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**IEEE P802.11**  
**Wireless LANs**

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**HE Variant HT Control – A-MPDU Content****Date:** 2016-09-12**Author(s):**

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**Abstract**

This submission proposes resolutions for multiple comments related to TGax D0.1 with the following CIDs (24 **CIDs**):

- 805, 1354, 1356, 1357, 1358, 1360, 1359, 668, 1792, 2475, 2477, 2478, 2479, 2480, 1527, 2263, 120, 1366, 10, 1368, 1369, 1371, 1372, 1374, 1375, 394, 11,12, 669, 1378, 1376, 2455, 2592, 1381, 1384, 2456, 1377, 1635, 1804, 2309, 1367, 670, 2593, 2594, 2595, 1386

**Revisions:**

- Rev 0: Initial version of the document.

# 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.*

| CID | PP | LL | Comment | Proposed Change | Resolution |
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| 805  | 35 | 43 | Trigger Frame, Multi-STA block ACK frame, etc. need to be a single A-MPDU contents in other contexts                                                                                                                                                                                                                              | Insert Trigger Frame, Multi-STA BlockAck frame, QoS Null MPDUs with Ack Policy set to No Acknowledgment cases in other A-MPDU contexts (immediate, no immediate, PSMP, control response)                                                                                                     | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1354 | 36 | 10 | The concept "multiple TID A-MPDU" is not defined; also in next cell down                                                                                                                                                                                                                                                          | Reword the para as something like "The A-MPDU contains QoS Data MPDUs with different TIDs and is transmitted outside a PSMP sequence by a TXOP holder in DL/UL MU frame exchange or a STA in UL MU frame exchange sequence including potential immediate responses."; also in next cell down | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1356 | 36 | 10 | "The multiple TID A-MPDU is transmitted outside a PSMP sequence by a TXOP holder in DL/UL MU frame exchange or a STA in UL MU frame exchange sequence" -- what is a "DL/UL MU frame exchange"? Does it mean an exchange that is both, or either one or the other exclusively, or one or the other or both? Also in next cell down | Clarify                                                                                                                                                                                                                                                                                      | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1357 | 36 | 10 | "The multiple TID A-MPDU is transmitted outside a PSMP sequence by a TXOP holder in DL/UL MU frame exchange or a STA in UL MU frame exchange sequence" -- why can the TXOP holder do DL/UL but other STAs only do UL? Also in next cell down                                                                                      | Clarify                                                                                                                                                                                                                                                                                      | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1358 | 36 | 23 | "An A-MPDU intended for a STA that is UL MU capable" -- what does "intended for" mean?                                                                                                                                                                                                                                            | Change "intended for" to "addressed to"                                                                                                                                                                                                                                                      | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1360 | 36 | 23 | The non-multiple-TID baseline equivalent has a reference to the NOTE which seems appropriate here too                                                                                                                                                                                                                             | Add "See NOTE." to the end of the cell                                                                                                                                                                                                                                                       | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |

