IEEE P802.11  
Wireless LANs

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| Resolution for CIDs related to MU Operation | | | | |
| Date: May 2, 2019 | | | | |
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Abstract

This submission proposes resolutions for comments received for TGax LB238 (28):

20748, 21188, 20220, 21612, 21189, 21113, 20044, 20045, 20323, 20698, 20699, 20046, 20047, 20048, 20539, 20592, 20049, 21547, 20855, 20531, 21110, 20050, 20051, 21194, 21195, 20324, 20535, 20416

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Several changes were made on-the-fly when the document was discussed on 5/10/19 (MAC ad-hoc)
  + 5 CIDs were deferred
* Rev 2: Resolution for the following CIDs is updated based on offline discussions: 20748, 20048, 20539
* Rev 3: Online edits when the doc was presented on 5/15/19 PM2
  + CIDs 20748, 20048, 20539 are no longer deferred
  + CIDs 21110 and 20699 are deferred

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** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 20748 | Mark RISON |  |  | Re CID 16128: the resolution did not address the issues in 8.3.5.2.2 and 27.3.2.5 identified | Add caveats of the form "except when sent to an AP" to the referenced locations. Also add text in 27.5.1.2 to describe the setting of the STA-ID field from a non-AP STA | **Revised**  The setting for STA\_ID is missing in DL case which was the root cause of the ambiguity that led to the comment. Added text to clarify the DL and UL case (based on TXVECTOR parameter UL\_FLAG). Clause 8.3.5.2.2 and 26.11.1 is updated to call out the two cases.  Updated row corresponding to AID element in TDLS setup tables to indicate that the element is optionally present when both peers are HE STAs  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20748** |

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| --- | --- | --- | --- | --- | --- | --- |
| ***CID*** | ***Commenter*** | ***Pg/Ln*** | ***Section*** | ***Comment*** | ***Proposed Change*** |  |
| *16128* | *Mark RISON* | *278.24* | *27.5.1.2* | *"If an RU is intended for an AP, then the STA\_ID\_LIST contains only one element that is set to the 11 LSBs of the AID of the non-AP STA transmitting the PPDU." contradicts other statements like "Each element of the TXVECTOR parameter STA\_ID\_LIST identifies the STA or group of STAs that is the recipient of an RU in the HE MU PPDU." in 27.11.1 and "for an HE MU PPDU and indicates the STA or group of STAs that is the recipient of an RU" in 8.3.5.2.2 and " The STA-ID field in each User field indicates the intended recipient user of the corresponding spatial streams and the RU." in 28.3.2.5* | *Add caveats of the form "except when sent to an AP" to the referenced locations. Also add text in 27.5.1.2 to describe the setting ot the STA-ID field from a non-AP STA* |  |

* **STA\_ID\_LIST**

***TGax Editor: Please make changes to the 1st paragraph in this subclause as shown below***

Each element of the TXVECTOR parameter STA\_ID\_LIST identifies the STA or group of STAs that is the recipient of an RU in the HE MU PPDU when the TXVECTOR parameter UPLINK\_FLAG is set to 0. An individually addressed RU is an RU addressed to an associated non-AP STA and the STA\_ID\_LIST element for that RU is set to the 11 LSBs of the AID of the STA receiving the PSDU contained in that RU. If an RU is intended for one or more unassociated non-AP STAs, then the STA\_ID\_LIST element for that RU is set to 2045. If an RU is intended for no user, then the STA\_ID\_LIST element for that RU is set to 2046. If an RU is intended for an AP (i.e., the TXVECTOR parameter UPLINK\_FLAG is set to 1), then the STA\_ID\_LIST contains only one element that is set to the 11 LSBs of the AID of the non-AP STA transmitting the PPDU. If an RU is intended for multiple STAs for MU-MIMO then multiple STAs identified by STA-IDs in the STA\_ID\_LIST will use the same resource unit (see 26.5.2 (UL MU operation)). If an RU is intended for multiple associated STAs and carries a single A-MPDU then the STA\_ID\_LIST element is set as follows:

