IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 11ax D2.0 Comment Resolution 9.7.3 | | | | |
| Date: 2018-02-28 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Liwen Chu | Marvell |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes resolutions for multiple comments related to TGax D2.0 with the following CIDs:

* 12718, 13079, 12915, 13088, 12619,12620, 12835, 12917, 11923, 11130,
* 12344, 12621, 12622, 12623, 12624, 12662, 12663, 12833, 12850, 12919,
* 12921, 12924, 12925, 13240, 13241, 13726, 13878, 11330, 11331, 11332,
* 11333, 11334, 12343, 12628, 12634, 12743, 12834, 13089, 11335, 12635,
* 12741, 11356, 11336.

Revisions:

* .

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** |
| 12718 | 170 | 3 | "All of the MPDUs within an A-MPDU have the same TA." -- either this is a new requirement that can't apply to legacy devices, or it's already a requirement | Delete the cited text | **Rejected**  **Discussion: This avoids that in a broadcast RU, frames from multiple virtual APs are aggregated in one A-MPDU.** |
| 13079 | 170 | 7 | a broadcast RU is a DL RU intended for multiple STAs (according 27.11.1), so this RU can convey frames addressed to several stations. This new form of RU mandates relaxing the TA addressing such that an AMPDU can aggregate frames intended to several stations (only for this special context). Typically, unassociated STAs can receive association responses from the AP they are willing to join, and each response is a unicast MPDU having a TA field set to their own individual address . | As indicated per comment, MPDUs aggregated in a AMPDU of an HE PPDU sent in a broadcast RU may have a RA field set to distinct MAC addresses (broadcast MAC address is also supported). For HE STAs receiving such broadcast RU, each HE STA may retrieve one or more frames, carried in a broadcast RU, that are addressed to this STA based on the RA field of each MPDU frame. | **Rejected**  **Discussion: a broadcast RU can only carries frames to a single STA or broadcast frames. With this the A-MPSU reception functionality doesn’t need to be changed.** |
| 12915 | 170 | 32 | "An HE MU PPDU can carry more than one A-MPDU each of which contains one or more MPDUs soliciting an immedi- ate response if it is carried in an HE TB PPDU" is confusing (is it an HE MU PPDU we're talking about or an HE TB PPDU?) | Change "if" to "that" in the cited text | **Revised**  **Discussion: What the sentence says is that if the response, i.e. acknowledgement, is carried in HE TB PPDU, the mulktiple A-MPDUs in HE MU PPDU can solicit such response.**  **TGax editor to make changes in 11-18/0426r6 under CID 12915** |
| 13088 | 170 | 31 | "A VHT MU PPDU does not carry more than one A-MPDU that contains one or more MPDUs soliciting an immediate response if the immediate response is carried in a PPDU that is not an HE TB PPDU. An HE MU PPDU can carry more than one A-MPDU each of which contains one or more MPDUs soliciting an immediate response if it is carried in an HE TB PPDU."  Does it really a VHT MU PPDU ? And it seems that an HE TB PPDU (used for MU UL Tx) does not carry an HE MU PPDU (used for MU DL Tx) ? | Please clarify. | **Revised**  **Discussion: HE TB PPDU in UL MU transmission is used for acknowledging the DL HE MU PPDU. “VHT MU PPDU” in the first sentence should be changed to “VHT MU PPDU or HE MU PPDU”.**  **TGax editor to make changes in 11-18/0426r6 under CID13088** |
|  |  |  |  |  |  |
| 12619 | 171 | 25 | The insertion in "The A-MPDU is transmitted by a STA that is neither a TXOP holder nor an RD responder or the A-MPDU is transmitted by AP in an HE BSS that also needs to transmit one of the following immediate response frames:" has introduced a precedence ambiguity | Change the cited text to "The A-MPDU is transmitted by a STA that is neither a TXOP holder nor an RD responder or the A-MPDU is transmitted by AP in an HE BSS, and the transmitter also needs to transmit one of the following immediate response frames:" | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12619.** |
