IEEE P802.11
Wireless LANs

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| **CRs from subclause 27.4.4**  |
| **Date:** 2018-01-09 |
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Abstract

Resolved the following **58 CIDs**

11092, 11740, 11757, 11758, 11759, 11760, 11761, 11762, 11763, 11810

12143, 12486, 12487, 12488, 12489, 12630, 12631, 12826, 12827, 12828

12829, 12831, 12832, 12887, 12888, 12889, 12891, 12892, 12893, 12894

12895, 12896, 12897, 12898, 12899, 12900, 12902, 12904, 12905, 12906

12907, 12908, 12909, 12911, 13517, 13518, 13519, 13520, 13734, 13735

13736, 13737, 13738, 13739, 13740, 13741, 13742, 13743

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 11092 | Adrian Stephens | 239.06 | "sends a PPDU to an intended recipient"This is, of course, to distinguish the PPDU from one sent to an unintended recipient.Also, PPDUs are not addressed, but frames within it are.Also "transmits" is the preferred verb. | Replace sentence with:"A STA that transmits a PPDU can solicit different immediate responses to the frames the PPDU contains by using the Ack Policy field of QoS Data or QoS Null frames, the type of the frame (e.g., Action, (multi-TID) BAR, MU-BAR Trigger frame, GCR MU-BAR Trigger frame, etc.) and the EOF field setting" | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11740 | GEORGE CHERIAN | 239.20 | There is an ambiguity in terminology between S-MPDU (where there is only one MPDU in a PPDU) Vs "a single MPDU (i.e., MPDU in an A-MPDU subframe with EOF = 1)". Fix it - define it in unambigous way | As in the comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11757 | GEORGE CHERIAN | 239.16 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE SU PPDU carries an S-MPDU that is a QoS Data frame or QoS Null frame with theAck Policy..." | As in the comment | WithdrawS-MPDU allows QoS Null with Ack required. |
| 11758 | GEORGE CHERIAN | 239.20 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE SU PPDU carries a single-TID A-MPDU that includes one or more QoS Data frame or QoS Null frame..." | As in the comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11759 | GEORGE CHERIAN | 239.27 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE SU PPDU carries a multi-TID A-MPDU that includes more than one QoS Data frame or QoS Null frame" | As in the comment | Revised - Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11760 | GEORGE CHERIAN | 239.45 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"A non-AP STA that receives an HE MU PPDU with an A-MPDU that contains QoS Data or QoS Null..." | As in the comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11761 | GEORGE CHERIAN | 239.49 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE MU PPDU carries an S-MPDU that is a QoS Data frame or QoS Null frame addressed..." | As in the comment | Rejected - S-MPDU allows QoS Null with Ack required. |
| 11762 | GEORGE CHERIAN | 239.53 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE MU PPDU carries a single TID A-MPDU that includes one or more QoS Data frame or QoS Null frame..." | As in the comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11763 | GEORGE CHERIAN | 239.59 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE MU PPDU carries a multi-TID A-MPDU that includes more than one QoS Data frame or QoS Null frame..." | As in the comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 11810 | Graham Smith | 239.06 | A STA that sends a PPDU to an intended recipient can solicit different immediate responses by using the Ack Policy field of QoS Data or QoS Null frames, the type of the frame (e.g., Action, (multi-TID) BAR ,Ack Policy field of QoS Data or QoS Null MU-BAR Trigger frame, GCR MU-BAR Trigger frame, etc.) and the EOF field setting." Somehow this does not read right. "the Ack Policy field ...of the type of frame"? Is it only in these frames or is it simply 'use the Ack Policy field in the PPDU"? Clarify | Replace with"A STA that sends a PPDU to an intended recipient can solicit different immediate responses by using the Ack Policy field of the transmitted PPDU." | Revised - Updated the textNote that PPDU doesn't contain the Ack Policy. It is the MPDU that indicates the Ack PolicyTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12143 | kaiying Lv | 240.59 | Miss a case that the immediate response is a Multi-STA BlockAck with the ACK Type field set to 1 and the TID field set to 14. Change the sentence to " If the HE TB PPDU carries a multi-TID A-MPDU that solicits an immediate response from a single STA then the HE AP shall respond with a Multi-STA BlockAck frame with the ACK Type field set to 1 and the TID field set to 14 or the Ack Type field set to 0 carried in a DL SU PPDU format. | as comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12486 | Liwen Chu | 240.21 | Managemenrt frame is missing from the bullet | Fix the issue mentioned in comment. | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12487 | Liwen Chu | 240.26 | the bullet is not in line with the all Ack context definition in 27.4.2.. | Fix the issue mentioned in comment. | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12488 | Liwen Chu | 240.34 | QoS Null in multi-TID A-MPDU can't request Ack. | Fix the issue mentioned in comment. | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12489 | Liwen Chu | 241.28 | "Group Addressed Multi-STA BlockAck In DL MU Support inDL MU Support subfield"What are you talking about? Change it to the correct subfield name. | Fix the issue mentioned in comment. | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12630 | Mark RISON | 239.41 | " an Action frame or an MMPDU that solicits aresponse." -- these overlap | Change the cited text to "a Management frame other than an Action No Ack frame" | Revised - Agree in principle. No need to explictly mention Action/Action No Ack, since it is a type of maangement frame. Updated the textTGax editor shall incorporate changes in 11-18-0027-00-00ax |