* **Semantics of the service primitive**

***TGax Editor: Please make changes to the 4th paragraph in this subclause as shown below***

The STA\_INDEX parameter (identified as an element of the STA\_ID\_LIST parameter; see STA\_ID\_LIST parameter in Table 27-1 (TXVECTOR and RXVECTOR parameters) and 26.11.1 (STA\_ID\_LIST)) is present for an HE MU PPDU; otherwise, this parameter is not present. When the TXVECTOR parameter UPLINK\_FLAG is set to 0, this parameter indicates the STA or group of STAs that is the recipient of an RU to which the accompanying DATA octet applies. When the TXVECTOR parameter UPLINK\_FLAG is set to 1, this parameter indicates the STA that is the transmitter of an RU to which the accompanying DATA octet applies.

* **TDLS Action field formats**
* **TDLS Setup Request Action field format**

***TGax Editor: Please make following changes to Table 9-412 as shown below***

|  |  |  |
| --- | --- | --- |
| * **Information for TDLS Setup Request Action field** | | |
| **Order** | **Information** | **Notes** |
| 19 | AID | The AID element containing the AID of the STA sending the frame is present if dot11VHTOptionImplemented or dot11S1GOptionImplemented or dot11HEOptionImplemented is true. |

* **TDLS Setup Response Action field format**

***TGax Editor: Please make following changes to Table 9-413 as shown below***

|  |  |  |
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| * **Information for TDLS Setup Response Action field** | | |
| **Order** | **Information** | **Notes** |
| 20 | AID | The AID element containing the AID of the STA sending the frame is present if dot11VHTOptionImplemented or dot11S1GOptionImplemented or dot11HEOptionImplemented is true and the Status Code is SUCCESS and not present otherwise. |

