID 20711 updated.

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** | **Pg/Ln** | **Clause** | **Comment** | **Proposed Changed** | **Resolution** |
| 21409 | 454.31 | 27.2.2 | In FORMAT HE\_MU, "CBW160" is assigned to CH\_BANDWIDTH to represent full 160 MHz and 80+80 MHz. But, in HE\_SU and HE\_TB, 160 MHz and 80+80 MHz are separately represented. How do we tell 160 MHz and 80+80 MHz in HE\_MU? | Please provide clarification or a note (if covered elsewhere) in HE\_MU. | **Revised**  **Response:**  The commenter made a point that the interpretation of “CBW160” is not in consistent for HE SU PPDU and HE MU PPDU. And in Table 27-3, the CBW160 is interpreted as only indicating the HE 160 MHz PPDU. To keep all the relevant text in consistent, it’s better to keep original CBW160 and add CBW80+80. Though in this way, the enumeration value of CH\_BANDWIDTH is not in consistent with the Bandwidth field in HE-SIG-A, it could be understood as a mapping rule from the enumeration values to 2 bits (SU) or 3 bits (MU) signaling.  And also note that there’re several places in the spec has referred to CBW160 to indicate both 160 MHz and 80+80 MHz bandwidth. These place should also be updated with reference to CBW160 and CBW80+80 individually.  **Instruction to TGax tech editor:**  1). Please implement to IEEE P802.11ax D4.0 the proposed changes corresponding to resolution to CID 21409 as in 11-18/0407r2 |
| 21020 | 454.55 | 27.2.2 | Re CID 16115: the resolution does not address the comment. The comment was about HE TB PPDUs, and specifically those where the PPDU is OFDMA, i.e. does not span the full channel bandwidth | In the NOTE for CH\_BANDWIDTH in Table 27-1 append ", which is in the TXVECTOR parameter RU\_ALLOCATION" | **Rejected.**  **Reason:**  The current note for parameter of “CH\_BANDWIDTH” for HE\_TB PPDU as in Table 27-1 has addressed the comment. |
| 21407 | 458.00 | 27.2.2 | Which 8 bits represent the lowest 20 MHz if CBW is 40, 80, 160, or 80+80 MHz?. | Please clarify and suggest adding the RU Allocation representations to Annex Z to complete the HE-SIG-B content examples. | **Rejected.**  **Reason:**  The TXVECTOR parameters define an interface for PHY/MAC communication. The detailed data structure design is left for implementation design. |
| 21363 | 458.28 | 27.2.2 | For the TXVECTOR, indicates the RU Allocation subfield of Common field in the HE-SIG-B of the transmitted PPDU ... | If the bits indicate the common block size (without DC RU allocation), 32-bits is not correct for 160 and 80+80 MHz. Also, remove referrence to "trigger frame format" for this condition which is HE\_MU and SIG\_B\_COMPRESSION\_MODE 0 | **Revised.**  **Response:**  Agree on the comment that the bit numbers of 40/80/160/80+80 MHz in comment-SIG-B is only for one 20 MHz. It should be doubled for more than 20 MHz cases. The reference to “trigger frame format” is to explain for the RXVECTOR, the RU\_ALLOCATION parameter is using the same coding for both HE\_MU PPDU and HE\_TB PPDU. But it’s better to make a modification to explain the purpose.  **Instruction to TGax tech editor:**  Please implement the same change as to comment CID 21382. |
| 21382 | 458.34 | 27.2.2 | "32 bits for a 160 MHz or 80+80 MHz PPDU." Should be 64 bits. This was agreed earlier in 11-18/1759r2, but Incorrectly implemented. | Correct | **Accepted.**  **Discussion:**  As pointed out by the commenter, this issue has been addressed in 11-18/1759r2 but incorrectly implemented in D4.0. |