| 12620 | 171 | 1 | The changes made in Tables 9-424 to 9-428 allow new transmissions to/from legacy devices that might not be understood by other legacy devices. Just a few examples: “QoS Data frames with multiple TIDs, which correspond to multiple HT-immediate block ack agreements.” In “Data frames sent under an HT-immediate block ack agreement “; “At most one Action frame”; “If the A-MPDU is transmitted by an AP, one or more Trigger frames where the Trigger Type field is Basic Trigger or BSRP.” For “Trigger”; “QoS Data frames with multiple TIDs which have no HT-imme- diate block ack agreement” | Precede all 11ax insertions with “When transmitted by an HE STA to an HE STA:” | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12620** |
| 12835 | 171 | 11 | The insertions of “, TXOP responder” break existing implementations | Restrict the use by a TXOP Responder to exchanges between HE STAs | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12835** |
| 12917 | 171 | 25 | The insertion in “The A-MPDU is transmitted by a STA that is neither a TXOP holder nor an RD responder \*\*\*or the A-MPDU is transmitted by AP in an HE BSS\*\*\* that also needs to transmit one of the following immediate response frames:” has wrecked the logic of the sentence | Change the cited text to: “The A-MPDU is transmitted by a STA that is neither a TXOP holder nor an RD responder, or the A-MPDU is transmitted by AP in an HE BSS. The transmitter also needs to transmit one of the following immediate response frames:” | **Duplicate with CID 12619.**  **TGax editor to make changes in 11-18/0426r6 under CID 12917.** |
| ~~13700~~ | ~~171~~ | ~~33~~ | ~~"Multi-STA BlockAck" is the correct terminology.~~ | ~~Change "Multi-STA BA" in the middle column in the row for Control Response in Table 9-424 to "Multi-STA BlockAck".~~ |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 11923 | 172 |  | If there are one ACK and one Block ACK or M-STA Block ACK inside t the A-MPDU data enabled immediate response context, the order is not clear | Need to add the text in the Table 9-425, to define the order of there is one ACK and one Block ACK or M-STA Block ACK inside an A-MPDU | **Rejected**  **Discussion: Among Ack, Block Ack and Multi-STA BA, there is at least one of them in an A-MPDU.** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 11130 | 173 | 7 | "except HE BSS" is not the converse of "between two HE STAs".  It leaves unspecified what happens between a non-HE and an HE STA in an HE BSS. | Change "except HE BSS" to "except between two HE STAs". | **Agreed** |
| 12344 | 173 | 22 | In a single TID A-MPDU context between two HE STAs at most one of the following is present: -- One or more QoS Data frames with a single TID value with the Ack Policy field equal to Implicit Block Ack Request or HTP Ack or Block Ack, zero or more QoS Null frames with Ack Policy set to No Ack, and zero or more Basic Trigger frames  Not sure if one or more QoS Data frame with ack policy set to Block ack and zero Basic Trigger frame is considered as part of data enabled immediate response context | Make clarifications for the case described | **Revised**  **Discussion: a STA can send an A-MPDU with QoS Data frames whose Ack Policy fields are equal to Block Ack for the TID with immediate block ack agreement. However when QoS Data frames have Block Ack in their Ack Policy fields, Trigger frames can’t be in the A-MPDU. Another observation is that beside Basic Trigger frame, BQRP frames and BSRP Trigger frame can be aggregated with QoS Data frames also.**  **TGax editor to make changes in 11-18/0426r6 under CID 12344** |
| 12621 | 173 | 6 | "Data frames without HT-immediate block ack agreement" breaks non-11ax implementations | Delete this row | **Rejected.**  **Discussion: The third column about condition clrarly says that Data frame without HT-immeidate block ack agreement will only be transmitted between two HE STAs** |
