IEEE P802.11  
Wireless LANs

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| Misc for Trigger frame format | | | | |
| Date: 2017-08-21 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Alfred Asterjadhi | Qualcomm Inc. | 5775 Morehouse Dr, San Diego, CA 92109 | +1-858-658-5302 | aasterja@qti.qualcomm.com |
| George Cherian | Qualcomm Inc. |  |  |  |
| Abhishek Patil | Qualcomm Inc. |  |  |  |
| Raja Banerjea | Qualcomm Inc. |  |  |  |

Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (69 CIDs):

* 3012, 3013, 3014, 3117, 3164, 3168, 3170, 3172, 3173, 4988,
* 5012, 5129, 5132, 5158, 5319, 5757, 5826, , 5955, 5956,
* 6081, 6151, 6323, 6325, 6326, 6327, 7261, 7263, 7485,
* 7486, 7488, 7748, 7749, 7750, 7913, 7956, 7958,
* 8112, 8189, 8253, 8254, 8650, 8653, 8654, 86559102,
* 9264, 9350, 9470, 9473, 9631, 9635, 9638, 9640, 9641, 9644,
* 9822, 9824, 9825, 9829, 9832, 9833, 9990, 9991,
* 9992, 9994, 10002, 10238

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Removed 5915 and 6309 (synch up with Liwen), some editorial changes as well and feedback received during the conf call (main changes in green).
* Rev 2: Uploaded Rev 1 before saving document. Minor changes (still changes in green).