| 12631 | Mark RISON | 240.07 | " an Action frame or an MMPDU that solicits an immediate acknowledgement" -- these overlap | Change the cited text to "a Management frame other than an Action No Ack frame" | Revised - Agree in principle. No need to explictly mention Action/Action No Ack, since it is a type of maangement frame. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12826 | Mark RISON | 239.13 | The A-MPDU might contain Action frames rather than QoS Data/Null frames | Add "Action," before QoS Data at 239.13 | Revised - Agree in principle. No need to explictly mention Action/Action No Ack, since it is a type of maangement frame. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12827 | Mark RISON | 240.22 | It doesn't have to be an UMRS, it can be a Trigger frame | Change " if a UMRS Control fieldis present" to "either a Trigger frame or a frame with a UMRS Control field is present" (as under 3)) | Rejected - Since this paragraph is about S-MPDU, it cannot carry both the trigger-frame MPDU and QoS-Data. Only UMRS is allowed in this case |
| 12828 | Mark RISON | 240.32 | "carries a multi-TID A-MPDU" is known by the transmitter but not by the receiver | Reword in terms of "receives QoS Data or QoS Null frames with ack policy HTP Ack and with more than one TID, or receives a QoS Data or QoS Null frame with ack policy HTP Ack and an Action frame". Ditto in Subclauses 27.4.4.2, 27.4.4.3, 27.4.4.5 | Revised - Agree in principle. No need to explictly mention Action/Action No Ack, since it is a type of maangement frame. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12829 | Mark RISON | 240.39 | It is not clear whether an HE TB PPDU is the transmission by a given STA or the union of the transmissions by a set of STAs (as specified in the Trigger frame/UMRS). Wording like "If the HE TB PPDU carries S-MPDUs, A-MPDUs, or multi-TID A-MPDUs from more than one STA" implies the latter but wording like "A non-AP STA that sends an HE TB PPDU as a response to a Basic Trigger frame" implies the former | State in 28.3.4 that an HE TB PPDU is the waveform generated by a given STA, and that an UL MU PPDU consists of one or more HE TB PPDUsChange the last para of 27.4.4.5 to "If there is an HE TB PPDU from more than one STA, the AP shall respond with a Multi-STA BlockAck frame carried [...]" | Revised - The current text already captures the idea that the HE-TB PPDU is a union of transmissions from multiple STAs. |
| 12831 | Mark RISON | 241.26 | Issues with "Group Addressed Multi-STA BlockAck In DL MU Support": should be hyphen not space at 136.19, 187.15, 241.27; should be specified to be reserved when transmitted by an AP; "if the receivers of group-addressed Multi-STA BlockAck frame support the reception of MU Multi-STA BlockAck frame by Group Addressed Multi-STA BlockAck In DL MU Support in DL MU Support subfield in the HE MAC Capabilities Information field The Ack Type field shall be set according to the acknowledgement context" is complete gobbledygook and should be "if the receiving STAs have all set the Group Addressed Multi-STA BlockAck In DL MU Support subfield the HE MAC Capabilities Information field to 1"; "An HE AP should only transmit" at 241.30 is confusing and should be "An HE AP shall not transmit a group addressed Multi-STA BlockAck frame in an HE MU PPDU to a non-AP HE STA on any RU other than the broadcast RU (26/52/106/242/484/996) (see 28.3.10.8.6 (HE-SIG-B per-user content)) that includesthe RU used for receiving the immediately preceding HE TB PPDU from that STA" | As it says in the comment | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12832 | Mark RISON | 239.16 | The usage of the term "S-MPDU" is incorrect. An S-MPDU, from the baseline, is "An MPDU that is the \*\*\*only\*\*\* MPDU in an aggregate MPDU (A-MPDU) carried in a VHT physicallayer (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." So an MPDU with EOF=1 in an A-MPDU that also contains a QoS Null MPDU with EOF=0 and No Ack ack policy, or an Action No Ack frame, say, is not an S-MPDU. This breaks e.g. 27.4.4.2 because a QoS Data with EOF=1 not sent under a BA agreement needs to be responded to with an Ack even if it's in an A-MPDU with an Action No Ack or QoS Null No Ack | Review all uses of the term "S-MPDU" and change those that need to be (e.g. the one at the referenced location) to "MPDU in a delimiter with EOF=1" | Revised - Agree in principle. Usage of S-MPDU is consistent with the definition. Removed QoS Null (which was also pointed out by other CIDs).Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12887 | Mark RISON | 239.26 | "If the HE SU PPDU carries a multi-TID A-MPDU that includes more than one QoS Data frameor QoS Null frame with the Ack Policy field equal to Implicit Block Ack Request and withmore than one TID, then the STA shall respond with a Multi-STA BlockAck" -- also if it contains just one QoS Data and also contains an Action | Include the case 1xQoS+1xAction in addition to the case >1xQoS already described | Revised - Agree in principle. Revised the text to add MMPDU + QoS DataTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12888 | Mark RISON | 239.20 | A QoS Null cannot be sent under a BA and so cannot have ack policy Implicit BAR. Ditto in 27.4.4.3 | Change " includes one or more QoS Data frameor QoS Null frame with EOF = 0, and with the Ack Policy field equal to Implicit Block AckRequest for at least one MPDU" to " includes one or more QoS Data frames with EOF = 0, and with the Ack Policy field equal to Implicit Block Ack Request". In 3) below change "includes more than one QoS Data frameor QoS Null frame with the Ack Policy field equal to Implicit Block Ack Request and withmore than one TID" to "includes more than one QoS Data frame with the Ack Policy field equal to Implicit Block Ack Request" | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12889 | Mark RISON | 239.17 | What if it's a Management frame other than an Action or Action No Ack? Those need to be acked too | Change "an Action Ack frame" to "a Management frame other than an Action No Ack frame" | Revised - Agree in principle. Updated the text to 'MMPDU that solicits an immediate acknowledgement' to make it general, since Action frame is a type of MMPDUTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12891 | Mark RISON | 239.06 | The TID is also important (distinguishes single-TID from multi-TID A-MPDUs) | Add "TID and" before "Ack Policy" at the referenced location | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12892 | Mark RISON | 239.06 | The PPDU type is also important | Add "PPDU format" to the list of deciding factors | Rejected - Though it is true that that there are some special rules based on PPDU format (like HE TB PPDU), the Ack rules are self-contained within the frame |
| 12893 | Mark RISON | 239.36 | This subclause is about responding, so rules on what the AP may or may not do are not appropriate | Move the first para (inc. bullets) to a different subclause | Rejected - The rules for response is in the first paragraph. Removing this paragraph will bring incompleteness |
| 12894 | Mark RISON | 240.03 | This subclause is about responding, so rules on what the AP may or may not do are not appropriate | Move the first sentence to a different subclause | Rejected - The rules for response is part of the sentence Removing this sentence will bring incompleteness |
| 12895 | Mark RISON | 240.41 | This subclause is about responding, so rules on what the non-AP STA may or may not do are not appropriate | Move the first sentence to a different subclause | Rejected - The rules for response is part of the sentence Removing this sentence will bring incompleteness |
| 12896 | Mark RISON | 240.04 | "shall set the Ack Policy to HTP Ack for each of the MPDUs for which it intends to solicit animmediate response" -- not all MPDUs have an Ack Policy field | Change "MPDUs" to "QoS Data or QoS Null frames" | Revised - Agree in principle. Changed MPDU to QoS Data frames. QoS Nulls are not allowed. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12897 | Mark RISON | 240.10 | What if it's a Management frame other than an Action or Action No Ack? Those need to be acked too | Change "an Action-Ack frame" to "a Management frame other than an Action No Ack frame" at the referenced location and at line 17. Also put a para break before the sentence at the referenced location | Revised - Agree in principle. No need to explictly mention Action/Action No Ack, since it is a type of maangement frame. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12898 | Mark RISON | 240.33 | "If the HE MU PPDU or HE SU PPDU carries a multi-TID A-MPDU that includes QoS Data framesor QoS Null frames with the Ack Policy field equal to HTP Ack, and an Action Ack frame" -- also if it contains just QoS Data but with >1 TID. Also not clear the case 1QoS+1xAction is being covered (because of use of plural "frames") | Include the cases 1xQoS+1xAction and 2xQoS-different-TIDs in addition to the case >1xQoS+1xAction already described | Revised - Agree in principle. Updated the textTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12899 | Mark RISON | 240.42 | " shall set the Ack Policy to Normal Ack/Implicit Block Ack Request " -- can only do so for QoS Data/Null (not e.g. MMPDUs) | add "of QoS Data and QoS Null frames" after "Ack Policy" | Revised - Agree in principle. Updated the text. QoS Nulls are not allowedTGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12900 | Mark RISON | 240.44 | "If the HE AP intends tosend the response in a DL SU PPDU format" -- the AP doesn't need to "intend", it just needs to do" | Change the cited text to "If the HE AP sends the response in a DL SU PPDU format" | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12902 | Mark RISON | 240.52 | "an S-MPDU from a single STA that solicits an immediate response" where the S-MPDU is a QoS Data/Null is also "a single TID A-MPDU from a single STA that solicits an immediateresponse", so 1) and 2) overlap and hence contradict each other | Mention QoS Data/Null and EOF=0, as in 27.4.4.3/4.2) | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12904 | Mark RISON | 240.53 | If the multi-TID A-MPDU has an Action frame too, the M-BA will have to have a mix of Ack Types. Also "all-ack" has been overlooked | Change " Multi-STA BlockAck frame with the Ack Type field set to 0 carried in a DL SU PPDU format" to "a Multi-STA BlockAck with one Per TID AID Info subfield, the Ack Type field set to 1 and the TID field set to 14, or a Multi-STA BlockAck frame with the Ack Type field set to 0 in at least two Per TID AID Info subfields and optionally the Ack Type field set to 1 and the TID field set to 15 in another Per TID AID Info subfield, carried in a DL SU PPDU format" | Revised - Agree in principle. Text is made more general by referring to the corresponding section, since there are different cases. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12905 | Mark RISON | 240.62 | "If the HE TB PPDU carries S-MPDUs, A-MPDUs, or multi-TID A-MPDUs from more than one STA, or acombination of S-MPDUs from a subset of STAs, A-MPDUs from another subset of STAs, or multi-TID A-MPDUs from another subset of STAs then the AP shall respond with a Multi-STA BlockAck frame" -- it might choose to respond with a DL MU PPDU containing Ack/C-BA instead | Make this para a "4)" so it is covered by the "If the HE AP intends tosend the response in a DL SU PPDU format," above | Rejected - This part covers the reception of HE-TB PPDU as a union of multiple STAs. So, the response has to be in M-BA |
| 12906 | Mark RISON | 240.62 | "If the HE TB PPDU carries S-MPDUs, A-MPDUs, or multi-TID A-MPDUs from more than one STA, or acombination of S-MPDUs from a subset of STAs, A-MPDUs from another subset of STAs, or multi-TID A-MPDUs from another subset of STAs" -- this is gibberish | Change the cited text to "If the HE AP needs to acknowledge frames from more than one STA" | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12907 | Mark RISON | 241.07 | This subclause is about responding, so rules on what the non-AP STA may or may not do are not appropriate | Move the first sentence to a different subclause | Rejected - The rules for response is part of the sentence Removing this sentence will bring incompleteness |
| 12908 | Mark RISON | 241.42 | " shall set the Ack Policy to Normal Ack/Implicit Block Ack Request " -- can only do so for QoS Data/Null (not e.g. MMPDUs) | add "of QoS Data and QoS Null frames" after "Ack Policy" and delete " for each of the MPDUs carriedin the A-MPDU" | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12909 | Mark RISON | 241.11 | "If the HE AP intends tosend the response in an OFDMA HE MU PPDU format" -- the AP doesn't need to "intend", it just needs to do" | Change the cited text to "If the HE AP sends the response in an OFDMA HE MU PPDU format" | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 12911 | Mark RISON | 241.14 | "If the HE TB PPDU carries an S-MPDU from more than one STA, or (multi-TID) A-MPDU frommore than one STA, or a combination of an S-MPDU from some STAs and (multi-TID) A-MPDUfrom other STAs" -- this is gibberish | Change the cited text to "If the HE AP needs to acknowledge frames from more than one STA" | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13517 | Simone Merlin | 240.16 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"A non-AP STA that receives an HE MU PPDU or HE SU PPDU with an A-MPDU that contains QoS Data or QoS Null frames" | As in the comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13518 | Simone Merlin | 240.21 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE MU PPDU or HE SU PPDU carries an S-MPDU that is a QoS Data frame or QoS Null.." | As in the comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13519 | Simone Merlin | 240.26 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE MU PPDU or HE SU PPDU carries a single TID A-MPDU that includes one or more QoS Data frames or QoS Null frames..." | As in the comment | Rejected - S-MPDU allows QoS Null with Ack required. |
| 13520 | Simone Merlin | 240.33 | Remove QoS Null from the following sentence, since this statement is inconsistent with other sections of the spec:"If the HE MU PPDU or HE SU PPDU carries a multi-TID A-MPDU that includes QoS Data frames or QoS Null frames..." | As in the comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13734 | Woojin Ahn | 239.01 | The terms 'S-MPDU', 'single TID A-MPDU' and 'multi-TID A-MPDU' define the ways of constructing an A-MPDU for HE STA as an originator. At the receiver side, however, the recipeint may not verify whether the received A-MPDU is an S-MPDU, a single TID A-MPDU' or a multi-TID A-MPDU as intended by the originator in case the received A-MPDU contains an error. Furthermore, the recipient doesn't need to know the type of A-MPDU in order to decide the response frame format, but the number of TIDs requiring immediate response and the presence of an Action frame and MPDU with EOF:1 | Delete 'S-MPDU', 'single TID A-MPDU', 'multi-TID A-MPDU' from this subcluase and the subsequent subcluases, and rewrite the rules based on the number of TIDs requiring immediate responses and EOF:1 MPDU among successfully received MPDUs by the recipient | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13735 | Woojin Ahn | 239.16 | "A single TID A-MPDU may include the following: 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 