| 12622 | 173 | 6 | "QoS Data frames with multiple TIDs which have no HT-immediate block ack agreement" -- why is it necessary to have more than one QoS Data frame of this nature? | Change "QoS Data frames with multiple TIDs" to "One or more QoS Data frames" | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12622** |
| 12623 | 173 | 37 | "In multi-TID A-MPDU context" -- there is no such context (see Table 9-424) | Change to "Between two HE STAs". At line 31 change "In a single TID A-MPDU context, at" to "At" | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12623** |
| 12624 | 173 | 42 | It says "block Ack" | Change to "block ack" | **Agreeed** |
| 12662 | 173 | 58 | Why are the only types of Trigger frame allowed in an A-MPDU Basic, MU-BAR and BSRP? You might wish to include e.g. an MU-RTS, to protect the subsequent data transmissions | Add MU-RTS to the list of permissible Trigger frame types | **Revised**  **Discussion: MU-RTS is not allowed to be in A-MPDU sine the purpose of MU-RTS is used for TXOP protection. This is just like the transmission of RTS. However other trigger frames, e.g. BQRP Trigger should be allowed to be aggregated in A-MPDU.**  **TGax editor to make changes in 11-18/0426r6 under CID 12662** |
| 12663 | 173 | 58 | Only Basic, MU-BAR and BSRP Trigger frames are allowed here, but the rightmost column mentions other types | Add GCR MU-BAR, BQRP to the list of permissible Trigger frame types | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12663** |
| 12833 | 173 | 28 | Only ack policy No Ack is allowed for QoS Nulls in the A-MPDU case, except for S-MPDU. It would be desirable for a STA to be able to know the peer has received whatever it's trying to signal in the QoS Null (here the QoS Null would have EOF=1 and Ack Policy=Normal/Implicit, and would be the only frame with that TID) | Allow ack policy Normal Ack for QoS Null frames sent in A-MPDUs between HE STAs | **Rejected**  **Discussion: The group believe that QoS Null with No Ack Policy is good enough.** |
| 12850 | 173 | 55 | "Implicit BAR" -- no such ack policy | Change to "Implicit Block Ack Request" | **Accepted** |
| 12919 | 173 | 43 | "There are at least two different values or TID subfield in this context. " has a typo and duplicates the previous sentence anyway | Delete the cited text | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12919** |
| 12921 | 173 | 61 | "Basic, MU-BAR, GCR MU-BAR, BQRP, or BSRP Trigger frame only when AP transmits the A-MPDU" is not clear | Change to "When transmitted by an AP, a Basic, MU-BAR, GCR MU-BAR, BQRP, or BSRP Trigger frame". Change at 173.48 too | **Agreed** |
| 12924 | 173 | 43 | "(if present)" is implicit for all possible MPDUs in an A-MPDU | Delete the cited text | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12924** |
| 12925 | 173 |  | "at most one of the following is present: x, y, z" is not clear. Does it mean that only what is specified in x or y or z can be present, or can e.g. you have stuff in x plus other stuff as long as it is not in y or z? | Add ", and no other frames" before the colon in each case | **Rejected**  **Discussion: “at most…” is what is used in IEEE 802.11TM – 2016 and 11md draft. The commenter is welcome to raise the comment in 11md.** |
| 13240 | 173 | 34 | All SU sequences should be available as triggered sequeces since triggered access is just another way for the non-AP STA to get data to the AP. The SU sequence BlockAckReq soliciting BlockAck is allowed. And similarly, the sequence Trigger frame + BlockAckReq frame soliciting BlockAck frame should be allowed. | Allow an A-MPDU to include a Trigger frame and BlockAckReq frame. Since the PPDU response is ambiguous (SU or TB PPDU), add ack policy HTP Ack to the BlockAckReq frame (similar to QoS Data frames) to indicate that a Trigger frame should have been received. See 17/1114r0. | **Rejected**  **Discussion: MU-BAR already includes the functionality with the combination of Trigger and BAR.** |