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** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 3012 | Abhishek Patil | 43.01 | The expected behavior of a STA that receives the CS Required set to a certain value is somehow sparsed and confusing in all normative subclauses I checked. Please add a reference here to where the normative behaviro is defined. It should be something along this lines: If CS Required is 0 then STA is not requred to check ED and NAV, if CS Required is 1 then STA is required to check both ED and NAV. | As in comment. | **This CID is already resolved. Please update the database.** |
| 3013 | Abhishek Patil | 45.07 | The SR field 1 and SR field 2 definition should be bandwidth dependent and operating band agnostic. The definition of SR field 1 and SR field 2 for 40 MHz should not be specific for 2.4 GHz. | remove "in 2.4 GHz" in the sentence "When operating 40 MHz in 2.4GHz band, two SR fields, SR field 1 and SR field 2, are set to same values." | Revised –  Agree in principle. The encoding of these fields is already defined in clause 28. Proposed resolution is to remove redundancy, add a figure to show the encoding and a reference to the table where such encoding is defined.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 3013. |
| 3014 | Abhishek Patil | 45.08 | Shouldn't SR fields for 80+80 be defined in the same way as the SR field for 160 MHz? | On P45L6, remove: "When operating 80+80 MHz, SR field 3 is set to same value as SR field 1, and SR field 4 is set to the same value as SR field 2." Insert on P45L5: "For 80+80 MHz four SR fields for each 40 MHz" | Revised –  Agree in principle. The encoding of these fields is already defined in clause 28. Proposed resolution is to remove redundancy, add a figure to show the encoding and a reference to the table where such encoding is defined.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 3014. |
| 3117 | Adrian Stephens | 46.10 | Don't use binary values to represent numeric values - ever. REVmc can tell you why. | Replace binary strings with decimal equivalents in Table 9-25f and the text following it. Make similar changes near "B19-B13".  Consider making this into a proper named subfield. | Revised –  Agree with the comment. Proposed resolution replaces the binary values with their respective decimal values.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 3117. |
| 3164 | Ahmadreza Hedayat | 46.06 | Table 9-25f and the following description is unnecessarily verbose. It'd be more strightforward if similar to the tables 28-3, 28-4, and 28-5 the value of B19-B13 is associated with a set of tone indices. | Follow the same principle as clause 28 (HE PHY) and replace this table and the following description with a strighforward table that maps the value of B19-B13 to a set of tone indices. | Revised –  The paragraph explicitly calls out the tone indices that are associated to the RU allocations. These declarative statemetns are beneficial to help the reader determine the equivalencies. Proposed resolution si to organize the paragraph in itemized list to highlight the presence of one item per RU width.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 3164. |
| 3168 | Ahmadreza Hedayat | 49.60 | Missing the setting of Trigger Type. | Add: "The Trigger Type subfield is set to 2 to indicate MU-BAR variant." | Rejected –  Table 9-25a—Trigger Type subfield encoding provides the setting of the Trigger type for all variants. Adding another statement would be redundant. |
| 3170 | Ahmadreza Hedayat | 48.23 | Missing the setting of Trigger Type. | Add: "The Trigger Type subfield is set to 0 to indicate Basic variant." | Rejected –  Table 9-25a—Trigger Type subfield encoding provides the setting of the Trigger type for all variants. Adding another statement would be redundant. |
| 3172 | Ahmadreza Hedayat | 51.33 | Missing the setting of Trigger Type. | Add: "The Trigger Type subfield is set to 5 to indicate GCR MU-BAR variant." | Rejected –  Table 9-25a—Trigger Type subfield encoding provides the setting of the Trigger type for all variants. Adding another statement would be redundant. |
| 3173 | Ahmadreza Hedayat | 51.58 | Missing the setting of Trigger Type. | Add: "The Trigger Type subfield is set to 6 to indicate BQRP variant." | Rejected –  Table 9-25a—Trigger Type subfield encoding provides the setting of the Trigger type for all variants. Adding another statement would be redundant. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 4988 | Brian Hart | 42.17 | Packets are generally L3 entities. Replace "Packet extension" by "PPDU Extension" throughout the draft | Packets are generally L3 entities. Replace "Packet extension" by "PPDU Extension" throughout the draft (61x) | Revised –  Agree in principle.  TGax editor: Replace “Packet extension” with “PPDU Extension” throughout the draft while using capitalization whenever necessary (part of name of a field, frame etc). |
| 5012 | Chao Chun Wang | 47.24 | For "target RSSI" in Trigger frame's per-user info, HT mentioned this value is normalized by 20 MHz bandwidth. However, D1.0 never mentioned this part in Table 9-25g. | Spec should add this statement about normalization unit to prevent interop issue | Rejected –  The target RSSI provided in the Trigger frame is not normalized to 20 MHz. This is because the AP sets Target RSSI and also knows the BW of incoming Signal from the STA. Hence AP can adjust the signal RSSI accordingly to certain PSD. Please refer to the normative behavior specified in 28.3.14.2 (Power pre-correction) which is along these lines. |
| 5129 | Dorothy Stanley | 44.37 | Is AP Tx Power conducted or EIRP? Please clarify. | As in comment | Revised –  Agree in principle that clarification is needed. Proposed resolution is the same as that of CID 5122 which is already adopted in D1.3 that specifies that the calculation is referenced to the antenna connector.  **Note to Editor: No further changes are required for this instruction as these changes are already incorporated in D1.3 (except some editorials as instructed below).**  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 5129. |
| 5132 | Dorothy Stanley | 51.30 | Regarding, "9.3.1.23.6 GCR MU-BAR variant", while we're modifying GCR and multicast, we need to address the issue that multicast only uses legacy rates. | expand the rate set available for multicast | Rejected –  Multicast frames are sent at basic rate because these frames are supposed to be received by all STAs operating in that BSS. If higher rates are desirable then FMS streams can be setup with those devices that support higher rates. This is already possible in the baseline. |
| 5158 | Dorothy Stanley | 91.50 | What is PE? Please define. | As in comment | Revised –  Agree in principle. Proposed resolution accounts for the suggested change and additionally specifies that the fields have the same encoding as their respective fields in HE SIG-A.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 5158.  TGax editor to add the following acronym in subclause 3.2: “PE PPDU Extension”. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5319 | EVGENY KHOROV | 45.01 | The constrains on possible values of SR fields are not full. | Either give a reference to Table 28-18, or adapt the text from that table | Revised –  Agree in principle. Proposed resolution is to provide reference to Table 28-19 that contains these constraints and simplify the paragraph.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 5319. |
| 5757 | Guoqing Li | 45.43 | Line 43 of page 45 says B12 indicates primary or non-primary 80MHz.If B12 is 1, then it indicates non-primary. And then line 28 of page 46 says this bit is set to 1 (for 160M/80+80). Are these two places contradictory? | add "except when BW indicates 160MHz/80+80MHz" at the end of the sentence on line 43 of page 45. | Revised –  Disagree in principle with the comment. The sentence says that B12 indicates whether the allocated RU is in the primary or non-primary 80 MHz. However, agree that it is confusing as currently written. Proposed resolution is to clarify this aspect by specifying that it is not the non-priamry but rather the secondary 80 MHz.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 5757. |
| 5826 | Huizhao Wang | 45.09 | Need to add the encoding table of Spatial Reuse subfields | Please add the encoding table of Spatial Reuse subfields | Revised –  Agree in principle. Proposed resolution adds the encoding field format as suggested.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 5826. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5955 | James Yee | 42.61 | Is it explicitly disallowed for two Trigger frames to be sent in succession? If not, then the benefits of the Cascade Indication feature is unclear. | Remove the Cascade Indication feature. | Rejected –  Cascade Indication field is independent of the subsequent Trigger frames. It helps STAs that are waiting for such frame to go to doze state if no other TF frames are not coming within TWT SPs. |
| 5956 | James Yee | 42.32 | For BSR/BQR, trigger frame can use the type of BSRP/BQRP to query the necessary information by AP itself. However, there is no trigger type for "UL power headroom. With this type, AP can decide when to query A-Control with this value by itself, rather than event-driven report by STA. | Considering defining a new trigger type for "UL power headroom". | Rejected –  The UPH Control field is required in any HE TB PPDU that is being solicited by any Trigger frame, except certain conditions, cited below from D1.3. There is no need for a TF type to solicit something that is always being solicited.  “The STA shall include an HE Control field containing the UPH Control field in MPDUs carried in the A-MPDU of the HE TB PPDU except when:  — The remaining space in the A-MPDU, after inclusion of solicited MPDUs that cannot contain an HE Control field, is not sufficient to contain MPDU(s) that contain an HE Control field  — The STA includes other Control fields in the HE Control field and the available space in the HE Con-trol field is not sufficient to contain an additional UPH Control field.” |
| 6081 | Jian Yu | 42.48 | Like BA and GCR BA, MU-BAR and GCR MU-BAR can be combined into one type of trigger frame and further differentiate by BAR control. This will help to save space for other types of trigger frame. | As in comment | Revised –  GCR BAR Information field contains the MAC address of the group address for which the receive status is requested, and its addition for every user info field (and same value) would increase the overhead. That is why the GCR MU BAR was introduced. Please refer to previous motioned contributions on the topic.  Proposed resoltuon is to clarify that the GCR BAR Infromation field does not contain the MAC address as it is already contained in the RA field, and also proposed some other text refinements related to this topic.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 6081. |
| 6151 | Jinjing Jiang | 50.13 | Can MU-BAR frame solicit a ACK frame? | Please clarify | Rejected –  The MU BAR frame inherits the functionalities of the BAR frame counterpart where the Ack Policy that would enable generation of an Ack frame as a response to a BAR frame is only under the delayed BA sessions, as such the MU BAR cannot solicit an Ack frame unless the peers negotiate delayed BA sessions (so the answer would technically yes but only under delayed BA sessions and until this protocol is not deprecated). |
| 6323 | John Coffey | 44.57 | Inconsistent terminology: here we have "the trigger-based PPDU", whereas almost everywhere else in the draft we have "the HE trigger-based PPDU". If the same thing is intended, the same term should be used. | Change to "the HE trigger-based PPDU". | Revised –  Using HE TB PPDU in latest draft. Proposed resolution is to keep using the same terminology as latest draft.  TGax Editor: Replace “trigger-based PPDU” with “HE TB PPDU” throughout the draft. |
| 6325 | John Coffey | 46.33 | Imprecise language: "in an increasing order". Why "an"? | Delete "an". | Accepted |
| 6326 | John Coffey | 46.42 | Imprecise language: "in an increasing order". Why "an"? | Delete "an". | Accepted |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 6327 | John Coffey | 46.51 | Imprecise language: "in an increasing order". Why "an"? | Delete "an". | Accepted |
| 7261 | Kwok Shum Au | 47.55 | The variable "N\_{DBPS}" is not defined. | In line 60, insert the following: "N\_{DBPS} is defined in Table 28-12". | Accepted |
| 7263 | Kwok Shum Au | 48.04 | The variable "N\_{DBPS,SHORT}" is not defined. | In line 10, insert the following: "N\_{DBPS,SHORT} is defined in equation (28-61)". | Accepted |
| 7485 | Lei Huang | 44.22 | The description on relation between the number of HE-LTF symbols and the total number of space-time streams is confusing | Replacing "The number of HE-LTF symbols is a function of the total number of space-time streams. For non-OFDMA PPDUs, the encoding of the Number Of HE-LTF Symbols subfield is defined in Table 22-13. For OFDMA PPDUs, the number of HE-LTFs is greater than or equal to the maximum across RUs of the total number of space time streams. The encoding of the Number Of HE-LTF Symbols subfield is the same as the Number of HE-LTF Symbols in HE-SIG-A2, which is defined in Table 28-18 (HE-SIG-A field of an HE trigger-based PPDU)." by "The number of HE-LTF symbols is a function of N\_STS,total as shown in Table 21-13. For a non-OFDMA PPDU, N\_STS,total is the total number of space-time streams; while for an OFDMA PPDU, N\_STS,total is the maximum of the total number of space time streams per RU. The encoding of the Number Of HE-LTF Symbols subfield is the same as the Number of HE-LTF Symbols subfield in HE-SIG-A2 of an HE MU PPDU, which is defined in Table 28-17 (HE-SIG-A field of an HE MU PPDU)." | Revised –  Agree in principle with the comment. Proposed resolution accounts for the suggested change, accounting for other changes proposed during the CR process for other CIDs.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7485. |
| 7486 | Lei Huang | 45.04 | 80+80MHz is missing. | Replacing "For 160 MHz four SR fields for each 40 MHz" by "For 80+80 MHz or 160 MHz four SR fields for each 40 MHz" | Revised –  Agree in principle with the comment. The proposed change is inline with definitions in provided in Table 28-19. Proposed resolution is to provide a reference to this table, inline with proposed resolution of other CIDs in this group.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7486. |
| 7488 | Lei Huang | 48.05 | M\_PAD is defined in the same manner in both (9-ax1) and (9-ax2). | delete the definition of M\_PAD under (9-ax2) | Revised –  Agree with comment. Proposed resolution deletes redundant definition.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7488. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 7748 | Mark Hamilton | 47.56 | Math equation is a little messed up. | Add a multiplication glyph between N\_DBPS and m\_PAD. | Accepted |
| 7749 | Mark Hamilton | 48.04 | Math equation is a little messed up. What is "SHORT"? | Replace the comma with a multiplication glyph between N\_DBPS and m\_PAD. Delete "SHORT" (or explain what it means). | Revised –  NDBS, Short is defined in equation 28-61. Proposed resolution is to add a reference to it.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7749. |
| 7750 | Mark Hamilton | 48.60 | Can refers to normative permission, not appropriate here | Change "can be aggregated by a STA" to "the STA supports aggregating" | Rejected –  May refers to normative permission. Can refers to declarative permission. Multiple occurrences of “can” are found in REVmc D8.0 in clause 9, e.g., in 9.2.2, 9.2.4.5.2, Table 9-9, etc. |
| 7913 | Mark RISON | 42.59 | "If the Cascade Indication subfield is 1, then a subsequent Trigger frame as defined in 27.7 (TWT operation) and in 27.14.2 (Power save with UL OFDMA-based random access) follows the current Trigger frame. " -- these xrefs look wrong | Fix the xrefs to the two subclauses that discuss the subsequent Trigger frames | Revised –  The references are correct. To make it more precise we provide the respective subclauses for the two TWT cases where this behaviour is defined.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7913. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 7956 | Mark RISON | 48.04 | "N\_DBPS,SHORT" is not defined | Give a xref to Equation (28-61) | Revised –  Agree with comment and account for it.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7956. |
| 7958 | Mark RISON | 47.55 | "N\_DBPS" is not defined | Give a xref to some equation or table in Clause 28 | Revised –  Agree with comment and account for it.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 7958. |
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| 8112 | Matthew Fischer | 44.60 | The description of the Spatial Reuse field is poorly written. For example, the description does not indicate which portions of a 40, 80 or 160 MHz channel are affected by which pieces of the SR field; The description is unclear about which fields are identical to which fields in the case of 40 and 80 MHz; There is no information about which BW is the BW of reference for the words "For 20 MHz one SR field" etc.; The current descripton talks about "SR field 1", "SR field 2" but nowhere is there a picture or even a sentence defining what these are. | Clarify the problems highlighted in the comment. | Revised –  Agree in principle with the comment. Proposed resolution is to simplify all this paragraph and simply refer to Table 9-51e for encoding of the fields, and Table 28-19 for the respective values.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 8112. |
| 8189 | Osama Aboulmagd | 49.15 | Can someone please translate the paragraph starting at line 11 on page 49 and ending at line 15 of the same page? For example what does, "the AC that is recommeneded for aggregation of MPDUs of Acs belonging to the same AC..." Acs belonging to the same AC!!!!! | as in comment | Revised –  Agree in principle that the words are poorly chosen. There is no need to translate since it is still English, but it is helpful to have some more clarifications. Proposed change clarifies this by simplifying the text.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 8189. |
| 8253 | Pascal VIGER | 48.23 | The MU-RTS can be used as a protection for UL transmission triggered by a Basic trigger frame. Using such successive TF frames is not efficient. It is more efficient if the basic trigger can also trigger CTS frames, before the UL transmissions occur. Thus overhead is reduced. | The "Trigger Dependent Common Info field" may be used to indicate the STA in charge of emitting HE-Triggered CTS frames. A specific structure composed of AID12 and RU Allocation subfields may be used. This replaces the requirement of using a dedicated MU-RTS trigger frame. The CTS frames will be emitted a SIFS after the Basic Trigger frame having such Trigger Dependent Common Info field. The UL triggered PPDUs are sent by STA a SIFS after CTS frames. | Rejected –  MU RTS/CTS is used to protect following DL delivery to the set of STAs that are sending back the CTS frames. Basic Trigger frame enables a set of STAs to send UL delivery to the AP. These features are independent and serve different purposes which mixing would lead to complications (as proposed by the proposed resolution) without compelling benefits. |
| 8254 | Pascal VIGER | 51.00 | 9.3.1.23.7 Bandwidth Query Report Poll variant As the Common Info field of the BQRP variant Trigger frame is defined in Figure 9-52d, there is missing the usage of such common info fields : are they all used or required ? | As done for MU-RTS, clarify which fields are reserved. | Rejected –  The BQR information in sent in an HE TB PPDU as such all the fields that are provided in the Trigger frame are used. Please refer to 27.5.1.3 which defines the normative behaviour for BQRP/BQR reporting procedure. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 8650 | Sigurd Schelstraete | 41.37 | Split sentence for clarity | Change "The Trigger frame solicits and allocates resources for UL MU transmissions a SIFS after the PPDU that carries the Trigger frame." to "The Trigger frame solicits and allocates resources for UL MU transmissions. The UL MU transmissions start a SIFS after the PPDU that carries the Trigger frame." | Revised –  Agree in principle. Proposed resolution accounts for the suggested change, while referring to the transmission as HE TB PPDU which is the correct terminology.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 8650. |
| 8653 | Sigurd Schelstraete | 42.57 | "HE trigger-based PPDU" could be plural. | Change "the value of the L-SIG Length field of the HE trigger-based PPDU that is the response to the Trigger frame" to "the value of the L-SIG Length field of all the HE trigger-based PPDUs that are sent in response to the Trigger frame" | Rejected –  Agree that are multiple HE TB PPDUs, each generated by one of the intended receivers of the User Info fields of the Trigger frame. However, from the APs (and third party STAs) this PPDU is observed as a single PPDU (same non-HT preamble, same HE preamble). The only parts that have different information is the PSDUs contained therein. As such it is appropriate to refer to as the HE TB PPDU. |
| 8654 | Sigurd Schelstraete | 43.07 | "HE trigger-based PPDU" could be plural. | Change "the bandwidth in the HE-SIG-A of the HE trigger-based PPDU" to "the bandwidth in the HE-SIG-A field of all the HE trigger-based PPDUs that are sent in response to the Trigger frame" | Rejected –  Agree that are multiple HE TB PPDUs, each generated by one of the intended receivers of the User Info fields of the Trigger frame. However, from the APs (and third party STAs) this PPDU is observed as a single PPDU (same non-HT preamble, same HE preamble). The only parts that have different information is the PSDUs contained therein. As such it is appropriate to refer to as the HE TB PPDU. |
| 8655 | Sigurd Schelstraete | 44.26 | Change "the same as" to "the same as the encoding of" | See comment | Revised –  Agree in principle. Incorporated the proposed change inline with the resolution of other CIDs in this paragraph.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 8655. |
| 9102 | stephane baron | 42.52 | Create a new type of trigger frame for the NDP | Allocate one of the reserved value of the Trigger Type field to the NDP feedback mechanism | Revised –  Proposed resolution is inline with that of several CIDs that have already been resolved for this ptable that add a new value for this particular case.  **Note to Editor: No further changes are required for this instruction as these changes are already incorporated in D1.3.**  TGax editor to make the changes shown in TGax D1.3 in P79L60. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 9264 | Tomoko Adachi | 49.01 | It should be clarified that, the value to be compared withn the TID Aggregation Limit subfield value in the Trigger frame is the value of the Multi-TID Aggregation Support field + 1. | Change the sentence starting from page 49 line 1 to read "The value in the TID Aggregation Limit subfield in Trigger frame is less than or equal to the value indicated in the Multi-TID Aggregation Support field in the HE Capabilities element (see 9.4.2.218 (HE Capabilities element)) plus 1. | Revised –  Agree in principle. Proposed resolution accounts for the suggested change.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9264. |
| 9350 | Tomoko Adachi | 48.61 | Count Action Ack frame as one TID (TID=15) when considering the TID Aggregation Limit subfield. | Add "Action Ack frame is also treated to consume one TID (TID=15)." after the sentence starting from line 61 in page 48. | Rejected –  The comment fails to identify a technical issue. TID Aggregation limit is used to limit the number of QoS Data frames that can be added in the HE TB PPDUs. This is to enable the AP to control the number of parallel BA sessions it needs to maintains. Action [Ack] frames do not participate in these BA sessions. |
| 9470 | xun yang | 42.32 | There is no definition of each subfield of Trigger variant. | Please define each subfield of trigger variant to make them clear somewhere. | Rejected –  The comment fails to provide sufficient details that would enable the comment resolution to be satisfactory for the comment (round robin). Reviewing this subclause it was not possible to identify any of the fields that are missing a definition. Please submit a more precise comment that identifies an issue to be resolved. |
| 9473 | xun yang | 47.61 | What is the definition of "max TF MAC Padding Duration"? Where is this parameter from at the Tx side? | Please clarify. | Revised –  Agree in principle. Proposed resolution is to use the parameter that is defiend in the normative behaviour and add a reference to that normative behaviour subclause.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9473. |
| 9631 | Yongho Seok | 46.23 | Add the following into the last row of Table 9-25f. 1000101 - 1111111 | Reserved | 59 | As per comment. | Revised –  Agree with comment. Proposed resolution adds the row.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9631. |
| 9635 | Yongho Seok | 48.04 | What is a NDBPS,SHORT in Equation (9-ax2)? | Define NDBPS,SHORT. | Revised –  Agree in principle. Adding reference to the equation that defines it.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9635. |
| 9638 | Yongho Seok | 47.62 | When HT/VHT PPDU containing a Trigger frame with a Padding field is transmitted by using a short GI, additional two OFDM symbols (3.6usx2=7.2us)do not meet the Trigger Frame MAC Padding Duration of 8us. Please either disallow to use a short GI or add the mPAD values for a short GI as the following: mPAD = 0, max TF MAC Padding Duration among receiving STAs = 0 uss mPAD = 3, max TF MAC Padding Duration among receiving STAs = 8 uss mPAD = 5, max TF MAC Padding Duration among receiving STAs = 16 uss | As per comment. | Revised –  Agree in principle. A statement disallowing short guard interval for HT and VHT PPDUs is added to the draft (already there in D1.3) which solves the issue.  **Note to Editor: No further changes are required for this instruction as these changes are already incorporated in D1.3.**  TGax editor to make the changes shown in TGax D1.3 in P22118-19. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 9640 | Yongho Seok | 48.40 | "The MPDU MU Spacing Factor subfield indicates the value by which the minimum MPDU start spacing defined in Table 8-159 is multiplied." Any normative behavior of the STA transmitting A-MPDU is not defined for this MPDU MU Spacing Factor subfield. | Add some normative behavior of the STA using the MPDU MU Spacing Factor subfield in 10.13.3 (Minimum MPDU Start Spacing field). | Revised –  Agree with the comment. Proposed resolution does so.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9640. |
| 9641 | Yongho Seok | 51.33 | "The Trigger Dependent Common Info field of the GCR MU-BAR variant Trigger frame is defined in Figure 9-52j (Trigger Dependent Common Info field for the GCR MU-BAR variant)." Each recipent GCR STAs can have different block bitmap that is started from different starting sequence. For the BAR Control Information and BAR Information, please change the Trigger Dependent Common Info field to the Trigger Dependent User Info field. | As per comment. | Rejected –  The originator uses explicit BARs to align the blockack scoreboards of the intended recipients (WinStartR) to its own WinStartO, which is one value. As such all recipients are expected to receive the same value of starting sequence number to perform such operation. The current design allows this. |
| 9644 | Yongho Seok | 45.43 | "The first bit, B12, indicates the allocated RU is located in the primary or non-primary 80 MHz (zero for primary and one for non-primary)." What do a primary and a non-primary 80 MHz indicates? Non-primary 80 MHz is not defined in Clause 3. | Change it as the following: "The first bit, B12, is set to 0 for indicating that the allocated RU is located in a primary 80 MHz channel or set to 1 for indicating that the allocated RU is located in a secondary 80 MHz channel." | Revised –  Agree in principle with the comment. Proposed resolution clarifies this aspect.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9644. |
| 9822 | Young Hoon Kwon | 41.62 | How about MU-BAR frame with GCR bit in BAR Control field is set to 1? Need further clarification. | As in the comment. | Revised –  Agree in principle with the comment. Proposed resolution clarifies it by specifying that the variants are either Compressed or Multi-TID BARs. The others are either not used or indicated in the CGR MU BAR counterpart.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9822. |
| 9824 | Young Hoon Kwon | 44.26 | There's no "Number of HE-LTF Symbols" defined in Table 28-18. Need clarification | As in the comment. | Revised –  Agree in principle. Proposed resolution is to clarify the referenced table is the one containing the definitions for the HE MU PPDU, not the HE TB PPDU that was referenced earlier.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9824. |
| 9825 | Young Hoon Kwon | 45.01 | It needs further clarification which SR subfield corresponds which 20MHz out of 40/80/160/80+80 channel bandwidth. | As in the comment. | Revised –  Agree in principle. Proposed resolution incorporates changes from a plurality of CIDs that clarified this aspect by referring to Table 28-19 (HE SIG-A field of an HE TB PPDU) which contains the correspondences.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9825. |
| 9829 | Young Hoon Kwon | 47.39 | It is not clear why we need Target RSSI subfield set to 127 if it implies maximum transmit power for the assigned MCS, because the AP sets the target RSSI value to reasonably high such that the STA needs to use its maximum power. Rather, it may be better to imply that no restriction on STA's transmit power. | Modify the description to "Indicates to the STAthat the target received signal power of the HE trigger-based PPDU response is not applied.". | Rejected –  Specifying that the STA transmits at maximum transmit power for the assigned MCS is different from specifying that there is no restriction (in this case the STA would be free to transmit at any TX PWR, which would cause failed transmission due to lower RSSI at RX). Current terminology is correct. |
| 9832 | Young Hoon Kwon | 48.64 | Then, how to indicate the STA can aggregate frames from 7 different TIDs? Need further clarification. | As in the comment. | Revised—  Agree in principle with the comment that more clarification is beneficial here, and in the normative behaviour clauses.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9832. |
| 9833 | Young Hoon Kwon | 50.16 | Table 9-24c is for Multi-STA BA variant and is not for Multi-TID BA variant. Instead, in the baseline RevMC spec., it says "The Fragment Number subfield of the Block Ack Starting Sequence Control subfield is set to 0.". Therefore, this sentence is not in line with baseline rule. It needs clarification. | As in the comment. | Revised –  Agree in principle. Proposed resolution is to remove the offending sentence.  **Note to Editor: No further changes are required for this instruction as these changes are already incorporated in D1.3.**  TGax editor to make the changes shown in TGax D1.3 in P85L4. |