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| 1359 | 36 | 23 | Isn't the UL MU Context context potentially also a Data Enabled [No] Immediate Response with Multiple TID Support context, e.g. a TXOP holder sending outside a PSMP sequence a DL MU PPDU with multiple TIDs to a STA that is UL MY capable?                                                                                                                                                                                                                                                             | Ensure that the contexts do not overlap by adding restrictions in the context definitions                                                                                                                                                                                                                                                            | <p>Revised.</p> <p>Revised.<br/>TGax editor makes changes as shown in the as specified in 11-16/1186r0.</p>                                                                                                                                              |
| 668  | 36 | 5  | Mixing tx sequence initiating frames (e.g: data frames sent under HT immediate block ack agreement, Trigger frames, BAR) with response frames (e.g: BlockAck, Multi-STA BlockAck) in a Multiple TID A-MPDU content, complicate the transmit & receive processes. Instead, separate them into two different Multiple TID A-MPDU types: 1. Multiple TID A-MPDU with tx sequence initiating frames; 2. Multiple TID A-MPDU with tx sequence response frame (a technical contribution will be followed later) | In Table 9-409, split the cell of "Data Enabled Immediate Response with Multiple TID Support", into two separate cells: 1. Data Enabled Immediate Response with Multiple TID Support with Tx sequence initiating frames; 2. Responses with Multiple TID support with Tx sequence response frames. (a technical contribution will be submitted later) | <p>Rejected.</p> <p>Discussion: 11ax already allows cascading MU frame wxchange where data frames, trigger frames, BA frames should be aggregated in one A-MPDU. Another observation is that 11mc already allows BAR, data frames, BA in one A-MPDU.</p> |
| 1792 | 36 | 10 | The use of the A-MPDU contexts by an HE AP and an HE non-AP STA is not clear. Under what conditions do the contexts apply? For example, in the case of an HE non-AP STA responding to a HE MU PPDU does the Control Response context apply? What context appl                                                                                                                                                                                                                                             | Define contexts based on direction: "DL context" and "UL context". Enumerate the possible MPDUs that can be included in the each context and the conditions under which they can be present. Remove the current three contexts.                                                                                                                      | <p>Revised.</p> <p>Agree in principal.<br/>TGax editor makes changes as shown in the as specified in 11-16/1186r0.</p>                                                                                                                                   |
| 2475 | 36 | 5  | Table 9-420 needs to be updated because the HE trigger-based PPDU including the following A-MPDU can be transmitted from a non-TXOP holder.<br>- Data Enabled No Immediate Response<br>- Control Response<br>- VHT single MPDU context                                                                                                                                                                                                                                                                    | As per comment                                                                                                                                                                                                                                                                                                                                       | <p>Revised.</p> <p>Agree in principal.<br/>TGax editor makes changes as shown in the as specified in 11-16/1186r0.</p>                                                                                                                                   |
| 2477 | 36 | 27 | In Table 9-421 (A-MPDU contents in the data enabled immediate response context), add Trigger control frame.                                                                                                                                                                                                                                                                                                                                                                                               | As per comment                                                                                                                                                                                                                                                                                                                                       | <p>Revised.</p> <p>Agree in principal.<br/>TGax editor makes changes as shown in the as specified in 11-16/1186r0.</p>                                                                                                                                   |
| 2478 | 36 | 27 | In Table 9-422 (A-MPDU contents in the data enabled no immediate response                                                                                                                                                                                                                                                                                                                                                                                                                                 | As per comment                                                                                                                                                                                                                                                                                                                                       | <p>Revised.</p> <p>Agree in principal.</p>                                                                                                                                                                                                               |

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|      |    |    | context), add Trigger control frame.                                                                                                                                                                                                                                                                                                                              |                                                       | TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                               |
| 2479 | 36 | 27 | In Table 9-424 (A-MPDU contents MPDUs in the control response context), add Trigger control frame.                                                                                                                                                                                                                                                                | As per comment                                        | <b>Revised.</b><br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 2480 | 36 | 27 | In Table 9-425 (A-MPDU contents in the VHT single MPDU context), add Trigger control frame as a conditional content.<br>The condition is that Trigger frame can be present in S-MPDU if it is contained in the HE PPDU.                                                                                                                                           | As per comment                                        | <b>Revised.</b><br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1527 | 36 | 4  | There seems to be no context for "I want to trigger UL MU but I don't want to use multiple TIDs"                                                                                                                                                                                                                                                                  | Add a "UL MU Data Enabled Immediate Response" context | <b>Revised.</b><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.     |
| 2263 | 36 | 12 | TXOP holder in case of UL MU frame must be defined. If it is AP, is it possible for AP to transmit multiple TID A-MPDU in UL MU frame exchange?                                                                                                                                                                                                                   | Need to clarify                                       | <b>Revised.</b><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.     |
| 120  | 54 | 22 | I am not certain we need new tables here. Rather simply add new columns to the existing tables of REVmc D5.0 to accommodate the new additions for Trigger frame, multi-TID operation (UL/DL MU operation, MU BAR, M-STA BA etc). If prefer to keep separate tables please add the missing parts so that all frames that can be present are covered in the A-MPDU. | As in comment.                                        | <b>Revised.</b><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.     |
| 1366 | 37 | 10 | I have no idea what "If the AP schedule resource for following UL MU transmission and HE A-Control field in data/management frames don't include trigger information." means                                                                                                                                                                                      | Reword                                                | <b>Revised.</b><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.     |
| 10   | 37 | 20 | Table 426-a: would "At most one of the MPDUs is present" mean that an AP cannot send BA/ACK to a set of STAs and send BAR to another set of STAs within an AMPDU? I think this is a case that should be allowed.                                                                                                                                                  | As in the comment.                                    | <b>Revised.</b><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.     |