| 13241 | 173 | 52 | With multi-TID operation, the operation for each stream should be largely independent. If one stream needs BlockAckReq to move the recipient window, it should not affect the other streams. We should thus allow BlockAckReq frame + QoS Data frame. If there is more than one TID involved then we could allow Multi-TID BlockAckReq + QoS Data frame. | Allow a multi-TID A-MPDU to include a BlockAckReq (either Compressed or Multi-TID) where the TIDs in the BlockAckReq are different from the TIDs in the QoS Data frames. | **Rejected**  **Discussion: in multi-TID A-MPDU, the transmitter can move the recipient window of one TID through 1), transmitting a QoS Data frame of the TID whose Sequence Number is out side the reception window, transmitting a BAR for the TID.** |
| 13726 | 173 | 7 | Is it possible to aggregate QoS Data frames with the Ack Policy field set to No Ack in a multi-TID A-MPDU with other Qos Data frames soliciting response? According to Table 9-425, it is not allowed in the current spec. As we already allow an HE STA to aggregate an Action No Ack frame(s) with QoS Data frames with HT-immediate BA agreement, aggregating QoS Data frame(s) with Ack Policy set to No Ack with QoS Data frames with HT-immediate BA agreement in a multi-TID A-MPDU should be allowed as well. | As in comment | **Reject.**  **Discussion: in 11n/11ac, A-MPDU doesn’t allow QoS Data with Ack Policy equalt o No Ack although Qction No Ack is allowed. This should be still true with the introduction of ack-enabled (multi-TID) A-MPDU.** |
| 13878 | 173 | 29 | "One frame with a single TID value with the Ack Policy field equal to Normal Ack or one Action frame, at least one of QoS Null frame with Ack Policy set to No Ack and Trigger frame" Why does single TID ack-enabled A-MPDU contain at least one of QoS Null frame and Trigger frame? For example, the ack-enabled A-MPDU is carried in an HE TB PPDU. Then, when the HE TB PPDU contains the BlockAck and one frame with Normal Ack Policy (or Action frame), why is the QoS null frame also needed? | Change "at least one of" to "zero or more", like the first bullet. | **Revised**  **Generally agree with the commenter. Additionally Action frame is changed to Management frame except Action no Ack.**  **TGax editor to make changes in 11-18/0426r6 under CID 13878** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 11330 | 174 | 9 | Even with one TID would be something explicitly added here. So replace "with multiple" with "one or more" | As in comment. | **Revised**  **Discussion: The CID should be related to P173L9.**  **TGas editor to make changes in 11-18/0426r6 under CID 11330** |
| 11331 | 174 | 9 | This should be different. Since the above statement covers the same TID. So replace "with multiple" with "different" | As in comment. | **Discussion: The CID should be related to P173L9.**  **TGas editor to make changes in 11-18/0426r6 under CID 11331** |
| 11332 | 174 | 7 | Add "in an HE BSS" for everything that is new in this table and the others below for backward compatibility. | As in comment. | **Revised**  **Generally agree with the commenter. The CID should be related to P173L7.**  **TGas editor to make changes in 11-18/0426r6 under CID 11332** |
| 11333 | 174 | 60 | Also BQRP can be present similar to the BSRP (same thing for the next table). But MU BAR is not supposed to be allowed in the A-MPDU context. Remove MU BAR from the list as well. | As in comment. | **Revised**  **Discussion: Agree with the commentr that BQRP should be present which si similar to BSRP. However, MU BAR should be allowed in A-MPDU, e.g. BA + MU-BAR in DL MU PPDU to solicit BA in HE TB PPDU.**  **TGas editor to make changes in 11-18/0426r6 under CID 11333** |