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| **CID** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 21188 | Pooya Monajemi | 322.59 | 26.5.1.2 | The same is true about different Users in the same RU. | Replace RUs with something more general, such as PSDU. | **Revised**  Agree with the commenter. In case of MU-MIMO, the same RU would be assigned to different users. The term RUs is replaced with PSDUs.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 21188** |
| 20220 | Huizhao Wang | 321.24 | 26.5.1.3 | Missing the rule of sending HE MU PPDU with 80MHz PPDU BW, with RU allocated to 20MHz operating non-AP HE STA. | Please add a paragraph to describe the rule of allocating RU for 20MHz operating STA for HE MU PPDU BW equal to 80MHz | **Revised**  Agree with the comment. A sentence is added requiring the AP to allocated an RU that lies within the STA’s operating BW and the subchannel that the STA is operating on.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20220** |
| 21612 | Zhou Lan | 324.58 | 26.5.3 | Per the current UL MU operation procedure, when AP decides the TXOP but unfortunately no STAs can respond due to variaty of reasons, then there is no way for the AP to terminate the current TXOP. A mechanism is needed to deal with this situation for efficiency improvement. | As stated in the comment. | **Reject**  No new mechanism needs to be defined. Baseline spec already provides a mechanism for a TXOP holder to send CF-End frame to release the TXOP. Please see 10.24.2.10 (Truncation of TXOP) |
| 21189 | Pooya Monajemi | 323.19 | 26.5.1.3 | Since the subfield name is "20 MHz In 40 MHz HE PPDU In 2.4 GHz Band", then this restriction should only apply in the 2.4 GHz band. If the restriction is intended to be independent of band, then the subfield name should be changed. | Modify as "An AP shall not transmit a 40 MHz HE MU PPDU in the 2.4 GHz band". Also modify on Page 325 Line 36. | **Revised**  The 1st paragraph in 26.5.1.3 is fixed as a resolution to CID 20389. The paragraph in 25.5.2.2.1 is no longer present in D4.1 It was resolved as a resolution to CIDs 20321 and 20322. The deletion of these paragraphs is incorrect as the comments were incorrect – as 26.5.1.3 specifies the actions for DL (transmission from AP) while 26.5.2.2.1 covers UL case (RU allocation by AP).  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 21189 and AP** |
| 20044 | Abhishek Patil | 326.01 | 26.5.3.2.1 | This subclause covers the Triggering side (i.e., AP-side) rules. The spec needs to provide corresponding normative rule to cover the Rx (non-AP)-side rules. | Add normative text in 26.5.3.1 to cover non-AP STA side action - i.e., the STA sets the UL 2├ù996-tone RU Support subfield in HE Capabilities element to 1 if it supports transmitting an HE TB PPDU in 2x996 tone RU. Need to have two sentences to capture TRS and Trigger frame separately based on other criteria (e.g., dot11ULMUMIMOOptionImplemented set to true for TRS case) | **Revised**  Agree with the comment. A sentence is added as suggested by the commenter  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20044** |
| 21113 | Oghenekome Oteri | 325.51 | 26.5.3.2.1 | Just discusses the trigger frame. Is the TRS control subfield valid as well ? | Add reference to the TRS control subfield. | **Reject**  The paragraph cited by the comment refers to UL MU-MIMO operation that does not apply to TRS case. TRS Control solicits TB PPDU from a single STA while a Trigger frame can allocate the same RU to more than one STA to perform a UL MU-MIMO operation amongst the STAs that share the RU. |
| 20045 | Abhishek Patil | 326.26 | 26.5.3.2.1 | This is applicable only if the non-AP STA supports UORA. | In the last two bullets (associated and unassociated case), replace text starting " ... (not) associated with the AP and ..." to the end of the bullet with " ... (not) associated with the AP and have OFDMA RA Support subfield in HE Capabilities element it transmits set to 1 (see 26.5.5 (UL OFDMA-based random access (UORA)))" | **Revised**  The bullets related to random access are updated to indicate that the rules apply only to the STAs that have indicated support for UORA  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20045** |
| 20323 | kaiying Lv | 326.44 | 26.5.3.2.1 | Change to " if any of the MPDUs contain a fragment" | As in comment. | **Reject**  A fragment is an MPDU (please see 10.4 of D2.2 baseline) |
| 20698 | Mark RISON | 326.46 | 26.5.3.2.1 | "More than one Trigger frame may be aggregated in an A-MPDU. If more than one Trigger frame is aggre- gated in an A-MPDU, all of them shall have the same content." -- this has no good justification. The only justification would be that this increases redundancy in noisy environments but the subsequent "If one or more Trigger frames are aggregated with other frames in an A-MPDU, then the Trigger frames shall be the first MPDUs of the A-MPDU unless the A-MPDU also carries an Ack or BlockAck frame in which case the Trigger frames shall be included immediately after the Ack or BlockAck frame." destroys this | Delete the second cited text and replace the first cited text with "No more than one Trigger frame shall be included in an A-MPDU." | **Reject**  The two paragraphs cited by the comment serve different purpose. The first paragraph says an AP could include more than one TF for redundancy reasons and in such case, the content of all the TFs is identical. The second paragraph specifies the order in which MPDUs appear in an A-MPDU – TFs are the first to appear unless the A-MPDU also includes MPDUs carrying ack or blockack, in which case the acknowledgement frames are carried before the TFs. The two paragraphs do not contradict or conflict with each other.  **5/10/19 (ad-hoc)**: If TF is sent in a DL MU PPDU with some RUs having longer A-MPDUs, the A-MPDU carrying a TF can carry multiple identical TFs instead of padding. |