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| 1368 | 37 | 10 | Doesn't the Ack frame have to be at the start (as in the baseline non-multi-TID version)? Ditto for the next page                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Add ", a single Ack frame at the start of the A-MPDU" as in the baseline                                                                                                                    | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1369 | 37 | 17 | Doesn't the BlockAck frame have to be at the start (as in the baseline non-multi-TID version)? Ditto for the next page                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Add ", in which case it occurs at the start of the A-MPDU" as in the baseline                                                                                                               | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1371 | 37 | 22 | Doesn't the Multi-STA BlockAck frame have to be at the start (as in the baseline non-multi-TID version)? Ditto for the next page                                                                                                                                                                                                                                                                                                                                                                                                                                                | Add ", in which case it occurs at the start of the A-MPDU" as in the baseline                                                                                                               | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1372 | 37 | 22 | It says "Multi-STA BlockAck frame", but the cell to the right makes it clear it's a Multi-TID BlockAck frame. Ditto for the next page                                                                                                                                                                                                                                                                                                                                                                                                                                           | Change "Multi-STA" to "Multi-TID"                                                                                                                                                           | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1374 | 37 | 30 | "QoS Data frames with the multiple TIDs, with TID being corresponding to an HT-immediate block ack agreement" is weird -- the baseline non-multi-TID version has a note on the Ack Policy                                                                                                                                                                                                                                                                                                                                                                                       | Add a "See NOTE." and at the end of the table a "NOTE--These MPDUs all have the Ack Policy field equal to the same value, which is either Implicit Block Ack Request or Block Ack."         | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 1375 | 37 | 34 | "In an HE BSS," -- this context only applies to an HE BSS anyway. Ditto for the next page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Delete the cited text and adjust the following capitalisation                                                                                                                               | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |
| 394  | 37 | 9  | These tables are confusing ... change "MPDU description" to "MPDU" and change "conditions" to "Restrictions on listed MPDU in this A-MPDU context" and be specific ... include Then more liberally, such as "If the AP schedules resources for an immediately following UL MU transmission and the HE A-Control field in a data/mgmt frame does not include trigger information [by what specific fields?] then <what exactly?.. then include {at most} one Trigger frame>, "Then at most one of the MDPUs is present ..." "Zero or more Action No Ack frames are included" etc | As in comment. Note multiple embeded technical and editorial corrections in comment also. Also, fix "TID being corresponding" at L30 and fix "sent under <what next?>" at L37L46. Ditto P38 | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0. |

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| 11   | 37 | 1  | Table 426-a: this restriction is unnecessary "If the AP schedule resource for following UL MU transmission and HE A-Control field in data/management frames don't include trigger information". An AP might support both Trigger frame and trigger info within HE A-Control. | As in the comment.                                                                                                                                                                                                                         | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                                      |
| 12   | 37 | 1  | Table 426-a and -b: The content and intention of this table could be made more clear.                                                                                                                                                                                        | As in the comment.                                                                                                                                                                                                                         | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                                      |
| 669  | 37 | 24 | Multi-STA BlockAck frame inside Multiple TID A-MPDU , should contain only one Per STA Info field                                                                                                                                                                             | Add "at most one Per STA Info field" allowed inside the Multi-STA BlockAck frame", into the Conditions                                                                                                                                     | <b>Rejected.</b><br><br><b>Discussion:</b> The Multi-STA BlockAck for multi-TID A-MPDU and acknowledgement of UL MU has unified frame format. <b>This can make acknowledgement decoding easier.</b> |
| 1378 | 37 | 46 | "At most one data frame for one TID that there is no data frames sent under" -- huh?                                                                                                                                                                                         | Reword. Note the baseline says "At most one BlockAckReq frame with a TID that corresponds to an HT-immediate block ack agreement. This is the last MPDU in the A-MPDU. It is not present if any QoS Data frames for that TID are present." | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                                      |
| 1376 | 37 | 23 | "for multiple TIDs for which an HT-immediate block ack agreement exists," is not clear                                                                                                                                                                                       | Change to "for multiple TIDs, where an HT-immediate block ack agreement exists for each TID,"                                                                                                                                              | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                                      |
| 2455 | 37 | 42 | "At most one data frame of the TID"<br>It shall be limited to QoS DATA frame. Change it as the following:<br>"At most one QoS data frame of the TID"                                                                                                                         |                                                                                                                                                                                                                                            | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                                      |
| 2592 | 37 | 24 | Multi-STA BlockAck frame is a variant of a BlockAck frame. Therefore, including both BlockAck frame and Multi-STA BlockAck frame is not consistent.                                                                                                                          | Removing a row for Multi-STA BlockAck frame and includes explanation on Multi-STA variant and Multi-TID variants of BlockAck in the row for MBlockAck frame.                                                                               | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                                      |