| 11334 | 174 | 30 | This can be present only in the Ack enabled A-MPDU context. Suggest to add another context that covers the case of this row, separate from the good old A-MPDU. Actually since now we have normative behavior subclauses why don't we just define the baseline A-MPDU here and then add the references to the subclauses in 27.10.4. This way we dont keep technical details in two different places which creates ambiguity. There are several details in this table that are not inline with the normatvie behavior subclauses. | As in comment. Preference is to simplify the table and only rely on the new additions in the normative subclauses in 27. | Revised  Discussion: The inconsistency between 27 and the table here are addressed in this document. Also the preference is to maintain references to the tables since the references to them avoids us to duplicate efforts. Proposed resolution tries to remove as much reduncancy as possible.  **TGas editor to make changes in 11-18/0426r6 under CID 11334** |
| ~~11337~~ | ~~324~~ | ~~48~~ | ~~Rules seem to be missing here. Ensure that rules from both AP side and STA side are clear.~~ | ~~As in comment.~~ |  |
| ~~11472~~ | ~~170~~ | ~~38~~ | ~~extra closing parenthesis~~ | ~~Should be 2 parentheses after HCCA: "(HCCA))"~~ |  |
| 12343 | 174 | 7 | "NOTE 1--The MPDUs from the same TID all have the Ack Policy field equal to the same value, which is either Implicit Block Ack Request, Normal Ack, HTP Ack or Block Ack", but There should be no more than 1 MPDU from the same TID requesting normal ack | remove Normal Ack | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12343** |
| 12628 | 174 | 8 | "An AP including a Trigger frame and BlockAck frame is not required to include QoS Data in that A-MPDU" is unclear. An AP is never required to include a QoS Data in an A-MPDU (ditto in T9-426, which is also missing "a" and "frame") | Delete NOTE 2 in T9-425 and NOTE 1 in T9-426 | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12628** |
| ~~12632~~ | ~~174~~ | ~~42~~ | ~~It says "Zero of more"~~ | ~~Change the cited text to "Zero or more"~~ |  |
| 12634 | 174 | 42 | "Zero of more", but all the items in the A-MPDU context tables are implicitly zero or more unless stated otherwise | Delete the cited text | **Rejected**  **Discussion: with aero or more, it is more clear.** |
| 12743 | 174 | 38 | "one or more Trigger frames where the Trigger Type field is Basic Trigger, MU-BAR, or BSRP." -- why would you want to include more than one of each of these? | Change the cited text to "a Basic, MU-BAR, or BSRP Trigger frame" | **Rejected**  **Discussion: more than one Trigger frames with same content is allowed in subclause 27. The group believe that multiple Trigger frames in an A-MPDU can increase the robustness.** |
| 12834 | 174 | 43 | There is no "No Acknowledgment" ack policy | Change to "No Ack" (2x) | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-18/0426r6 under CID 12834** |
| 13089 | 174 | 10 | "The BSRP and BQRP Trigger frames can be aggregated with other MPDUs in the A-MPDU if the receiver has indicated the support of receiving these trigger types in the BSRP BQRP A-MPDU Aggregation field of the HE Capabilities element."  All MPDUs of a A-MPDU must have the RA field, although the BSRP and BQRP trigger variant Trigger frame are broadcast frame. | Please clarify. | **Rejected**  **Discussion: the reception of BSRP and BQRP in A-MPDU is optional. Only when a STA announce such capability, its associated AP can tramsit BSRP and BQRP within A-MPDU with other frames. This has nothing to do with RA field.** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 11335 | 175 | 16 | There cannot be both Ack and BlockAck. Only one can be present. Please fix it. | As in comment. | **Revised**  **TGax editor to make changes in 11-18/0426r6 under CID 11335** |
| 12635 | 175 | 33 | "Zero of more", but all the items in the A-MPDU context tables are implicitly zero or more unless stated otherwise | Delete the cited text | **Rejected**  **Discussion: with aero or more, it is more clear.** |