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 9990 | Yuichi Morioka | 41.61 | The sentence "If the Trigger Type field is GCR-MU BA, ..." may contradict with the previous two sentences. | add "If the Trigger Type field is not GCR-MU BA and" to the previous two sentences. | Revised –  Agree in principle. Proposed resolution accounts for the suggested change.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9990. |
| 9991 | Yuichi Morioka | 42.51 | AP should be allowed to trigger CF\_End frame transmission from multiple STAs, to cancel over-reserved NAV set by MU-RTS. | Replace p.42 line 51 "7-15 Reserved" with "7 MU-CF\_End" and add in the next line "8-15 Reserved" | Rejected –  AP uses MU RTS/CTS to reserve the medium for following DL BU delivery to a plurality of STAs, which confirm by sending CTS frames. At this stage the AP is the TXOP holder. The TXOP holder should not overreserve the medium in the first place, but if it does so it is the duty of the TXOP holder (AP) to send a CF-End frame, not of STAs. |
| 9992 | Yuichi Morioka | 42.61 | "...follows the current Trigger frame." This implies that the Trigger frames are sent back to back. Is this the intent? | Change "follows the current Trigger frame" with "will be transmitted". | Revised –  Agree in principle. Proposed resolution clarifies this part by referencing to the normative behaviour subclauses and replacing the cited text with “is scheduled for transmission.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9992. |
| 9994 | Yuichi Morioka | 44.65 | "For 20MHz one SR field..." Unclear what is 20MHz. | Replace "For 20MHz" with "If the BW sublfield is set to 0,". Same for other bandwidths. | Revised –  Agree in principle with the proposed change, although not clear why it is not clear what a 20 MHz is. Proposed resolution is inline with the proposed changes of multiple CIDs in this paragraph that provide a figure for the SR subfield and a reference to table 28-19 where the definitions of each SR subfields are present.  TGax editor to make the changes shown in 11-17/1264r2 under all headings that include CID 9994. |
| 10002 | Yuichi Morioka | 49.07 | recommendation is useless. Either remove the recommendation or change it to a requirement. | as commented. | Rejected –  The comment fails to identify a technical issue. The recommendation is useful because it allows the the AP to provide guidance to the STA on what type of traffic the STA should include in the HE TB PPDU (traffic shaping), while leaving the flexibility to the STA to incorporate types of traffic that are more urgent (e.g., depending on its buffer status, delivery delay requirements and so on). |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 10238 | Yusuke Tanaka | 51.30 | The operation and the frame for GCR with MU-BAR is defined in this spec, but a hole in a receiver's Block Ack bitmap problem (previously known since11aa) remains. It can be solved by GCR MU-BAR variant with a bitmap of sequence numbers corresponding to the GCR stream. | Add GCR sequence number bitmap in Trigger Dependent Common Info field for the GCR MU-BAR variant. | Rejected –  The originator uses explicit BARs to align the blockack scoreboards of the intended recipients (WinStartR) to its own WinStartO, which is one value. As such all recipients are expected to receive the same value of starting sequence number to perform such operation. The current design allows this. |