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| 1381 | 37 | 8  | The "MPDU Description" column does not need "frame" (see the baseline)                                                                                                                                                                                                                                                                                                      | Delete all the "frame"s from this column                                                                                                                                                                       | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                         |
| 1384 | 37 | 4  | Basically just align this table technically with Table 9-421, except for the specific changes due to multi-TIDness                                                                                                                                                                                                                                                          | As it says in the comment                                                                                                                                                                                      |                                                                                                                                                                                        |
| 2456 | 37 | 43 | "Data frame with TID that has no block ack agreement and with Ack Policy set to Normal Ack"<br>The Ack frame of the Data frame can be the Trigger based UL MU Ack. Change it as the following:<br>"Data frame with TID that has no block ack agreement and with Ack Policy set to either Normal Ack or Trigger based UL MU Ack"                                             |                                                                                                                                                                                                                | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                         |
| 1377 | 37 | 30 | The baseline has a restriction "Of these, at most one of the following is present in a non-DMG BSS:<br>--- One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request<br>--- A BlockAckReq frame"                                                                                                                                            | Add such a restriction (without the "in a non-DMG BSS" bit)                                                                                                                                                    | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                         |
| 1635 | 37 | 4  | Need text that indicates how to aggregate various control subtypes within an AMPDU. While the new table 9-246 includes a trigger frame, it is not clear whether a DATA type must also be included, or if the DATA type is optional. We need a case where trigger is aggregated with, for example, only BA, but no DATA and it is not clear in the table if that is allowed. | Clarify if the table 9-246, is the DATA entry zero or more instances? Add text in clause 10 that describes what the rules are for aggregation - when can a particular aggregation context be used or not used? | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                                         |
| 1804 | 37 | 14 | Aggregating an ACK frame with other MPDUs in an A-MPDU complicates the recipient implementation. An ACK frame does not have a TA so the transmitter is inferred by the sequence. For SU sequences (Data/ACK or Management/ACK) this is not too complicated to handle. But with the A-MPDU where subsequent frames may be Data frames that require                           | Add a rule that ACK be sent stand-alone. Add a rule that Multi-STA BA (ack equivalent form) is used when aggregated with other MPDUs.                                                                          | Rejected.<br><br>Discussion: With MU transmission, RU identifier already tells the TA. Allowing Ack in A-MPDU avoids the transmission of separate PPDU for TID without BA negotiation. |