| 12741 | 175 | 15 | "One Ack and BlockAck frame is present at the start of the A-MPDU" -- no, only one is present | Change "and" to "or" in the citex text | **Revised**  **TGax editor to make changes in 11-18/0426r6 under CID 12741** |
| ~~12633~~ | ~~175~~ | ~~33~~ | ~~It says "Zero of more"~~ | ~~Change the cited text to "Zero or more"~~ |  |
| 11356 | 175 | 31 | in Table 9-428: Action NO Ack frames can be any type for HE STAS. Either specify in the tabel or in any of the occurrences of it in the normative references. | As in comment. | **Revised**  **TGax editor to make changes in 11-18/0426r6 under CID 11356** |
| 11336 | 175 | 20 | Similar observation here. Instead of listing all possible cases again it is easier to refer to the normative sublcause(s) where this M-BA frame is generated. Refer to dependent clauses of 27.4 so that it is simplified and the rules are all in one place. | As in comment. | **Rejected**  **See the discussion of CID 11334** |

**9.7.3 A-MPDU contents**

***TGax editor: Make the following changes in 9.7.3:***

A VHT MU PPDU or an HE MU PPDU does not carry more than one A-MPDU that contains one or more MPDUs soliciting an immediate response if the immediate response is carried in a PPDU that is not an HE TB PPDU. An HE MU PPDU can carry more than one A-MPDU each of which contains one or more MPDUs soliciting an immediate response if the immediate response is carried in an HE TB PPDU.(12915, 13088)(#3134, #4758, #8407)

***TGax editor: Change Table 9-424 (A-MPDU Contexts) as follows:***

|  |  |  |
| --- | --- | --- |
| * A-MPDU Contexts | | |
| Name of Context | Definition of Context | Table defining  permitted contents |
| Data Enabled Immediate Response | The A-MPDU is transmitted outside a PSMP sequence by a TXOP holder, TXOP responder when transmitted by an HE STA to another HE STA (12835, 12620) or an RD responder including potential immediate responses. | Table 9-425 (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, TXOP responder when transmitted by an HE STA to another HE STA, and the A-MPDU does not include or solicit an immediate response. (12835, 12620)  See NOTE. | Table 9-426 (A-MPDU contents in the data enabled no immediate response context) |
| PSMP | The A-MPDU is transmitted within a PSMP sequence. | Table 9-427 (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 or the A-MPDU is transmitted by an HE AP in response to an HE TB PPDU, and the transmitter also needs to transmit one of the following immediate response frames:(12619, 12917, 12620)   1. Ack 2. BlockAck frame with a TID for which an HT-immediate block ack agreement exists 3. Multi-STA BA for acknowledging multi-TID A-MPDU | Table 9-428 (A-MPDU contents MPDUs in the control response context) |
| S-MPDU context | The A-MPDU is transmitted within a VHT PPDU or an HE PPDU and contains an S-MPDU. | Table 9-429 (A-MPDU contents in the S-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: Change Table 9-425 (A-MPDU contents in the data enabled immediate response context) as follows***

|  |  |  |  |
| --- | --- | --- | --- |
| * 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. | | In a non-DMG STA the frame is not transmitted between an HE STA and another HE STA: at most one of ~~these~~ Ack and HT-immediate BlockAck MPDUs is present.  **when transmitted by an HE STA to another HE STA**: at most one of these MPDUs is present.(12620)  In a DMG STA: at most one Ack frame is present, and zero or more HT-immediate BlockAck frames are present. |
| HT-immediate BlockAck | 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.  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. | |
| Multi-STA BlockAck | **when transmitted by an HE STA to another HE STA**: If the preceding PPDU that carried a 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. (12620) | |