| 20699 | Mark RISON | 326.56 | 26.5.3.2.1 | "If one or more Trigger frames are aggregated with other frames in an A-MPDU, then the Trigger frames shall be the first MPDUs of the A-MPDU unless the A-MPDU also carries an Ack or BlockAck frame in which case the Trigger frames shall be included immediately after the Ack or BlockAck frame." -- this is format not behaviour | Move to 9.7.3 | **Revised**  Clause 9.7.3 has multiple tables to cover the content of an A-MPDU under different scenarios. It is easier to have one normative sentence to define the behavior of an AP to cover all the scenarios. The current text in 26.5.2.2.1 was misleading – MPDUs don’t aggregate themselves or decide in which order they should go in an A-MPDU. These decisions are made by an AP. The text in 26.5.2.2.1 is update to provide rules for an AP when aggregating MPDUs carrying TFs  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20699** |
| 20046 | Abhishek Patil | 326.61 | 26.5.3.2.1 | This is an important rule that needs to be called out at the beginning of the UL MU clause. Besides, this subclause cover AP-side rules. | Move this as the 2nd sentence of 26.5.3.1 | **Accept**  **TGax editor, please implement the changes as suggested by the commenter** |
| 20047 | Abhishek Patil | 327.25 | 26.5.3.2.1 | This subclause covers AP-side rules for Triggering | Move this sentence to 26.5.3.1 | **Revised**  **TGax editor, please move the paragraph at the referenced location to the new location indicated by the comment.** |
| 20048 | Abhishek Patil | 329.12 | 26.5.3.2.4 | Simplify the text in the paragraph | Replace the contents of the paragraph with: "An AP shall not send a Trigger frame, to a non-AP STA, containing User Info fields addressed to non-AP STAs associated with at least two different BSSs of a multiple BSSID set, unless the non-AP STA has set the Rx Control Frame To MultiBSS subfield in HE Capabilities element it transmits to 1. The exception to this is NFRP Trigger frame which may be addressed to non-AP STAs associated with different BSSIDs in a multiple BSSID set." | **Revised**  The 1st sentence in the paragraph was updated by doc 11-19/0506 as a resolution to CIDs 20582, 20315. The revised sentence partially addresses the commenters concerns. The 2nd sentence in this paragraph is updated to be consistent with the revised 1st sentence and to clarify its intent.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20048** |
| 20539 | Mark RISON | 329.51 | 26.5.3.2.4 | "An AP that transmits Trigger frames and frames carrying a TRS Control subfield in more than one A-MPDU in an HE MU PPDU shall set the Common Info field of the Trigger frames and the TRS Control subfields in each A-MPDU as follows:" -- should apply even if there is only one A-MPDU | Change the cited text at the referenced location to "An AP that transmits both Trigger frames and frames carrying a TRS Control subfield in an HE PPDU shall set the Common Info field of the Trigger frame(s) and the TRS Control subfield(s) as follows:" | **Reject**  The spec mandates that an A-MPDU shall not carry a TF and a frame carrying TRS Control (see P329L60 of D4.1). The context cited by the comment is with respect to an MU PPDU where multiple A-MPDUs are involved and the rules described are with respect to TF carried in one A-MPDU and TRS carried in another A-MPDU directed to a different STA. |
| 20592 | Mark RISON | 329.62 | 26.5.3.2.4 | "STBC subfields" -- no such subfield(s) | Change to "UL STBC subfields" | **Accept**  **TGax editor, please implement the changes as suggested by the commenter** |
| 20049 | Abhishek Patil | 330.15 | 26.5.3.2.4 | The intention of the note is to indicate how a responding STAs gather information to prepare an HE TB PPDU. The term 'common information' is misleading as it points to Common Info field of Trigger frame. Reword the terminology to clarify the intention of the note. | Replace the first sentence as: "Non-AP STAs obtains information required to prepare a TB PPDU explicitly, implicitly or both." | **Revised**  The note is updated as suggested by the commenter with further changes to focus on a single STA.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20049** |
| 21547 | Yoshio Urabe | 325.33 | 26.5.3.2.1 | It is not explicitly described whether two or more User Info in a Trigger frame may indicate the same RU or not. In general, the same RU should not be allocated by more than one User Info in a Trigger frame. RU indicated by a User Info with AID12=2046 may be excluded, i.e. it may overlap with the RU indicated by other User Info, because it is not used to allocate the RU. | Add the following sentence in the last of the subclause 26.5.3.2.1 (or in other appropriate place): "More than one User Info field in a Trigger frame shall not indicate the same RU except the AID12 subfield in a User Info is 2046." | **Reject**  In case of MU-MIMO, an AP can assign the same RU to more than one non-AP STA. In such a scenario, the subfields in SS Allocation field helps differentiate the stream on which the each STA responds. |