**Discussion: *None.***

# 9.3.1.23 Trigger frame format

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 8650):***

The Trigger frame solicits and allocates resources for HE TB PPDU transmissions. The HE TB PPDU transmission starts SIFS after the PPDU that carries the Trigger frame*(#8650)*. The Trigger frame also carries other information required by the responding STA to send an HE TB PPDU.

The frame format for the Trigger frame is defined in Figure 9-52c (Trigger frame).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Frame Control | Duration | RA | TA | Common Info | User Info | ... | User Info | Padding | FCS |
| Octets: | 2 | 2 | 6 | 6 | 8 or more | 5 or more |  | 5 or more | variable | 4 |
| * Trigger frame | | | | | | | | | | |

The Duration field is set as defined in 9.2.5 (Duration/ID field (QoS STA)).

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 9990):***

The RA field of the Trigger frame is the address of the recipient STA(s). The RA field is set to the individual address of the STA if the Trigger frame has only one User Info field containing the 12 LSBs of the AID of the STA in the AID12 field, is set to the broadcast address if the Trigger frame is not a GCR MU-BAR and has either more than one User Info field or has at least one User Info field that allocates random access RUs, and is set to the MAC address of the group for which reception status is being requested if the Trigger frame is GCR MU-BAR.

*(#9990)*

The TA field is the address of the STA transmitting the Trigger frame when the Trigger frame is addressed to STAs that belong to a single BSS. The TA field is the address of the transmitted BSSID when the Trigger frame is addressed to STAs from at least two different BSSs of the multiple BSSID set. The rules for setting of the TA field are defined in 27.5.2.2.2 (Allowed settings of the Trigger frame fields and UMRS Control field).

The Common Info field is defined in Figure 9-52d (Common Info field).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0    B3 | B4   B15 | B16 | B17 | B18 B19 | B20   B21 | B22 | B23    B25 | B26 |
|  | Trigger Type | Length | Cascade Indication | CS Required | BW | GI And LTF Type | MU-MIMO LTF Mode | Number Of HE-LTF Symbols | STBC |
| Bits: | 4 | 12 | 1 | 1 | 2 | 2 | 1 | 3 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B27 | B28     B33 | B34    B36 | B37    B52 | B53 | B54    B62 | B63 |  |
|  | LDPC Extra Symbol Segment | AP TX Power | Packet Extension | Spatial Reuse | Doppler | HE-SIG-A Reserved | Reserved | Trigger Dependent Common Info |
| Bits: | 1 | 6 | 3 | 16 | 1 | 9 | 1 | variable |
| * Common Info field | | | | | | | | |

The Trigger Type subfield indicates the type of the Trigger frame. The Trigger frame can include an optional Trigger Dependent Common Info subfield and optional Trigger Dependent User Info subfield. The Trigger Type subfield encoding is defined in Table 9-25a (Trigger Type subfield encoding).

|  |  |
| --- | --- |
| * Trigger Type subfield encoding | |
| Trigger Type field value | Description |
| 0 | Basic Trigger |
| 1 | Beamforming Report Poll (BRP) |
| 2 | MU-BAR |
| 3 | MU-RTS |
| 4 | Buffer Status Report Poll (BSRP) |
| 5 | GCR MU-BAR |
| 6 | Bandwidth Query Report Poll (BQRP) |
| 7 | NDP Feedback Report Poll |
| 8-15 | Reserved |

The Length subfield of the Common Info field indicates the value of the L-SIG Length field of the HE TB PPDU that is the response to the Trigger frame.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7913, 9992):***

The Cascade Indication subfield of the Common Info field(#8020) is set to 1 to indicate that a subsequent Trigger frame is scheduled for transmission as defined in 27.7.2 (Individual TWT agreements), 27.7.3.2 (Rules for TWT scheduling AP), and in 27.14.2 (Power save with UORA), . Otherwise the Cascade Indication subfield is set to 0. *(#7913, 9992)*

The CS Required subfield of the Common Info field is set to 1 to indicate that the STAs identified in the User Info fields are required to use ED to sense the medium and to consider the medium state and the NAV in determining whether or not to respond. The CS Required subfield is set to 0 to indicate that the STAs identified in the User Info fields are not required to consider the medium state or the NAV in determining whether or not to respond. See 27.5.2.3 (STA behavior for UL MU operation) and 27.5.2.4 (UL MU CS mechanism) for details.