| Delayed BlockAcks | In a non-HE STA: 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 | In a non-HE STA: QoS Data frames with a TID that corresponds to a Delayed or HT-delayed block ack agreement.  These have the Ack Policy field equal to Block Ack. | | |
| Action No Ack | Action No Ack frames. | | |
| Delayed BlockAckReqs | In a non-HE STA: 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. | | |
| Data frames without HT-immediate block ack agreement | If transmitted by an HE STA to another HE STA(11332, 12620): One or more QoS Data frames with each with different TIDs where none of the TIDs have HT-immediate block ack agreement (12622, 11330)  See NOTE 1. | Of these, at most one of the following is present in a non-DMG BSS except the transmission by an HE STA to another HE STA (11130):   * One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request * A BlockAckReq frame   Of these, at most one of the following is present in a DMG BSS:   * One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request * QoS Null MPDU with Ack Policy set to No Ack * A BlockAckReq frame with an optional QoS Null MPDU with Ack Policy set to No Ack   (#4763)In a single TID non-ack-enabled A-MPDU context between two HE STAs, at most one of the following is present: (12623)   * One or more QoS Data frames with a single TID value with the Ack Policy field equal to Implicit Block Ack Request or HTP Ack or Block Ack(#4723), zero or more QoS Null frames with Ack Policy set to No Ack, and zero or more Trigger frames. The Trigger frame is one of Basic Trigger, BQRP Trigger or BSRP Trigger, where the content of all Trigger frames in the A-MPDU is the same (11333, 12344) * QoS Null MPDU with Ack Policy set to No Ack * One BlockAckReq * One or more Trigger frames. The Trigger frame is one of Basic Trigger, MU-BAR Trigger, GCR MU-BAR Trigger, BQRP Trigger,(#3180, #7566) or BSRP Trigger frame where the content of all Trigger frames in the A-MPDU is the same.   In an ack-enabled A-MPDU the following is present:   * One frame with a single TID value with the Ack Policy field equal to Normal Ack(#8408, #9678)( or HTP Ack) or one Management frame that solicits an Ack frame, at least one QoS Null frame with Ack Policy set to No Ack and and zero or more Trigger frames. The Trigger frame is one of Basic Trigger, BQRP Trigger or BSRP Trigger, where the content of all Trigger frames in the A-MPDU is the same   In a non-ack-enabled multi-TID A-MPDU context between two HE STAs, at most one of the following is present:   * Two or more QoS Data frames from two or more TIDs with the Ack Policy field equal to Implicit Block Ack Request, HTP Ack(#4723), or BlockAck(#4723), zero or more QoS Null frames with Ack Policy set to No Ack, and zero or more Trigger frames. The Trigger frame is one of Basic Trigger, BQRP Trigger or BSRP Trigger, where the content of all Trigger frames in the A-MPDU is the same (12919) * One Multi-TID BlockAckReq frame * One or more Trigger frames. The Trigger frame is one of Basic Trigger frame, MU-BAR Trigger frame, GCR MU-BAR Trigger frame, BQRP Trigger frame or BSRP Trigger frame where the content of all Trigger frames in the A-MPDU is the same   In an ack-enabled multi-TID A-MPDU context between two HE STAs at most one of the following is present:   * Zero or more QoS Data frames from one or more TIDs with the Ack Policy field equal to Implicit Block Ack Request (12850), HTP Ack, Normal Ack or BlockAck, zero or more QoS Null frames with Ack Policy set to No Ack, up to one Action frame, and zero or more Basic Trigger frames. There are at least two nonzero length MPDU delimiters in the A-MPDU of which at least one has the EOF field equal to 1. * One or more Trigger frames. The Trigger frame is one of Basic Trigger,, MU-BAR Trigger, GCR MU-BAR Trigger, BQRP Trigger, or BSRP Trigger frame where the content of all Trigger frames in the A-MPDU is the sam (12921) | |