| 20855 | Mark RISON | 330.44 | 26.5.3.2.4 | "An AP shall put a User Info field with AID12 subfield equal to 2046 after User Info fields with an AID12 subfield less than 2046." -- an AP should not be required to include 2046 in a Trigger frame | Change the cited text at the referenced location to "An AP shall put any User Info field with AID12 subfield equal to 2046 after all User Info fields with an AID12 subfield less than 2046." | **Accept**  **TGax editor, please implement the changes as suggested by the commenter** |
| 20531 | Mark RISON | 331.30 | 26.5.3.2.4 | "If the AP does not have a recommendation then it shall set the Preferred AC subfield to a value 0." would be clearer as "If the AP does not have a recommendation then it shall set the Preferred AC subfield to indicate AC\_BK." | As it says in the comment | **Revised**  The text is updated to indicate that the value carried in the Preferred AC subfield corresponds to the ACI value from Table 9-154. Fix the table reference. Clarified that value 0 corresponds to AC\_BE category.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20531** |
| 21110 | Oghenekome Oteri | 325.33 | 26.5.3.2.1 | No discussion on the "26 tone RU" case as discussed on pg 323 line 31 "The center 26-tone RU in any 20 MHz channel of a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE MU PPDU shall not be assigned to a 20 MHz operating non-AP STA" | Write corresponding case in this section | **Revised**  Agree with the comment. A sentence is added prohibiting an AP from allocating a center 26-tone RU to a 20 MHz operating non-AP STA when the TB PPDU is 40MHz, 80MHz 160 MHz or 80+80 MHz.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 21110** |
| 20050 | Abhishek Patil | 332.18 | 26.5.3.3.1 | The first sentence is confusing. Clause 26.5.3.3.2 provides rules on when a triggered non-AP STA will not respond. Call it out separately and then provide the rules when the non-AP will respond. | Replace the sentence as: "A non-AP STA shall not transmit an HE TB PPDU if any of the conditions specified in 26.5.3.3.2 are satisfied. Otherwise, a non-AP STA shall transmit an HE TB PPDU a SIFS after a received PPDU if all of the following conditions are met:" | **Revised**  **TGax editor, please update the cited text as:** “A non-AP STA shall not transmit an HE TB PPDU if all of the conditions specified in 26.5.3.3.2 are satisfied. Otherwise, a non-AP STA shall transmit an HE TB PPDU a SIFS after a received PPDU if all of the following conditions are met:" |
| 20051 | Abhishek Patil | 332.34 | 26.5.3.3.1 | Incorrect reference to clause 26.5.5 | Support for UORA is indicated via a bit in HE MAC Capabilities field in HE Capabilities element. Update the two bullets on UORA to point to the OFDMA RA Support subfield in HE Capabilities element. | **Revised**  The two bullets on random access are updated to indicate that the non-AP STA should have indicated support for UORA feature by setting the OFDMA RA Support subfield in HE Capabilities element to 1.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20051** |
| 21194 | Pooya Monajemi | 332.34 | 26.5.3.3.1 | As written this would require all UL OFDMA capable STA associated to the AP to respond, independent of if they have something to send for that Trigger Type or the OBO has counted down to 0. | Recommend adding text to state they must meet the conditions as outlined in 26.5.5. | **Revised**  Agree with the comment. The bullets on associated STA is updated to indicate that the non-AP STA must satisfy the conditions mentioned in clause 26.5.4. The remaining text in the bullets is reorganized to provide more clarity.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 21194** |
| 21195 | Pooya Monajemi | 332.38 | 26.5.3.3.1 | As written this would require all UL OFDMA capable STA not associated to the AP to respond, independent of if the OBO has counted down to 0. | Recommend adding text to state they must meet the conditions as outlined in 26.5.5. | **Revised**  Agree with the comment. The bullets on unassociated STA is updated to indicate that the non-AP STA must satisfy the conditions mentioned in clause 26.5.4. The remaining text in the bullets is reorganized to provide more clarity.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 21195** |
| 20324 | kaiying Lv | 335.02 | 26.5.3.3.4 | TRS control field can appear in HE MU PPDU, HE SU PPDU or HE ER SU PPDU. So the soliciting PPDU should also include HE SU PPDU or HE ER SU PPDU. | Change "the soliciting DL MU PPDU" to "the soliciting DL HE MU PPDU or HE SU PPDU or HE ER SU PPDU." | **Revised**  A non-AP STA is not permitted to send frame carrying TRS Control subfield. Therefore the term ‘DL’ is required. Agree with the comment that the term ‘MU’ is limiting as a DL SU or DL ER SU PPDU may also include TRS Control subfield. Updated the text to say ‘DL HE PPDU’  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20324** |
| 20535 | Mark RISON | 339.00 | 26.5.3.5 | The concept of an "unassociated AP" is not well-defined | Change "unassociated AP" to "AP with which it is not associated" (2x on page) | **Accept**  **TGax editor, please implement the changes as suggested by the commenter** |
| 20416 | Liwen Chu | 342.48 | 26.5.4 | delete this since HE MU frame exchange success definition is in 27.5. | As in comment | **Revised**  The cited paragraph is deleted and replaced with reference to clause 26.5.2.2.5 – P334L52 in D4.1. Text in 26.5.2.2.5 is updated to indicate that AP will perform backoff procedure described in 10.24.2.2.  **TGax editor, please implement the changes shown in doc 11-19/510r3 with the tag 20416** |