The BW subfield of the Common Info field indicates the bandwidth in the HE-SIG-A of the HE TB PPDU and is defined in Table 9-25b (BW subfield encoding).

|  |  |  |
| --- | --- | --- |
| * BW subfield encoding | | |
| BW subfield value | Description |
| 0 | 20 MHz |
| 1 | 40 MHz |
| 2 | 80 MHz |
| 3 | 80+80 MHz or 160 MHz |

The GI And LTF Type subfield of the Common Info field indicates the GI and HE-LTF type of the HE TB PPDU response. The GI And LTF Type subfield encoding is defined in Table 9-25c (GI And LTF Type subfield encoding).

|  |  |  |
| --- | --- | --- |
| * GI And LTF Type subfield encoding(#6124) | | |
| GI And LTF field value | Description |
| 0 | 1x LTF + 1.6 µs GI |
| 1 | 2x LTF + 1.6 µs GI |
| 2 | 4x LTF + 3.2 µs GI |
| 3 | Reserved |

The MU-MIMO LTF Mode subfield of the Common Info field indicates the LTF mode of the UL MU-MIMO HE TB PPDU response. The AP shall set the MU-MIMO LTF Mode subfield to single stream pilots if the triggered UL PPDU contains partial or full UL OFDMA allocation. The MU-MIMO LTF Mode subfield encoding is defined in Table 9-25d (MU-MIMO LTF Mode subfield encoding).

|  |  |  |
| --- | --- | --- |
| * MU-MIMO LTF Mode subfield encoding | | |
| MU-MIMO LTF subfield value | Description |
| 0 | HE single stream pilot HE LTF mode |
| 1 | HE masked HE LTF sequence mode |

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7485, 8655, 9824):***

The Number Of HE-LTF Symbols subfield of the Common Info field indicates the number of HE-LTF symbols present in the HE TB PPDU that is the response to the Trigger frame minus one:

* For a non-OFDMA PPDU the number of HE-LTF symbols is a function of the total number of space-time streams, *NSTS, total* and the encoding of the Number Of HE-LTF Symbols subfield is defined in Table 21-13.

For an OFDMA PPDU the number of HE-LTFs symbols is greater than or equal to the maximum *NSTS, total* across all allocated RUs and the encoding of the Number Of HE-LTF Symbols subfield is the same as the encoding of the Number of HE-LTF Symbols defined in Table 28-18 (HE-SIG-A field of an HE MU PPDU).*(#7485, 8655, 9824)*The STBC subfield of the Common Info field indicates the status of STBC encoding of the HE TB PPDU that is the response to the Trigger frame. It is set to 1 if STBC encoding is used and set to 0 otherwise.

The LDPC Extra Symbol Segment subfield of the Common Info field indicates the status of the LDPC extra symbol segment. It is set to 1 when LDPC extra symbol segment is present and set to 0 otherwise.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 5129):***

The AP Tx Power subfield of the Common Info field indicates the combined average power per 20 MHz bandwidth referenced to the antenna connector, of all transmit antennas used to transmit the Trigger frame*(#5129)* at the HE AP. The resolution for the transmit power reported in the Common Info field is 1 dB. The AP Tx Power subfield encoding is defined in Table 9-25e (AP Tx Power subfield encoding).

|  |  |
| --- | --- |
| * AP Tx Power subfield encoding | |
| AP Tx Power subfield value | Description |
| 0-60 | Values 0 to 60(#7677) map to 20 dBm to 40 dBm |
| 61-63 | Reserved |

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 5158, 4988):***

The Packet Extension subfield of the Common Info field indicates the PPDU extension (PE) *(#5158, 4988)* duration of the HE TB PPDU that is the response to the Trigger frame. The structure of the Packet Extension subfield is defined in Figure 9-52e (Packet Extension subfield).

|  |  |  |
| --- | --- | --- |
|  | B0                     B1 | B2 |
|  | Pre-FEC Padding Factor | PE Disambiguity |
| Bits: | 2 | 1 |
| * Packet Extension subfield | | | |

The subfields of the Packet Extension subfield are defined in Table 9-25f (Subfields of the Packet Extension subfield) and have the same encoding as their respective subfields in HE SIG-A (see Table 28-19—HE-SIG-A field of an HE TB PPDU)) *(#5158)*.

|  |  |  |
| --- | --- | --- |
| * Subfields of the Packet Extension subfield | | |
| Subfield | Description | Encoding |
| Pre-FEC Padding Factor | Indicates the pre-FEC padding factor | Set to 0 to indicate a pre-FEC padding factor of 4  Set to 1 to indicate a pre-FEC padding factor of 1  Set to 2 to indicate a pre-FEC padding factor of 2  Set to 3 to indicate a pre-FEC padding factor of 3 |
| PE Disambiguity | Indicates PE disambiguity | Set to 0 to indicate no PE disambiguity  Set to 1 to indicate PE disambiguity |

The PE Disambiguity subfield shall be set to 1 if the condition in Equation (28-109) is met, otherwise it shall be set to 0.

**TGax Editor: *Change the paragraph below as follows (#CID 3013, 3014, 5319, 5826, 7486, 8112, 9825, 9994):***

The Spatial Reuse subfield of the Common Info field carries the value for the Spatial Reuse fields in the HE-SIG-A field of the HE TB PPDU that is the response to the Trigger frame. The format of the Spatial Reuse subfield is shown in Figure 9-52e1 (Spatial Reuse field), where each Spatial Reuse *n* subfield, 1 <= *n* <= 4, is set to the same value as its corresponding subfield in the HE-SIG-A of the TB PPDU, which are defined in Table 28-19 (HE-SIG-A field of an HE TB PPDU).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0                     B3 | B4                 B7 | B8                B11 | B12                   B15 |
|  | Spatial Reuse 1 | Spatial Reuse 2 | Spatial Reuse 3 | Spatial Reuse 4 |
| Bits: | 4 | 4 | 4 | 4 |
| Figure 9-52e1 – Spatial Reuse field | | | | |

*(#3013, 3014, 5319, 5826, 7486, 8112, 9825, 9994)*The Doppler subfield of the Common Info field indicates a high Doppler mode of transmission.

The HE-SIG-A Reserved subfield of the Common Info field indicates the values of the reserved bits in the HE-SIG-A2 subfield of the HE TB PPDU that is the response to the Trigger frame. Bits B54 to B62 in the Trigger frame are set to 1 and correspond to the bits B7 to B15 in the HE-SIG-A2 subfield of the HE TB PPDU with B54 in the Trigger frame corresponding to B7 in the HE-SIG-A2 subfield of the HE TB PPDU and so on.

The User Info field is defined in Figure 9-52f (User Info field).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0   B11 | B12    B19 | B20 | B21  B24 | B25 | B26     B31 | B32     B38 | B39 |  |
|  | AID12 | RU  Allocation | Coding Type | MCS | DCM | SS  Allocation | Target RSSI | Reserved | Trigger Dependent User Info |
| Bits: | 12 | 8 | 1 | 4 | 1 | 6 | 7 | 1 | variable |
| * User Info field | | | | | | | | | |

The AID12 subfield of the User Info field carries the 12 LSBs of the AID of the STA for which the User Info field is intended. An AID12 subfield that is 0 or 2045 indicates that the User Info field allocates an RU for random access (see 27.5.4 (UL OFDMA-based random access (UORA))). User Info fields with AID12 not equal to 0 and not equal to 2045 appear before User Info fields with AID12 equal to 0 or equal to 2045 (if any present).

**TGax Editor: *Change the paragraph below, and table, of this subclause as follows (#CID 3117, 9631, 9644, 5757):***

The RU Allocation subfield of the User Info field indicates the RU used by the HE TB PPDU of the STA identified by the AID12 subfield. The first bit, B12, is set to 0 to indicate that the allocated RU is located within the primary 80 MHz and is set to 1 to indicate that the allocated RU is located within the secondary 80 MHz *(#9644, 5757)*. The mapping of the subsequent 7 bits, B19-B13, indices to the RU allocation is defined in Table 9-25g (The encoding of B19–B13 of the RU Allocation subfield).

|  |  |  |
| --- | --- | --- |
| * The encoding of B19–B13 of the RU Allocation subfield | | |
| B19 – B13 | Description | Number of entries |
| 0 – 36 | Possible 26-tone RU cases in 80 MHz | 37 |
| 37 – 52 | Possible 52-tone RU cases in 80 MHz | 16 |
| 53 – 60 | Possible 106-tone RU cases in 80 MHz | 8 |
| 61 – 64 | Possible 242-tone RU cases in 80 MHz | 4 |
| 65 – 66 | Possible 484-tone RU cases in 80 MHz | 2 |
| 67 | 996-tone RU cases in 80 MHz | 1 |
| 68*(#3117)* | 2996-tone RU case | 1 |
| 69 – 127 | Reserved | 59 |
| Total |  | 128*(#9631)* |
| NOTE—These values are in binary form in PHY (see for example Table 28-23( RU Allocation subfield) | | |