| 20477 | 460.42 | 27.2.2 | There are references to "starting spatial stream"s, a Starting Spatial Stream subfield and a STARTING\_STS\_NUM parameter, but there's no description of how spatial streams are numbered. And the concept of a "global space-time stream" is undefined. And there is confusion between SSes and STSes | In Table 27-1 in the STARTING\_STS\_NUM row, change "Indicates the starting STS number in the global space-time streams for the UL MU MIMO." to "Set to the starting spatial stream number minus 1 (spatial streams are numbered starting from 1).". Globally replace "STARTING\_STS\_NUM" with "STARTING\_SS\_NUM" | **Revised.**  **Response:**  Agree on the comment. The “global space-time” is a confusing conception. It could be defined as “spatial streams are globally numbered starting from 1”. And throughout the whole spec, there’s only one place referring “STARTING\_SS\_NUM” incorrectly.  **Instruction to TGax tech editor:**  1). Replace “Indicates the starting STS number in the global space-time streams for the UL MU MIMO.” with “ Set to the starting spatial stream number minus 1 (spatial streams are globally numbered starting from 1).” at pg460/ln42 in IEEE P802.11ax D4.0.  2). Change “STARTING\_SS\_NUM” to “STARTING\_STS\_NUM” at Pg577/Ln58 in IEEE P802.11ax D4.0 |
| 20787 | 447.35 | 27.2.2 | Re CID 16349: CID 9490 in 17/0465, given as rejection reason in the resolution, is not about the comment. 17/0465 appears to be about "Various PHY participants indicated desire to have the PE duration computation to be described within the PHY clause (clause 28), which means that the TXVECTOR should not pass the actual PE duration (except for the case of UMRS)." but the comment is about passing the PE for both Trigger frames and TRS (nee UMRS) | Make both cases or neither take a TXVECTOR parameter for the PE | **Rejected**  **Reason**  The spec has defined the way to calculate the PE duration for TRIGGER\_FRAME mode as in sub-clause 27.3.12 (Packet extension). And the spec also defines the parameter DEFAULT\_PE\_DURATON only for TRS mode to calculate the PE duration. It’s not necessary to define a TXVECTOR parameter for TRIGGER\_FRAME mode to calculate the PE duration in another way. |
| 20775 | 462.13 | 27.2.2 | Re CID 16261: "Since PE\_DURATION parameter is not used in the spec, this entry is deleted." -- it still appears in the spec | Delete the PE\_DURATION row in Table 27-1 | **Accepted**  **Discussion:**  The “PE\_DURATION” parameter is not actually used in any case for TXVECTOR and there’s no definition of how to use it in RXVECTOR. Therefore it could be removed. |
| 20711 | 462.42 | 27.2.2 | "Set to 0 if the PPDU is not addressed to an AP except as indi- cated in 26.11.2 (UPLINK\_FLAG)." is missing some cases (e.g. addressed to AP but meets the exception in 26.11.2) | Change to "Set to 0 otherwise." | **Revised**  **Discussion:**  Agree on the comment in principle. If we check the exception described in sub-clause 26.11.2 (UPLINK\_FLAG), we can find the exact exception only applies for HE ER SU PPDU under some conditions. So it’d more clear to describe the UPLINK\_FLAG value for HE ER SU specifically. The TXVECTOR and RXVECTOR parameters’ values in Table 27-1 are described from PHY point of view. Therefore in any condition, the parameter UPLINK\_FLAG set to 1 means the PPDU is addressed to an AP, to PHY’s understanding.  **Instructions to TGax Editor**  Please implement to IEEE P802.11ax D4.0 the proposed changes corresponding to resolution to CID 20711 as in 11-18/0407r3 |
| 20707 | 463.10 | 27.2.2 | "SCRAMBLER\_INITIAL\_VALUE" would be clearer as "SCRAMBLER\_INITIALIZATION\_FIELD", since what the scrambler initial value is \*not\* what is being communicated; what is being communicated is the (scrambled) value of the Scrambler Initialization field | Change "SCRAMBLER\_INITIAL\_VALUE" to "SCRAMBLER\_INITIALIZATION\_FIELD" throughout | **Rejected**  **Reason:**  The group had discussion as in 11-18/0754r0 and agreed to name the parameter as “SCRAMBLER\_INITIAL\_VALUE”. |
| 20726 |  |  | Re CID 16050: SCRAMBLER\_INITIALIZATION\_VALUE would be much clearer because what's being passed is NOT the scrambler initial value but the value of the Scrambler Initialization field (when scrambled) | Change "SCRAMBLER\_INITIAL\_VALUE" to "SCRAMBLER\_INITIALIZATION\_VALUE" throughout (including vertical text in Table 27-1) | **Rejected**  **Reason:**  The group had discussion as in 11-18/0754r0 and agreed to name the parameter as “SCRAMBLER\_INITIAL\_VALUE”. |