| Data frames sent under an HT-immediate block ack agreement | One or more QoS Data frames with the same TID, which corresponds to an HT-immediate block ack agreement.(12622)  If transmitted by an HE STA to another HE STA(11332, 12260): QoS Data frames with different TIDs, which correspond to multiple HT-immediate block ack agreements.(11331)  See NOTE 1. |
| QoS Null MPDUs with Ack Policy set to No Ack | In a DMG BSS, QoS Null MPDUs with Ack Policy set to No Ack.  In an A-MPDU between two HE STAs: (11332, 12620)QoS Null MPDUs with Ack Policy set to No Ack. |
| Immediate BlockAckReq | ~~At~~ In a single TID A-MPDU context, at most one BlockAckReq frame with a TID that corresponds to an HT-immediate block ack agreement.  If transmitted by an HE STA to another HE STA:(11332, 12620) In multi-TID A-MPDU context, at most one multi-TID BlockAckReq frame with TIDs that correspond to HT-immediate block ack agreements.(12624)  This frame is the last MPDU in the A-MPDU. (12924)  ~~It is not~~ Neither a BlockAckReq nor a Multi-TID BlockAckReq frame is present if any QoS Data frames ~~for that TID~~ are present. |
| Action | when transmitted by an HE STA to another HE STA:(11332, 12620) At most one Action frame |
| Trigger | If transmitted by an HE STA to another HE STA: (11332, 12620) One or more Trigger frames when the A-MPDU is sent by an HE AP where the Trigger Type field is Basic Trigger, MU-BAR, GCR MU BAR, BQRP or BSRP.(12662, 12663, 11333)  See NOTE 2 and NOTE 3. |
| NOTE 1—~~These~~ The MPDUs from the same TID all have the Ack Policy field equal to the same value, which is either Implicit Block Ack Request, HTP Ack(#4723) or Block Ack.( 12343)  (12628)NOTE 2—Only an AP is allowed to include a Trigger frame in the A-MPDU (12921)  NOTE 3—The BSRP and BQRP Trigger frames can be aggregated with other MPDUs in the A-MPDU if the receiver has indicated the support of receiving these trigger types in the BSRP BQRP A-MPDU Aggregation field of the HE Capabilities element. | | | |

***TGax editor: Change Table 9-426 (A-MPDU contents in the data enabled no immediate response context) as follows:***

|  |  |
| --- | --- |
| * 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.  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. |
| Trigger | If the A-MPDU is transmitted by an AP, one or more Trigger frames where the Trigger Type field is Basic Trigger or BSRP. |
| QoS Null frame with Ack Policy field set to No Ack(12834) | Zero of more QoS Null MPDUs with Ack Policy field set to No Ack sent by an HE STA.(12834) |
| (12628) | |

***TGax editor: Change Table 9-428 (A-MPDU contents MPDUs in the control response context) as follows:***

|  |  |  |
| --- | --- | --- |
| * 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 Ack and BlockAck frame is present at the start of the A-MPDU between two STAs that are not both HE STAs.(11335, **12741**)(#8409)  One of Ack, Block Ack, Multi-STA Block Ack is present at the start of the A-MPDU between two HE STAs. |
| BlockAck | BlockAck frame with a TID that corresponds to an HT-immediate block ack agreement. |
| Multi-STA BlockAck | At most one Multi-STA BlockAck frame if: the preceding PPDU carries a multi-TID A-MPDU (see 27.10.4 (multi-TID A-MPDU and ack-enabled A-MPDU)) that includes at least two frames soliciting an immediate response and contains:   * Zero or more implicit or explicit block ack requests for multiple TIDs for which HT-immediate block ack agreement exists * Up to one Action frame * Zero or more MPDUs that solicit an immediate acknowledgement   The preceding PPDU is an HE TB PPDU.(#4760) |
| Action No Ack | In an A-MPDU between two STAs which are not both HE STAs: +HTC Action No Ack frames carrying a Management Action Body containing an explicit feedback response or BRP frame. (11356)  In an A-MPDU between two HE STAs: Action No Ack frames (11356) | |
| QoS Null frame with Ack Policy field set to No Ack | Zero of more QoS Null MPDUs with Ack Policy field set to No Ack when the A-MPDU is sent by an HE STA. | |