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 3117, 3164, 5757):***

**TGax Editor*: Please incorporate also the itemization present in this document (#CID 3164):***

B12 is set to 0 for 20 MHz, 40 MHz and 80 MHz PPDUs, is set to either 0 or 1 for 80+80 MHz and 160 MHz PPDUs. The mapping of subsequent 7 bits indices B19-B13 to RU index in each row depends on the BW subfield in Common Info field:

* For a 20 MHz PPDU, the mapping of B19-B13 to RU allocation follows the RU index in Table 28-5 (Data and pilot subcarrier indices for RUs in a 20 MHz HE PPDU) in increasing order.
* The value 0 indicates 26-tone RU1 [121: 96], the value 8 indicates 26-tone RU9 [96: 121], and the values 9-36 are not used.
* The value 37 indicates 52-tone RU1 [121: 70], the value 40 indicates 52-tone RU4 [70: 121], and the values 41-52 are not used.
* The value 53 indicates 106-tone RU1 [122: 17], the value 54 indicates 106-tone RU2 [17: 122], and the values 55-60 are not used.
* The value 61 indicates 242-tone RU1 [122: 2, 2:122], and the values 62-64 are not used.
* For a 40 MHz PPDU, the mapping of B19-B13 to RU allocation follows the RU index in Table 28-6 (Data and pilot subcarrier indices for RUs in a 40 MHz HE PPDU) in increasing order.
* The value 0 indicates 26-tone RU1 [243: 218], the value 17 indicates 26-tone RU18 [218: 243], and the values 18-36 are not used.
* The value 37 indicates 52-tone RU1 [243: 192], the value 44 indicates 52-tone RU8 [192: 243], and the values 45-52 are not used.
* A similar ordering is followed for 106-tone RU, 242-tone RU and 484-tone RU.
* For an 80 MHz, 160 MHz and 80+80 MHz PPDU, the mapping of B19-B13 to RU allocation follows the RU index in Table 28-7 (Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU) in increasing order .
* The value 0 indicates 26-tone RU1 [499: 474], and the value 36 indicates 26-tone RU37 [474: 499].
* The value 37 indicates 52-tone RU1 [499: 448], and the value 52 indicates 52-tone RU16 [448: 499].
* A similar ordering is followed for 106-tone RU, 242-tone RU, 484-tone RU and 996-tone RU.
* For a 160 MHz and 80+80 MHz PPDU, B19-B13 is set to 68 and B12 is set to 1 to indicate 2996-tone RU. *(#3117, 3164, 5757)*

The Coding Type subfield of the User Info field indicates the code type of the HE TB PPDU that is the response to the Trigger frame. The Coding Type subfield is set to 0 to indicate BCC and set to 1 to indicate LDPC.

The MCS subfield of the User Info field indicates the MCS of the HE TB PPDU that is the response to the Trigger frame. The encoding of the MCS field is defined in 28.3.7 (HE modulation and coding schemes (HE-MCSs)).

The DCM subfield of the User Info field indicates dual carrier modulation of the HE TB PPDU that is the response to the Trigger frame. The DCM subfield is set to 1 to indicate that DCM is used the HE TB PPDU that is the response to the Trigger frame as defined in 28.3.11.15 (Dual carrier modulation). The DCM subfield is set to 0 to indicate that DCM is not used.

The SS Allocation subfield of the User Info field indicates the spatial streams of the HE TB PPDU that is the response to the Trigger frame. The format of the SS Allocation subfield is defined in Figure 9-52g (SS Allocation subfield format).

|  |  |  |
| --- | --- | --- |
|  | B26 B28 | B29 B31 |
|  | Starting Spatial Stream | Number Of Spatial Streams |
| Bits: | 3 | 3 |
| * SS Allocation subfield format | | |

The Starting Spatial Stream subfield indicates the starting spatial stream, STARTING\_SS\_NUM, and is set to STARTING\_SS\_NUM  1.

The Number Of Spatial Streams subfield indicates the number of spatial streams, NUM\_SS and is set to NUM\_SS  1.

The Target RSSI subfield of the User Info field indicates the target received signal power of the HE TB PPDU that is the response to the Trigger frame. The resolution for the Target RSSI subfield in the User Info field is 1 dB. The Target RSSI subfield encoding is defined in Table 9-25h (Target RSSI subfield encoding).

|  |  |
| --- | --- |
| * Target RSSI subfield encoding | |
| Target RSSI subfield | Description |
| 0–90 | Values 0 to 90 map to 110 dBm to 20 dBm |
| 91–126 | Reserved |
| 127 | Indicates to the STA to transmit an HE TB PPDU response at its maximum transmit power for the assigned MCS |

The Padding field extends the frame length to give the recipient STAs more time to prepare a response. The Padding field of the Trigger frame, if present, is an integer number of two or more octets and is set to all 1s. The start of the Padding field is identified by the value 2047 that appears in the position of the AID12 subfield of a User Info field that would otherwise be present. The AID value 2047 is reserved as the special value to indicate the start of the padding. The length of the Padding field is in units of octets and is set as defined in the following formulas.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7261, 7958, 9473):***

For a non-HT PPDU, HT PPDU and VHT PPDU, the length of the Padding field (in octets), which depends on the *MinTrigProcTime* (see 27.5.2.2 (Rules for soliciting UL MU PPDU), *(#9473)* is given by Equation (9-ax1).

* (#3118)

Where

**TGax Editor: *Change in the equation below “*, max TF MAC Padding Duration among receiving STAs =*” with “* if MinTrigProcTime is*” (#CID 9473):***



*NDBPS* is defined in Table 28-12*(#7261, 7958)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7488, 7263, 7749, 7956, 9635, 9473):***

For an HE PPDU, the length of the Padding field (in octets), which depends on the *MinTrigProcTime* (see 27.5.2.2 (Rules for soliciting UL MU PPDU), *(#9473)* is given by Equation (9-ax2).

* (#3118)

where

*(#7488)*

*NDBPS, SHORT* is defined in equation 28-61. *(#7263, 7749, 7956, 9635)*

# 9.3.1.23.1 Basic Trigger variant

The Trigger Dependent Common Info subfield is not present in the Basic Trigger frame. The Trigger Dependent User Info subfield of the Basic Trigger frame is defined in Figure 9-52h (Trigger Dependent User Info subfield for the Basic Trigger variant).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0                       B1 | B2                    B4 | B5 | B6               B7 |
|  | MPDU MU Spacing Factor | TID Aggregation Limit | Reserved | Preferred AC |
| Bits: | 2 | 3 | 1 | 2 |
| * Trigger Dependent User Info subfield for the Basic Trigger variant | | | | |

**TGax Editor: *Change this paragraph as follows (#CID 9640):***



The MPDU MU Spacing Factor subfield is used for calculating *MSF*, the value by which the minimum MPDU start spacingis multiplied (see 10.13.3 (Minimum MPDU start spacing field). *MSF* is equal to 2MPDU MU Spacing Factor­ *(#9640)***TGax Editor*: Change the paragraph below of this subclause as follows (#CID 9264, 9832):***

The TID Aggregation Limit subfield indicates what MPDUs are allowed in an A-MPDU carried in the HE TB PPDU and the maximum number of TIDs that can be aggregated by the STA in the A-MPDU and is set as defined in 27.5.2.2.2 (Allowed settings of the Trigger frame fields and UMRS Control field).

The value in the TID Aggregation Limit subfield in Trigger frame is less than or equal to *MT* plus one, where *MT* is the value indicated in the Multi-TID Aggregation Support field in the HE Capabilities element transmitted by the AP that is the intended receiver of the User Info field.*(#9264, 9832)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 8189):***

The Preferred AC subfield indicates the lowest AC that is recommended for aggregation of MPDUs in the A-MPDU contained in the HE TB PPDU sent as a response to the Trigger frame (see 9.3.1.23 (Trigger frame format)). The encoding of the Preferred AC subfield is shown in Table 9-25j (Preferred AC subfield encoding). *(#8189)*

|  |  |
| --- | --- |
| * Preferred AC subfield encoding | |
| Value | Description |
| 3 | AC\_VO |
| 2 | AC\_VI |
| 1 | AC\_BE |
| 0 | AC\_BK |

# 9.3.1.23.2 Beamforming Report Poll (BRP) variant

The Trigger Dependent Common Info subfield is not present in the BRP Trigger frame. The Trigger Dependent User Info subfield of the BRP Trigger frame is defined in Figure 9-52i (Trigger Dependent User Info subfield for the Beamforming Report Poll variant).

|  |  |
| --- | --- |
|  |  |
|  | Feedback Segment Retransmission Bitmap |
| Octets: | 1 |
| * Trigger Dependent User Info subfield(#7324) for the Beamforming Report Poll variant | |

The Feedback Segment Retransmission Bitmap subfield indicates the requested feedback segments of an HE compressed beamforming report. If the bit in position *n* (*n*= 0 for LSB and *n*= 7 for MSB) is 1, then the feedback segment with the Remaining Feedback Segments subfield in the HE MIMO Control field equal to *n* is requested. If the bit in position *n* is 0, then the feedback segment with the Remaining Feedback Segments subfield in the HE MIMO Control field equal to n is not requested.