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|      |    |    | security engine setup or other context, it makes things complicated. The recipient needs special handling for the case where ACK is the first frame in the A-MPDU and TA needs to be derived from elsewhere. Overall, the benefit of allowing ACK together with other MPDU types is minimal. |                                                                                                                                                          |                                                                                                                                                                      |
| 2309 | 37 | 45 | The text for condition of Immediate BlockAckReq frames seems to be incomplete.                                                                                                                                                                                                               | Following sentence has to be completed;<br>"At most one data frame for one TID that there is no data frames sent under"                                  | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                       |
| 1367 | 38 | 7  | I have no idea what "If the AP schedule resource for following UL MU transmission and HE A-Control field in data/management frames don't include trigger information." means                                                                                                                 | Reword                                                                                                                                                   | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                       |
| 670  | 38 | 46 | "MPDU with trigger information in MAC header": no such trigger information field is defined in MAC in the draft                                                                                                                                                                              | In table 9-426c, it implies that there is a "trigger information" field in MAC header, but no such field is defined anywhere in the draft.               | Rejected.<br><br>Discussion: HE variant HT Control defines trigger info in MAC header.                                                                               |
| 2593 | 38 | 8  | A trigger frame always solicits immediate response frame. Therefore, the trigger frame cannot be included in this context                                                                                                                                                                    | Delete the row for "Trigger frame" in Table 9-426b.                                                                                                      | Rejected.<br><br>It depends on MSDUs' service policy. If all MSDUs in UL A-MPDU don't ask for acknowledgement (QoSNoack), no acknowledgement will follow UL MU PPDU. |
| 2594 | 38 | 43 | "can" is not appropriate in clause 9.                                                                                                                                                                                                                                                        | Modify the text from "One or more Trigger frames can be included" to "A control frame of subtype Trigger".                                               | Rejected.<br><br>Discussion: "can" is used in many places in clause 9.                                                                                               |
| 2595 | 38 | 47 | Normative text ("may") is not appropriate in clause 9.                                                                                                                                                                                                                                       | Modify the text from "One or more MPDUs with trigger information in the MAC header may be included" to "MPDU with trigger information in the MAC header" | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                       |
| 1386 | 38 | 1  | Basically just align this table technically with Table 9-422, except for the specific changes due to multi-TIDness                                                                                                                                                                           | As it says in the comment                                                                                                                                | Revised.<br><br>Agree in principal.<br>TGax editor makes changes as shown in the as specified in 11-16/1186r0.                                                       |

### 3. Definitions, acronyms, and abbreviations

#### 3.1 Definitions

**TGax Editor: Changes the definition of VHT single MPDU as following:**

**very high throughput (VHT) single medium access control (MAC) protocol data unit (VHT single MPDU):** An MPDU that is the only MPDU in an aggregate MPDU (A-MPDU) carried in a VHT physical layer (PHY) protocol data unit (PPDU) or HE physical layer (PHY) protocol data unit (PPDU) and that is carried in an A-MPDU subframe with the EOF subfield of the MPDU delimiter field equal to 1.

### 9.7.3 A-MPDU contents

#### **TGax Editor: Changes the 7<sup>th</sup> paragraph as following:**

An A-MPDU is transmitted in one of the contexts specified in Table 9-420 (A-MPDU Contexts) as defined by the description in the “Definition of context” column, ~~independently of whether the A-MPDU is contained in a VHT MU PPDU or an SU PPDU.~~ The further restrictions of A-MPDU content are defined in the conditions of various contexts. Ordering of MPDUs within an A-MPDU is not constrained, except where noted in these tables. See 10.13.1 (A-MPDU contents).

#### **TGax Editor: Changes Table9-420 as following:**

**Table9-420 A-MPDU contexts**

| Name of Context                                                                                                                                       | Definition of Context                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Table defining permitted contents                                               |
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| Data Enabled Immediate Response                                                                                                                       | The A-MPDU is transmitted outside a PSMP sequence by a TXOP holder, <u>TXOP responder</u> or an RD responder including potential immediate responses.                                                                                                                                                                                                                                                                                                                  | Table 9-421 (A-MPDU contents in the data enabled immediate response context)    |
| Data Enabled No Immediate Response                                                                                                                    | The A-MPDU is transmitted outside a PSMP sequence by a TXOP holder, <u>TXOP Responder</u> that does not include or solicit an immediate response.<br>See NOTE.                                                                                                                                                                                                                                                                                                         | Table 9-422 (A-MPDU contents in the data enabled no immediate response context) |
| PSMP                                                                                                                                                  | The A-MPDU is transmitted within a PSMP sequence.                                                                                                                                                                                                                                                                                                                                                                                                                      | Table 9-423 (A-MPDU contents in the PSMP context)                               |
| Control Response                                                                                                                                      | The A-MPDU is transmitted by a STA that is neither a TXOP holder nor an RD responder that also needs to transmit one of the following immediate response frames:<br>Ack<br>BlockAck frame with a TID for which an HT-immediate block ack agreement exists<br><u>Multi-TID BA for acknowledging multi-TID A-MPDU</u><br><br><del>The A-MPDU is transmitted by a STA that is a TXOP holder that also needs to transmit the following frames:</del><br><del>Trigger</del> | A-MPDU contents MPDUs in the control response context                           |
| VHT single MPDU context                                                                                                                               | The A-MPDU is transmitted within a VHT PPDU <u>or a HE PPDU</u> and contains a VHT single MPDU.                                                                                                                                                                                                                                                                                                                                                                        | Table 9-425 (A-MPDU contents in the VHT single MPDU context)                    |
| NOTE—This context includes cases when no response is generated or when a response is generated later by the operation of the delayed block ack rules. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                 |