* **RU addressing in an HE MU PPDU**

***TGax Editor: Please make changes to the 1st paragraph in this subclause as shown below:***

The Type and Subtype subfields in the Frame Control field and address type (individually addressed or group addressed) of MPDUs may be different across A-MPDUs in different [21188]PSDUs within the same HE MU PPDU.

* RU allocation in an HE MU PPDU

***TGax Editor: Please make changes to the 3rd paragraph in this subclause as shown below:***

An AP shall not assign the center 26-tone RU in any 20 MHz channel of a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE MU PPDU to a 20 MHz operating non-AP STA. An AP shall follow the rules specified in 27.3.2.7, 27.3.2.8 and 27.3.2.9 or the SST subchannel (if applicable) in which the STA is operating (see 26.8.7) when allocating RUs to a non-AP STA.[20220]

* **UL MU operation**
* **General**

***TGax Editor: Please add new paragraph as the 3rd paragraph in this subclause as shown below:***

[20044]A non-AP HE STA shall set the UL 2×996-tone RU Support subfield in HE Capabilities element to 1 if it supports receiving a frame that carries a TRS Control subfield allocating a 2x996-tone RU or a Trigger frame with User Info field addressed to the STA with RU Allocation subfield indicating a 2x996-tone RU.

* **Rules for soliciting UL MU frames**
* **General**

***TGax Editor: Please restore the following paragraph back to this subclause as shown below:***

***The paragraph was deleted as a resolution to editorial comments 20321 and 20322 which mentions that the paragraphs are a repetition of similar paragraphs in 26.5.1.3. However, the comment is incorrect as 26.5.1.3 specifies the actions for DL (transmission from AP) while this subclause covers UL case (RU allocation by AP).***

[AP]An HE AP shall not allocate an RU for a 40 MHz HE TB PPDU to a 20 MHz operating non-AP HE STA [21189]in the 2.4 GHz band unless the AP has received from the 20 MHz operating non-AP HE STA an HE Capabilities element with the 20 MHz In 40 MHz HE PPDU In 2.4 GHz Band subfield in the HE PHY Capabilities Information field in its HE Capabilities element equal to 1.

***TGax Editor: Please make changes to the 6th paragraph in this subclause as shown below:***

An AP that transmits a PPDU may solicit an HE TB PPDU from one or more non-AP STAs through one of the following mechanisms:

* Including in the PPDU one or more Trigger frames that include one or more User Info fields with one of the following AID12 subfield settings:
* The AID12 subfield is set to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with the AP.
* The AID12 subfield is set to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with a nontransmitted BSSID in a multiple BSSID set to which the AP belongs, the TA field of the Trigger frame is set to the transmitted BSSID and the non-AP STA has set the Rx Control Frame To MultiBSS sub-field in the HE Capabilities element it transmits to 1.
* [20045]The AID12 subfield is set to 0 if the User Info field is addressed to non-AP STAs that are associated with the AP and that support UL OFDMA-based random access (see 26.5.4).
* [20045]The AID12 subfield is set to 2045 if the User Info field is addressed to non-AP STAs that are not associated with the AP and that support UL OFDMA-based random access (see 26.5.4).
* Including in the PPDU one or more individually addressed frames that include a TRS Control subfield and that:
* Are carried in an S-MPDU format that solicits an immediate Ack frame (see 10.13.8 (Transport of S-MPDUs))
* Are carried in an A-MPDU format that solicits an immediate BlockAck frame (see 10.24.7.7 (Originator's behavior))
* Are carried in a multi-TID A-MPDU format that solicits an immediate Multi-STA BlockAck frame (see 26.6.4 (Multi-TID A-MPDU and ack-enabled A-MPDU))

***TGax Editor: Please make changes to the 8th, 9th and 10th paragraphs in this subclause as shown below:***

[20699]An AP may aggregate more than one Trigger frame in an A-MPDU. If an AP aggregates more than one Trigger frame in an A-MPDU, then all of the Trigger frames shall have the same content. An AP may include a frame carrying a TRS Control subfield in an HE MU PPDU, HE SU PPDU or HE ER SU PPDU.

NOTE—The TRS Control subfields within MPDUs carried in an A-MPDU have the same value (see 10.9 (HT Control field operation)).

[20699]An AP shall not transmit an A-MPDU that includes both a Trigger frame and a frame carrying a TRS Control subfield.

[20699]If an AP aggregates one or more Trigger frames with other frames in an A-MPDU, then the AP shall place the Trigger frames as the first set of MPDUs of the A-MPDU unless the A-MPDU also carries an Ack or BlockAck frame in which case the AP shall place the Trigger frames immediately after the Ack or BlockAck frame.

* **Allowed settings of the Trigger frame fields and TRS Control subfield**

***TGax Editor: Please the 1st paragraph in this subclause as shown below:***

An AP with dot11MultiBSSIDImplemented equal to true shall not send a Trigger frame (other than an NFRP Trigger frame) with the TA field set to the transmitted BSSID to a non-AP STA that is associated with a nontransmitted BSSID in the multiple BSSID set unless the AP received an HE Capabilities element from the non-AP STA with the Rx Control Frame To MultiBSS subfield in the HE MAC Capabilities Information field of the HE Capabilities element equal to 1. [20048]An AP with dot11MultiBSSIDImplemented equal to true may send an NFRP Trigger frame with the TA field set to the transmitted BSSID to a non-AP STA that is associated with a nontransmitted BSSID in the multiple BSSID set.

***TGax Editor: Please the 1st paragraph in this subclause as shown below:***

[20539]An AP that transmits one or more Trigger frames in one or more A-MPDUs and frames carrying a TRS Control subfield in one or more other A-MPDUs in an HE MU PPDU shall set the Common Info field of the Trigger frames and the TRS Control subfields in each A-MPDU as follows:

***TGax Editor: Please update the NOTE below the 7th paragraph in this subclause as shown below:***

[20049]NOTE—A non-AP STA obtains the information required to prepare an HE TB PPDU explicitly and implicitly. Explicit information is obtained in the Common Info field of a Trigger frame, or in the UL Data Symbols and DL TX Power subfields of the TRS Control subfield contained in the soliciting PPDU. Implicit information is obtained in previously exchanged frames with the AP, e.g., in the BSS Color and the Default PE Duration subfields of the HE Operation element, or from default values specified in 26.5.2.3 (Non-AP STA behavior for UL MU operation).

***TGax Editor: Please make changes to the 8th paragraph in this subclause as shown below:***

An AP shall not set any subfields of the User Info field of a Trigger frame to a value that is not supported by the recipient non-STA of the User Info field. An AP shall not set any subfields of a TRS Control subfield to a value that is not supported by the recipient non-AP STA of the TRS Control subfield. When an RU is allocated to only one non-AP STA the Starting Spatial Stream subfield for that non-AP STA shall be set to 0. [21110]An AP shall not assign the center 26-tone RU in any 20 MHz channel of a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE TB PPDU to a 20 MHz operating non-AP STA.