| 20894 | 463.10 | 27.2.2 | Re CID 16051: resolution doesn't seem to have addressed the point that an MU-RTS might be sent in an HE SU PPDU or HE ER SU PPDU | In the SCRAMBLER\_INITIAL\_VALUE rows in Table 27-1, delete the "Otherwise" row, change "FORMAT is NON\_HT" to "Otherwise" and move it to be the last row | **Rejected**  **Reason**  Though I agree that an MU-RTS might be sent in an HE SU PPDU or HE ER SU PPDU, it doesn’t mean the parameter is used in TXVECTOR for MAC to set the scrambler initialization field in this case. For MU-RTS, it’s enough to define the parameter used in RXVECTOR. |
| 20899 | 464.52 | 27.2.2 | "For an HE TB PPDU, [...] MU in the RXVECTOR column indicates the parameter is not present" is confusing, since prima facie the receiver needs to know | After the cited text append " (the receiver knows the values since they were specified in the triggering PPDU)" | **Rejected**  **Reason**  The cited text is clearly used to define the term “MU” in Table 27-1 without any confusion. While in a bigger picture, how a receiver knows these parameter is defined in sub-clause 27.2.1 and 27.2.3. |
| 21025 | 465.00 | 27.2.3 | Reserved values don't make sense in enumerations | Delete "Values 5-7 are reserved. " and "Values 3 and 7 are reserved." in Table 27-2 | **Accepted** |
| 21026 | 465.01 | 27.2.3 | Re CID 16306: there are various issues with the TRIGVECTOR material | I will supply a commented version of this material to whoever resolves this comment |  |
| 21384 | 465.04 | 27.2.3 | Unclear sentence "The TRIGVECTOR is carried in a PHY-TRIGGER.request primitive for PHY of AP to receive HE TB PPDU over each assigned RU." | Change to e.g. "The TRIGVECTOR is carried in a PHY-TRIGGER.request primitive to indicate to the PHY of the AP the parameters needed to receive the HE TB PPDU over each assigned RU." | **Accepted** |
| 20731 | 465.37 | 27.2.3 | Re CID 16065: the obvious benefit is that it separates semantics from syntax (meaning from encoding). The TXVECTOR is an abstract interface and so there is no need for it to follow over-air fielding | In Table 27-2 change "NUMBER\_OF\_HELTF\_SYMBOLS\_AND\_MIDAMBLE\_PERIODICITY" to two parameters, NUMBER\_OF\_HELTF\_SYMBOLS and MIDAMBLE\_PERIODICITY. The latter is only present if DOPPLER is set to 1 and has possible values 10 and 20. The former can take values 1, 2, 4, 6 or 8 if DOPPLER is set to 0 and 1, 2, 4 if DOPPLER is set to 1 | **Revised**  **Response**  Though there’s no obvious difference between these two ways to define the number of HE LTF and mid-amble duration for implementation, I agree it’s better to keep the syntax of parameters consistent between TX/RXVECTOR and TRIGVECTOR.  **Instruction to TGax tech editor:**  1). Please implement to IEEE P802.11ax D4.0 the proposed changes corresponding to resolution to CID 20731 as in 11-18/0407r2. |
| 20557 | 467.01 | 27.2.4 | "The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an HE PHY contains a CEN- TER\_FREQUENCY\_SEGMENT\_0 parameter, which identifies the center frequency of the channel (or of segment 0 if the CHANNEL\_WIDTH parameter indicates 80+80 MHz) and takes a value between 1 and 200. " does not account for 6 GHz channels | Add a PHYCONFIG\_VECTOR parameter to specify the band, and allow a different channel number range in the 6G band | **Revised**  **Response**  Agree on the comment. The value range of CENTER\_FREQUENCY\_SEGMENT\_0 and CENTER\_FREQUENCY\_SEGMENT\_1 is not enough to cover the 6 GHz band. But it’s not necessary to define a new parameter for that. An efficient way is to extend the range of the value of parameter “CENTER\_FREQUENCY\_SEGMENT\_0” and “CENTER\_FREQUENCY\_SEGEMNT\_1”. According to current regulation plan as defined in ANNEX E, the greatest value used for Channel Center Frequency Index is 233. Therefore it’s reasonable to extend the value range of “CENTER\_FREQUENCY\_SEGMENT\_0” and “CENTER\_FREQUENCY\_SEGEMNT\_1” to 255.  **Instruction to TGax tech editor:**  Replace “200” with “255” at pg467/ln05 in IEEE P802.11ax D4.0. |
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*---------------------------Proposed Spec Text Modifications----------------------------------*