#### **TGax Editor: Changes Table9-421 as following:**

**Table 9-421 A-MPDU contents in the data enabled immediate response context**

| MPDU Description                                            | Conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ack                                                         | If the preceding PPDU contains an MPDU that requires an Ack frame response, a single Ack frame at the start of the A-MPDU.                                                                                                                                                                                                                                                                                                                                                         | <p>In a non-DMG STA <u>other than HE STA</u>: at most one of <u>these Ack and HT-immediate BlockAck</u> MPDUs is present.</p> <p><u>In a non-DMG HE STA: at most one of these MPDUs is present.</u></p>                                                                                                                                                                                                   |
| HT-immediate BlockAck                                       | <p>In a non-DMG STA: if the preceding PPDU contains an implicit or explicit block ack request for a TID for which an HT-immediate block ack agreement exists, at most one BlockAck frame for this TID, in which case it occurs at the start of the A-MPDU.</p> <p>In a DMG STA: if the preceding PPDU contains an implicit or explicit block ack request for a TID for which an HT-immediate block ack agreement exists, one or more copies of the same BlockAck for this TID.</p> |                                                                                                                                                                                                                                                                                                                                                                                                           |
| <u>Multi-STA BA</u>                                         | <u>In a non-DMG HE STA: If the preceding PPDU that carried multiple-TID A-MPDU contains implicit or explicit block ack requests for multiple TIDs for which HT-immediate block ack agreement exist, at most one Multi-STA BA frame, in which case it occurs at the start of the A-MPDU.</u>                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                           |
| Delayed BlockAcks                                           | BlockAck frames with the BA Ack Policy subfield equal to No Acknowledgment with a TID for which an HT-delayed block ack agreement exists.                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                           |
| Delayed block ack data                                      | QoS Data frames with a TID that corresponds to a Delayed or HT-delayed block ack agreement.<br>These have the Ack Policy field equal to Block Ack.                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                           |
| Action No Ack                                               | Action No Ack frames.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                           |
| Delayed BlockAckReqs                                        | BlockAckReq frames with a TID that corresponds to an HT-delayed block ack agreement in which the BA Ack Policy subfield is equal to No Acknowledgment.                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                           |
| <u>Data frames without HT-immediate block ack agreement</u> | <u>QoS Data frames with multiple TIDs which have no HT-immediate block ack agreement</u><br><br><u>See NOTE1.</u>                                                                                                                                                                                                                                                                                                                                                                  | <p>Of these, at most one of the following is present in a non-DMG BSS <u>except HE BSS</u>:</p> <p>— One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request</p> <p>— A BlockAckReq frame</p> <p>Of these, at most one of the following is present in a DMG BSS:</p> <p>— One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request</p> |
| Data frames sent under an HT-immediate block ack agreement  | <p>QoS Data frames with the same TID, which corresponds to an HT-immediate block ack agreement</p> <p><u>QoS Data frames with multiple TIDs, which correspond to multiple HT-immediate block ack agreements</u></p> <p>See NOTE1.</p>                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                           |