***TGax Editor: Please make changes to the 14th paragraph in this subclause as shown below:***

[20531]The AP may assign any ACI value defined in Table 9-154 (ACI-to-AC encoding) in the Preferred AC subfield in the Trigger Dependent User Info field for an HE STA and identified by the AID12 subfield of the User Info field of a Basic Trigger frame. If the AP does not have a recommendation then it shall set the Preferred AC subfield to the value 0 (AC\_BE).

* **Non-AP STA behavior for UL MU operation**
* **General**

***TGax Editor: Please make change to the two bullets in the 3rd paragraph in this subclause as shown below:***

If a non-AP STA does not satisfy the conditions specified in 26.5.2.3.2 (Conditions for not responding with an HE TB PPDU) that prevents the non-AP STA from transmitting an HE TB PPDU, a non-AP STA shall transmit an HE TB PPDU a SIFS after a received PPDU, if all the following conditions are met:

* The received PPDU contains either a Trigger frame (that is not an MU-RTS variant) with a User Info field addressed to the non-AP STA, or an MPDU addressed to the non-AP STA that contains an TRS Control subfield. A User Info field in the Trigger frame is addressed to a non-AP STA if one of the following conditions are met:
* The AID12 subfield is equal to the 12 LSBs of the AID of the non-AP STA and the Trigger frame is sent by the AP with which the non-AP STA is associated with or by the AP corresponding to the transmitted BSSID if the non-AP STA is associated with a nontransmitted BSSID and has indicated support for receiving Control frames with TA field set to the transmitted BSSID by setting the Rx Control Frame To MultiBSS subfield to 1 in the HE Capabilities element that the STA transmits.
* [20051, 21194]The AID12 subfield is set to 0, the non-AP STA is associated with the AP that sent the Trigger frame, the non-AP STA supports UORA and the conditions specified in 26.5.4 (UL OFDMA-based random access (UORA)) are satisfied.
* [20051, 21195]The AID12 subfield is set to 2045, the non-AP STA is not associated with the AP that sent the Trigger frame, the non-AP STA supports UORA, the conditions specified in 26.5.4 (UL OFDMA-based random access (UORA)) are satisfied, and the resource that the STA gains access to is sufficient for the non-AP STA to include the pending frame.
* The CS Required subfield in the Trigger frame is 1 and the UL MU CS condition described in 26.5.2.5 (UL MU CS mechanism) indicates the medium is idle, or the CS Required subfield in a Trigger frame is 0 or the response was solicited by a frame containing a TRS Control subfield.
* The UL MU Disable subfield is 0 and the UL MU Data Disable subfield is 0 in the most recent OM Control subfield (if any) sent by the non-AP STA to the AP or the UL MU Disable subfield is 0 and the UL MU Data Disable subfield is 1 in the most recent OM Control subfield (if any) sent by the non-AP STA to the AP and the frame that is being triggered is an acknowledgment (see 26.9.3 (Transmit operating mode (TOM) indication)).
* **TXVECTOR parameters for HE TB PPDU response to TRS Control subfield**

***TGax Editor: Please make changes to the following bullets in this subclause as shown below:***

A non-AP STA transmitting an HE TB PPDU in response to a frame containing a TRS Control subfield shall set the TXVECTOR parameters as follows:

* The CH\_BANDWITDTH parameter is set to the value of the RXVECTOR parameter CH\_BANDWIDTH of the soliciting DL HE PPDU (see Table 27-1)
* The BSS\_COLOR and DCM parameters are set to the values of the RXVECTOR parameters BSS\_COLOR and DCM of the soliciting [20324]DL HE PPDU, respectively
* **MU cascading sequence**

***TGax Editor: Please make change to the 4th paragraph in this subclause as shown below:***

[20416]An AP follows the procedure described in 26.5.2.2.5.

**26.5.2.2.5 AP access procedures for UL MU operation**

***TGax Editor: Please make change to the 3rd paragraph in this subclause as shown below:***

If an AP does not receive an immediate response with at least one MPDU from at least one non-AP STA solicited by a PPDU that contains at least one Trigger frame the frame exchange is not successful [20416]and the AP shall follow the backoff procedure described in 10.24.2.2.