the Ack Policy set to No Ack. | If the HE SU PPDU carries an S-MPDU or an A-MPDU that includes only one MPDU with EOF = 1 soliciting an immeidate response, then the STA shall respond with an Ack frame | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13736 | Woojin Ahn | 239.20 | In an multi-TID A-MPDU, MPDUs from different TIDs don't have to have the same value of the Ack Policy subfield. Therefore, a non ack-enabled multi-TID A-MPDU may contains QoS Data frames from one TID with the Ack Policy subfield set to implicit BAR and another TID with the Ack Policy subfield set to Block Ack. In this case, the recipient should respond with a compressed BA frame, because the MPDUs from only one TID require immediate responses. | "If the HE SU PPDU carries an A-MPDU that includes one or more MPDU, and if one or more MPDU from only one TID solicits an immediate response and the EOF of the MPDU is set to 1, then the STA shall respond with an Compressed BlockAck frame. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13737 | Woojin Ahn | 239.16 | An Ack-enabled multi-TID A-MPDU may contains QoS Data frames from a TID with the Ack Policy subfield set to Block Ack and one Qos Data with the EOF field set to 1 or an Action frame. In this case, the recipient must respond with an Ack frame | If the HE SU PPDU carries an S-MPDU or an A-MPDU that includes only one MPDU with EOF = 1 soliciting an immeidate response, then the STA shall respond with an Ack frame. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13738 | Woojin Ahn | 239.49 | "A single TID A-MPDU may include the following: 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. | If the HE MU PPDU carries an S-MPDU or an A-MPDU that includes only one MPDU with EOF = 1 soliciting an immeidate response, then the STA shall respond with an Ack frame | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13739 | Woojin Ahn | 239.53 | In an multi-TID A-MPDU, MPDUs from different TIDs don't have to have the same Ack Policy value. Therefore, a non ack-enabled multi-TID A-MPDU may contains QoS Data frames from one TID with the Ack Policy subfield set to implicit BAR and another TID with the Ack Policy subfield set to Block Ack. In this case, the recipient should respond with a compressed BA frame, because the MPDUs from only one TID require immediate responses. | "If the HE MU PPDU carries an A-MPDU that includes one or more MPDU, and if one or more MPDU from only one TID solicits an immediate response and the EOF of the MPDU is set to 1, then the STA shall respond with an Compressed BlockAck frame. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13740 | Woojin Ahn | 239.49 | An Ack-enabled multi-TID A-MPDU may contains QoS Data frames from a TID with the Ack Policy subfield set to Block Ack and one Qos Data with the EOF field set to 1 or an Action frame. In this case, the recipient must respond with an Ack frame | If the HE MU PPDU carries an S-MPDU or an A-MPDU that includes only one MPDU with EOF = 1 soliciting an immeidate response, then the STA shall respond with an Ack frame | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13741 | Woojin Ahn | 240.21 | If a recipient received an EOF:1 MPDU and a Trigger frame, it is better to respond with an Ack frame | If the HE MU PPDU or HE SU PPDU carries an S-MPDU or an A-MPDU that includes only one MPDU with EOF = 1 soliciting an immeidate response, and if a UMRS Control field or a Trigger frame is present, then the STA shall respond with an Ack frame carried in the HE TB PPDU sent as a response. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13742 | Woojin Ahn | 240.21 | "A single TID A-MPDU may include the following: One frame with a single TID value with the Ack Policy field equal to Normal Ack or one Action frame and at least one of QoS Null frame with Ack Policy set to No Ack. | "If the HE MU PPDU or HE SU PPDU carries an A-MPDU that includes one or more MPDU, and if one or more MPDU from only one TID solicits an immediate response and the EOF of the MPDU is set to 1, and if a UMRS Control field or a Trigger frame is present, then the STA shall respond with an Compressed BlockAck frame.If the HE MU PPDU or HE SU PPDU carries an A-MPDU that includes one or more MPDU, and if one or more MPDU from more than one TID solicits an immediate response, and if a UMRS Control field or a Trigger frame is present, then the STA shall respond with an Multi-STA BlockAck carried in the HE TB PPDU sent as a response." | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |
| 13743 | Woojin Ahn | 240.26 | In an multi-TID A-MPDU, MPDUs from different TIDs don't have to have the same Ack Policy value. Therefore, a non ack-enabled multi-TID A-MPDU may contains QoS Data frames from one TID with the Ack Policy subfield set to implicit BAR and another TID with the Ack Policy subfield set to No Ack. In this case, the recipient should respond with a compressed BA frame, because the MPDUs from only one TID require immediate responses. | If the HE MU PPDU or HE SU PPDU carries an S-MPDU or an A-MPDU that includes only one MPDU with EOF = 1 soliciting an immeidate response, and if a UMRS Control field or a Trigger frame is present, then the STA shall respond with an Ack frame carried in the HE TB PPDU sent as a response. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-18-0027-02-00ax |