**26.11.7 INACTIVE\_SUBCHANNELS and RU\_ALLOCATION**

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***TGax Editor: please implement the following modification at page 410 line 48 in IEEE P802.11ax D4.0 as part of resolution to CID 21409.***

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- The CH\_BANDWIDTH parameter value shall be set to CBW160 or CBW80+80 if there is at least one bit set to 0 in the INACTIVE\_SUBCHANNELS bitmap that corresponds to any 20 MHz subchannel of the secondary 80 MHz

***TGax Editor: please modify the Table 27-1 – TXVECTOR and RXVECTOR parameters from page 454 line 32 in IEEE P802.11ax D4.0 as proposed below as resolution to CID 21409/20711.***

**27.2.2 TXVECTOR and RXVECTOR parameters**

**……**

Table 21-1—TXVECTOR and RXVECTOR parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| **…** | **…** | **…** | **…** | **…** |
| CH\_BANDWIDTH | … | … | … | … |
| … | … | … | … |
| FORMAT is HE\_MU | Indicates the channel width of the PPDU. See the Bandwidth field in Table 27-20 (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~~  CBW80+80 for full 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 punctured HE-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.  *[CID # 21409]* | Y | Y |
| … | … | … | … |
| … | … | | |
| … | … | … | … | … |
| CENTER\_26\_TONE\_RU | FORMAT is HE\_MU and CH\_BANDWIDTH is CBW80, CBW160, CBW80+80, HE CBW-PUNC80-PRI, HE CBW-PUNC80-SEC, HE CBW-PUNC160-PRI20 or HE-CBW-PUNC160-SEC40.  *[CID # 21409]* | Indicate the presence of the center 26-tone RU with regard to bandwidth.  If 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 27-7 (RU locations in an 80 MHz HE PPDU));  Set to 0 to indicate that no user is allocated to the center 26- tone RU.  If the CH\_BANDWIDTH parameter is set to CBW160, CBW80+80, HE-CBW-PUNC160-PRI20 or HE-CBW-PUNC160-SEC40: *[CID # 21409]*  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 27.3.10.8.4 (HE-SIG-B common content). | Y | N |
| Otherwise | Not present | N | N |
| … | … | … | … | … |
| UPLINK\_FLAG | FORMAT is HE\_SU~~,~~ or HE\_MU ~~or HE\_ER\_SU~~  *[CID # 20711]* | Set to 1 if the PPDU is addressed to an AP~~, except as indicated in 26.11.2 (UPLINK\_FLAG)~~.  Set to 0 ~~if the PPDU is not addressed to an AP except as indicated in 26.11.2 (UPLINK\_FLAG)~~otherwise.  *[CID # 20711]* | Y | Y |
| FORMAT is HE\_ER\_SU  *[CID # 20711]* | Set to 1 if the PPDU is addressed to an AP. Set to 0 if the PPDU is not addressed to an AP, or if the PPDU is addressed to an AP but meets the exception as indicated in 26.11.2 (UPLINK\_FLAG).  *[CID # 20711]* | Y | Y |
| Otherwise | Not present | N | N |
| … | … | … | … | … |

--- ***End of proposed changes as part of resolution to CID 21409***-----

***TGax Editor: please modify the Table 27-2 – TRIGVECTOR parameters from page 465 line 15 in IEEE P802.11ax D4.0 as proposed below as resolution to CID 20731/21409.***

**27.2.3 TRIGVECTOR parameters**

The TRIGVECTOR is carried in a PHY-TRIGGER.request primitive for PHY of AP to receive HE TB PPDU over each assigned RU. The parameters in Table 28-2 (TRIGVECTOR parameters) are defined as part of the TRIGVECTOR parameter list in the PHY-TRIGGER.request primitive

**Table 28-2 – TRIGVECTOR parameters**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| CH\_BANDWIDTH | Indicates the bandwidth in the HE-SIG-A of the expected HE TB 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~~  CBW80+80 for 80+80 MHz  *[CID #21409]* |
| …… | …… |
| ~~NUMBER\_OF\_HELTF\_SY MBOLS\_AND\_MIDAMBL E\_PERIODICITY~~  NUMBER\_OF\_HE\_LTF | ~~If the parameter DOPPLER is 0:~~ Indicates the number of HE-LTF symbols present in the expected HE TB PPDU.  If the parameter DOPPLER is 0: Set to 0 for 1 HE-LTF symbol Set to 1 for 2 HE-LTF symbols Set to 2 for 4 HE-LTF symbols Set to 3 for 6 HE-LTF symbols Set to 4 for 8 HE-LTF symbols ~~Values 5–7 are reserved.~~  If the parameter DOPPLER is 1: ~~Indicates the number of HE-LTF symbols present in the expected HE TB PPDU.~~ Set to 0 for 1 HE-LTF symbol ~~and 10 symbol midamble periodicity~~ Set to 1 for 2 HE-LTF symbols ~~and 10 symbol midamble periodicity~~ Set to 2 for 4 HE-LTF symbols ~~and 10 symbol midamble periodicity~~ ~~Set to 4 for 1 HE-LTF symbol and 20 symbol midamble periodicity Set to 5 for 2 HE-LTF symbols and 20 symbol midamble periodicity Set to 6 for 4 HE-LTF symbols and 20 symbol midamble periodicity Values 3 and 7 are reserved.~~  *[CID #20731]* |
| MIDAMBLE\_PERIODICITY | Present only if the parameter DOPPLER is 1. Indicates the midamble periodicity.  Integer value set to 10 or 20 to indicate 10 symbols or 20 symbols midamble periodicity individually.  *[CID #20731]* |
|  |  |
| … | … |

--- ***End of proposed changes as part of resolution to CID 20731***-----

**References:**

1. **IEEE P802.11axTM/D4.0, Feb 2019.**