# 9.3.1.23.3 MU-BAR variant

The Trigger Dependent Common Info subfield is not present in the MU-BAR Trigger frame. The Trigger Dependent User Info subfield for the MU-BAR Trigger frame is defined in Figure 9-52j (Trigger Dependent User Info subfield for the MU-BAR variant).

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | BAR Control | BAR Information |
| Octets: | 2 | variable |
| * Trigger Dependent User Info subfield for the MU-BAR variant | | |

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 9822):***

The BAR Control subfield is defined in 9.3.1.8 (BlockAckReq frame format) and indicates either a Compressed BlockAckReq variant or a Multi-TID BlockAckReq variant. *(#9822)*

The BAR Information subfield is defined in 9.3.1.8 (BlockAckReq frame format).

# 9.3.1.23.4 MU-RTS variant

The Trigger Dependent Common Info subfield and Trigger Dependent User Info subfield are not present in the MU-RTS Trigger frame.

The RA field of the MU-RTS Trigger frame is set to the broadcast address.

The CS Required subfield in the Common Info field is set as described in 27.5.2.4 (UL MU CS mechanism).

The BW subfield in the Common Info field indicates the total PPDU bandwidth, and is defined in Table 9-25b (BW subfield encoding).

The Length, GI And LTF Type, MU-MIMO LTF Mode, Number Of HE-LTF Symbols, STBC, LDPC Extra Symbol Segment, AP TX Power, Packet Extension, Spatial Reuse, Doppler and HE-SIG-A Reserved subfields in the Common Info field are reserved.

The MCS, Coding Type, DCM, SS Allocation and Target RSSI fields in the User Info field are reserved.

The RU Allocation subfield in the User Info field addressed to the STA indicates whether the CTS frame is transmitted on the primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel, 160 MHz channel, or 80+80 MHz channel.

B12 of the RU Allocation subfield is set to 0 to indicate primary 20 MHz channel, primary 40 MHz channel and primary 80 MHz channel. For 160 MHz and 80+80 MHz indication, B12 of the RU Allocation subfield is set to 1.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 3117):***

If the BW subfield indicates 20 MHz, then the primary 20 MHz channel is indicated by setting B19-B13 of the RU Allocation subfield to 61. *(#3117)*

If the BW subfield indicates 40 MHz, then

* The primary 20 MHz channel is indicated by setting B19-B13 of the RU Allocation subfield to 61 when the primary 20 MHz channel is the lowest frequency 20 MHz channel and 62 when the primary 20 MHz channel is the second lowest frequency 20 MHz channel. *(#3117)*
* The primary 40 MHz channel is indicated by setting B19-B13 of the RU Allocation subfield to 65. *(#3117)*

If the BW subfield indicates 80 MHz, 80+80 MHz or 160 MHz, then

* The primary 20 MHz channel is indicated by setting B19-B13 of the RU Allocation subfield to 61 when the primary 20 MHz channel is the lowest frequency 20 MHz channel in the primary 80MHz channel, 62 when the primary 20 MHz channel is the second lowest frequency 20 MHz channel in the primary 80MHz, 63 when the primary 20 MHz channel is the third lowest frequency 20 MHz channel in the primary 80MHz, and 64 when the primary 20 MHz channel is the fourth lowest frequency 20 MHz channel in the primary 80 MHz. *(#3117)*
* The primary 40 MHz channel is indicated by setting B19-B13 of the RU Allocation subfield to 65 when the primary 40 MHz channel is the lowest frequency 40 MHz channel in the primary 80 MHz channel and 66 when the primary 40 MHz channel is the second lowest frequency 40 MHz channel in the primary 80 MHz channel. *(#3117)*
* The primary 80 MHz channel is indicated by setting B19-B13 of the RU Allocation subfield to 67. *(#3117)*

If the BW field indicates 80+80 MHz or 160 MHz, then the primary and secondary 80 MHz is indicated by setting B19-B13 of the RU Allocation subfield to 68. *(#3117)*

# 9.3.1.23.5 Buffer Status Report Poll (BSRP) variant

The Trigger Dependent Common Info subfield and Trigger Dependent User Info subfield are not present in the BSRP Trigger frame.

# 9.3.1.23.6 GCR MU-BAR variant

**TGax Editor: *Change this subclause as follows (#CID 6081, 9833):***

The Trigger Dependent Common Info subfield of the GCR MU-BAR Trigger frame is defined in Figure 9-52k (Trigger Dependent Common Info subfield for the GCR MU-BAR variant). The Trigger Dependent User Info subfield is not present in the GCR MU-BAR Trigger frame.

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | BAR Control | BAR Information |
| Octets: | 2 | 2 |
| * Trigger Dependent Common Info subfield(#7323) for the GCR MU-BAR variant | | |

The BAR Control subfield is as defined in 9.3.1.8 (BlockAckReq frame format) and indicates a GCR BlockAckReq variant.

The BAR Information subfield is as defined in 9.3.1.8.6 (GCR BlockAckReq variant) except that the GCR Group Address field is not present. *(#6081, 9833)*

# 9.3.1.23.7 Bandwidth Query Report Poll (BQRP) variant

The Trigger Dependent Common Info subfield and Trigger Dependent User Info subfield are not present in the BQRP Trigger frame.

# 9.3.1.23.8 NDP Feedback Report Poll variant

The NDP Feedback Report Poll Trigger frame format is defined in Figure 9-52c (Trigger frame).

The RA field is set to the broadcast address.

The Common Info field of the NDP Feedback Report Poll Trigger frame is defined in Figure 9-52d (Common Info field).

The BW subfield indicates the bandwidth of the NDP feedback report response and is defined in Table 9-25b (BW subfield encoding).

The CS Required subfield of the NDP Feedback Report Poll Trigger frame may be set to 0.

The STBC, LDPC Extra Symbol Segment, Packet Extension, and Doppler subfields are reserved.

The Number of HE-LTFs subfield of the Common Info field indicates the number of HE-LTF symbols present in the NDP feedback report response and is set to 2 for 2 HE-LTF symbols.

The GI and LTF Type subfield of the Common Info field is set to 2.

The Trigger Dependent Common Info subfield is not present.

The User Info field for NDP Feedback Report Poll Trigger frame is defined in Figure 9-52l (User Info field for the NDP Feedback Report Poll variant).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  | Starting AID | Reserved | Feedback Type | Reserved | Target RSSI | Multiplexing Flag |
| Bits: | 12 | 9 | 4 | 7 | 7 | 1 |
| * User Info field for the NDP Feedback Report Poll variant | | | | | | |

The Feedback Type subfield encoding is defined in Table 9-25k (Feedback Type subfield encoding).

|  |  |
| --- | --- |
| * Feedback Type subfield encoding | |
| Value | Description |
| 0 | Resource request |
| 1-15 | Reserved |

The scheduled HE non-AP STAs are identified by a range of AIDs. The Starting AID field defines the first AID of the range of AIDs that are scheduled to respond to the NDP Feedback Report Poll Trigger frame.

The Target RSSI subfield indicates the target received signal power of the NDP feedback report response for all scheduled STAs. The resolution for the Target RSSI subfield is 1 dB. The Target RSSI subfield encoding is defined in Table 9-25h (Target RSSI subfield encoding).

The total number of STAs, *NSTA*, that are scheduled to respond to the NDP Feedback Report Poll Trigger frame is calculated by the following Equation (9-ax3):

*NSTA* = 18  2*BW* *Multiplexing Flag*

where *BW* is the value indicated in the BW subfield of the NDP Feedback Report Poll Trigger frame, *Multiplexing Flag* is the value indicated in the Multiplexing Flag subfield of the NDP Feedback Report Poll Trigger frame.

The Multiplexing Flag subfield indicates the number of STAs that are multiplexed with P-matrix codes on the same set of tones in the same RU, and is encoded as the number of STAs minus 1.

# 10.13.3 Minimum MPDU start spacing rules

**TGax Editor: *Change this subclause as follows (#CID 9640):***

If the intended receiver is a non-HE STA, a ~~A~~ STA shall not start the transmission of more than one MPDU within the time limit described in the Minimum MPDU Start Spacing field declared by the intended receiver. If the intended receiver is an HE STA, an HE STA shall not start the transmission of more than one QoS Data frame, QoS Null frame or Management frame within the time limit described in the Minimum MPDU Start Spacing field declared by the intended receiver. To satisfy this requirement, the number of octets between the start of two consecutive MPDUs in an A‑MPDU, measured at the PHY SAP, shall be equal to or greater than



where

 is the time (in microseconds) defined in the “Encoding” column of Table 9-163 (Subfields of the A-MPDU Parameters field) for an HT STA and of Table 9-229 (Subfields of the A-MPDU Parameters subfield) for a DMG STA for the value of the Minimum MPDU Start Spacing field and if the A-MPDU is carried in an HE TB PPDU sent in response to a Basic Trigger frame then the time provided in Table 9-163(Subfields of the A-MPDU Parameters field) shall be multiplied by *MSF*, where *MSF* is equal to 2MPDU MU Spacing Factor, and is calculated from the value of the MPDU MU Spacing Factor subfield of the User Info field addressed to the HE STA (see Table 9-25i (MPDU MU Spacing Factor subfield)).*(#9640)*

*r* is the value of the PHY Data Rate (in megabits per second) defined in 19.5 (Parameters for HT MCSs) for HT PPDUs, in 21.5 (Parameters for VHT-MCSs) for VHT PPDUs, and in Clause 20 (Directional multi-gigabit (DMG) PHY specification) for a DMG STA

If necessary, in order to satisfy this requirement, a STA shall add padding between MPDUs in an A‑MPDU. Any such padding shall be in the form of one or more MPDU delimiters with the MPDU Length field set to 0.