|                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QoS Null MPDUs with Ack Policy set to No Ack                                                                                                                                                                                                                                                                                                                                 | In a DMG BSS, QoS Null MPDUs with Ack Policy set to No Ack.<br><br><u>In a HE BSS, QoS Null MPDUs with Ack Policy set to No Ack.</u>                                                                                                                                                                                                                                                                                                                             | — QoS Null MPDU with Ack Policy set to No Acknowledgment<br>— A BlockAckReq frame with an optional QoS Null MPDU with Ack Policy set to No Acknowledgment                                                                                                                                                                                                                                                                                                                                                                                           |
| Immediate BlockAckReq                                                                                                                                                                                                                                                                                                                                                        | At most one BlockAckReq frame with a TID that corresponds to an HT-immediate block ack agreement. This is the last MPDU in the A-MPDU.<br><br>It is not present if any QoS Data frames for that TID are present.<br><br><u>At most one of the following cases: 1), Multi-TID BlockAckReq frame with TIDs that correspond to an HT-immediate block ack agreement. This is after data and management frames in the A-MPDU. This is the last MPDU in the A-MPDU</u> | <u>Of these, at most one of the following is present between two HE STAs:</u><br>— <u>One or more QoS Data frames from multiple TIDs with the Ack Policy field equal to Implicit Block Ack Request/Trigger based UL MU Ack/ AckRequest, at most one Action, optional QoS Null with Ack Policy set to No Ack, Trigger frame only when AP transmits the A-MPDU</u><br>— <u>QoS Null MPDU with Ack Policy set to No Ack</u><br>— <u>One of BolckAckReq and Multi-TID BlockAckReq frame</u><br>— <u>Trigger frame only when AP transmits the A-MPDU</u> |
| <u>Action</u>                                                                                                                                                                                                                                                                                                                                                                | <u>At most one Action frame</u>                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <u>Trigger</u>                                                                                                                                                                                                                                                                                                                                                               | <u>At most 1 or more Trigger frame of which the Trigger Type is Basic Trigger, MU-BAR, BSRP. See Note2</u>                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| NOTE1— <del>These</del> The MPDUs <u>from same TID</u> all have the Ack Policy field equal to the same value, which is <del>either</del> <u>one of</u> Implicit Block Ack Request ( <u>Ack Request</u> ), <u>Trigger based UL MU Ack</u> , or Block Ack.<br><br>NOTE2:- <u>An AP including trigger frame and blockack is not required to include QoS Data in that A-MPDU</u> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**TGax Editor: Changes Table9-422 as following:**

**Table 9-426—A-MPDU contents in the data enabled no immediate response context**

| MPDU Description | Conditions |
|------------------|------------|
|------------------|------------|

|                                                                                                                |                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delayed BlockAcks                                                                                              | BlockAck frames for a TID for which an HT-delayed block ack agreement exists with the BA Ack Policy subfield equal to No Acknowledgment.                                  |
| Delayed Block Ack data                                                                                         | QoS Data frames with a TID that corresponds to a Delayed or HT-delayed block ack agreement.<br>These have the Ack Policy field equal to Block Ack.                        |
| Data without a block ack agreement                                                                             | QoS Data frames with a TID that does not correspond to a block ack agreement. These have the Ack Policy field equal to No Ack and the A-MSDU Present subfield equal to 0. |
| Action No Ack                                                                                                  | Action No Ack frames.                                                                                                                                                     |
| Delayed BlockAckReqs                                                                                           | BlockAckReq frames with the BA Ack Policy subfield equal to No Acknowledgment and with a TID that corresponds to an HT-delayed block ack agreement.                       |
| <u>Trigger</u>                                                                                                 | <u>1 or more Trigger frame of which the Trigger Type is Basic Trigger, MU-BAR, BSRP when AP transmits the A-MPDU.</u><br><u>See Note1</u>                                 |
| <u>Note1---- An AP including trigger frame and blockack is not required to include QoS Data in that A-MPDU</u> |                                                                                                                                                                           |

**Table 9-428—A-MPDU contents MPDUs in the control response context**

| MPDU                | Conditions                                                                                                                                                                                              |                                                                                                                                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ack                 | Ack frame transmitted in response to an MPDU that requires an Ack frame.                                                                                                                                | One of <del>these</del> <u>Ack and BlockAck</u> is present at the start of the A-MPDU <u>in a BSS other than HE BSS</u> .<br><u>One of these is present at the start of the A-MPDU between two HE STAs.</u> |
| BlockAck            | BlockAck frame with a TID that corresponds to an HT-immediate block ack agreement.                                                                                                                      |                                                                                                                                                                                                             |
| <u>Multi-STA BA</u> | <u>If the preceding PPDU that carried multi-TID A-MPDU contains implicit or explicit block ack requests for multiple TIDs for which HT-immediate block ack agreement exist, at most one M-BA frame.</u> |                                                                                                                                                                                                             |
| Action No Ack       | +HTC Action No Ack frames carrying a Management Action Body containing an explicit feedback response or BRP frame.                                                                                      |                                                                                                                                                                                                             |