QoS Null frames transmitted by DMG STAs are not subject to this spacing, i.e., no MPDU delimiters with zero length need to be inserted after the MPDU immediately preceding the QoS Null frame in an A‑MPDU.

# 10.24.10.3 GCR block ack BlockAckReq and BlockAck frame exchanges

**TGax Editor: *Change this subclause as follows (#CID 6081, 9822):***

Change the following 2nd and 3rd paragraphs as follows:

When the retransmission policy for a group address is GCR Block Ack, an originator shall not transmit more than the GCR buffer size number of A-MSDUs with RA set to the GCR concealment address and the DA field of the A‑MSDU subframe set to the GCR group address before sending a BlockAckReq frame to one of the STAs that has a GCR block ack agreement for this group address. The RA field of the BlockAckReq frame shall be set to the MAC address of the destination STA. Upon reception of the BlockAck frame, an originator may send a BlockAckReq frame to another STA that has a block ack agreement for this group address, and this process may be repeated multiple times. If the originator has a GCR block ack agreement with one or more of the HE STAs for this group address, the originator may send a GCR MU-BAR Trigger frame(#10252) to one or more of the HE STAs. Upon reception of the BlockAck frame from one or more HE STAs, the originator may send a GCR MU-BAR Trigger frame(#10252) to one or more other HE STAs that have a GCR block ack agreement, and this process may be repeated multiple times.(#3052, #3053, #3207, #3208, #9695, #9864)

NOTE 1If the originator sends a BlockAckReq frame to a STA with a MAC address that matches the SA in any of the A-MSDUs transmitted during the GCR TXOP, the Block Ack Bitmap subfield does not indicate the MSDUs sourced from this STA. This is because the STA will have discarded all group addressed MPDUs transmitted by the AP that have the source address equal to their MAC address (see 10.3.6 (Group addressed MPDU transfer procedure)).

When a recipient receives a BlockAckReq frame with the GCR Group Address subfield equal to a GCR group address, the recipient shall transmit a BlockAck frame at a delay of SIFS after the BlockAckReq frame. The BlockAck frame acknowledges the STA’s reception status of the block of group addressed frames requested by the BlockAckReq frame. When an HE STA receives a GCR MU-BAR Trigger frame(#10252) with the AID12 subfield set to the 12 LSBs of the(#7786) AID of the HE STA, the HE STA shall include the BlockAck frame in the HE TB PPDUsent in response to the Trigger frame. The BlockAck frames acknowledge the HE STA's reception status of the block of group addressed frames requested by the GCR MU-BAR Trigger frame(#10252).(#3209, #3210, #9695, #9864)*(#6081, 9822)*

Figure 10-36 (Example of a frame exchange with GCR block ack retransmission policy) shows an example of a frame exchange when the GCR block ackretransmission policy is used. The AP sends several A‑MSDUs using the GCR block ack retransmission policy. The AP then sends a BlockAckReq frame to group member 1 of the GCR group, waits for the BlockAck frame, and then sends a BlockAckReq frame to group member 2. After receiving the BlockAck frame from GCR group member 2, the AP determines whether any A‑MSDUs need to be retransmitted and sends additional A‑MSDUs (some of which might be retransmissions of previous A‑MSDUs) using the GCR block ack retransmission policy.

Insert the following paragraph and associated figure:

Figure 10-36a (Example of a frame exchange with GCR block ack retransmission policy) shows another example of a frame exchange when the GCR block ack retransmission policy is used. The HE AP sends several A-MSDUs using the GCR block ack retransmission policy. The HE AP then sends a GCR MU-BAR Trigger frame to group members 1 and 2 of the GCR group, waits for the BlockAck frames, and then sends a GCR MU-BAR to group members 3 and 4 and then waits for the BlockAck frame. The HE AP then sends a BAR frame to group member 5, which is a non-HE STA, and waits for the BlockAck frame. After receiving the BlockAck frames, the HE AP determines whether any A-MSDUs need to be retransmitted and sends additional A-MSDUs (some of which might be retransmissions of previous A-MSDUs) using the GCR block ack retransmission policy. *(#6081, 9822)*

|  |
| --- |
|  |
| * Example of a frame exchange with GCR block ack retransmission policy |

Change the 6th,7th and 8th paragraph as follows:

After completing the BlockAckReq or GCR MU-BAR Trigger and BlockAck frame exchanges, the originator determines from the information provided in the BlockAck bitmap and from the missing BlockAck frames which, if any, A-MSDUs need to be retransmitted.

An originator adopting the GCR block ack retransmission policy for a GCR group address chooses a lifetime limit for the group address. The originator may vary the lifetime limit for the group address at any time and may use different lifetime limits for different GCR group addresses. The originator transmits and retries each A-MSDU until the appropriate lifetime limit is reached or until each one has been received by all group members to which a BlockAckReq frame or a GCR MU-BAR Trigger frame(#10252) has been sent, whichever occurs first.

For GCR streams with retransmission policy equal to GCR Block Ack, an originator may regularly send a BlockAckReq frame with the GCR Group Address subfield in the BAR Information field set to the GCR group address and the Block Ack Starting Sequence Control subfield set to the Sequence Number field of the earliest A‑MSDU of the GCR stream that has not been acknowledged by all group members and has not expired due to lifetime limits, in order to minimize buffering latency at receivers in the GCR group. An originator may also send a GCR MU-BAR Trigger frame(#10252) with the AID12 fields set to 12 LSBs of the(#7787) AIDs of HE STAs that transmit the BlockAck frames and the Block Ack Starting Sequence Control subfield set to the Sequence Number field of the earliest A-MSDU of the GCR stream that has not been acknowledged by all group members and has not expired due to lifetime limits, in order to minimize buffering latency at receivers in the GCR group.

NOTE 2This is because an originator might transmit Management frames, QoS Data frames with a group address in the Address 1 field (including different GCR streams), and non-QoS Data frames intermingled. Since these are transmitted using a single sequence counter, missing frames or frames sent to group addresses absent from a receiving STA’s dot11GroupAddresses table complicate receiver processing for GCR streams with a GCR block ack retransmission policy since the cause of a hole in a receiver’s block ack bitmap is ambiguous: it is due either to an MPDU being lost from the GCR stream or to transmissions of MPDUs not related to the GCR service using the same sequence number counter.

Change the last paragraph as follows:

If the beginning of such reception does not occur during the first slot time following a SIFS, then the originator may perform error recovery by retransmitting a BlockAckReq frame or a GCR MU-BAR Trigger frame(#10252) *(#6081, 9822)* PIFS after the previous BlockAckReq frame or a GCR MU-BAR Trigger frame(#10252) when both of the following conditions are met:

* The carrier sense mechanism (see 10.3.2.1 (CS mechanism)) indicates that the medium is idle at the TxPIFS slot boundary (defined in 10.3.7 (DCF timing relations)) after the expected start of a BlockAck frame, and
* The remaining duration of the GCR TXOP is longer than the total time required to retransmit the GCR BlockAckReq frame or a GCR MU-BAR Trigger frame(#10252) plus one slot time.(#3211, #3212, #9695, #9864)

NOTE 3If an originator fails to receive a BlockAck frame in response to a BlockAckReq frame and there is insufficient time to transmit a recovery frame, the AP retransmits the BlockAckReq frame in a new TXOP.

# 27.5.2.3 STA behavior for UL MU operation

**TGax Editor: *Change the paragraphs below as follows (#CID 9640):***

A STA transmitting an HE TB PPDU follows the rules defined for constructing the PSDU carried in the HE TB PPDU*(#9640)*

A(#6684) STA that responds to a DL MU PPDU containing MPDU(s) addressed to it that include UMRS Control field(s) follows the rules defined in 10.3.2.9 (Ack procedure) for generating the Ack frame, the rules defined in 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA) for generating the BlockAck frame, and the rules defined in 27.4 (Block acknowledgement) for generating the Multi-STA BlockAck frame. The STA shall construct the A-MPDU carried in the HE TB PPDU(#6685) as defined in Table 9-428 (A-MPDU contents MPDUs in the control response context) when the A-MPDU (#4827)solicits an immediate response and as defined in Table 9-426 (A-MPDU contents in the data enabled no immediate response context) when the A-MPDU does not solicit an immediate response.

NOTE—The STA additionally follows the rules defined in 27.3.3 (Procedure at the originator) when fragments are present in the soliciting (A-)MPDU(s).