* HE block acknowledgement procedure(#8432)
* Overview

(#8432)The HE-immediate block acknowledge procedure builds on the features defined for HT-immediate block ack, with the following extensions:

* Support for a Multi-STA BlockAck frame
* Support for a Multi-STA BlockAckReq (MU-BAR)
* Support for a Multi-TID BlockAckReq frame

Additionally, the HE-immediate block acknowledgment procedure also added features such as:

* Acknowledging multiple STAs using a single Multi-STA BlockAck frame
* Acknowledging QoS Data frames with two or more TIDs using a Multi-STA BlockAck frame
* Acknowledging QoS Data frames with one or more TIDs, and a management frame using a Multi-STA BlockAck frame
* All-Ack, which uses a variant of Multi-STA BlockAck frame to acknowledge all MPDUs in the eliciting PPDU
* Pre-Association acknowledgment, which acknowledges pre-association management frames for multiple STAs using a single Multi-STA BlockAck frame

(#6608, #8459)An HE STA shall support generation of Compressed BlockAck frames if HT-immediate block ack(#Ed) is supported in the role of recipient (see 10.24.7.1 (Introduction))(#9875). An HE STA shall support generation of Multi-STA BlockAck frame if multi-TID A-MPDU operation (27.10.4 (multi-TID A-MPDU and ack-enabled A-MPDU) is supported in the role of recipient. An non-AP HE STA shall support reception of a Multi-STA BlockAck frame.(#9286, #10329)

A non-AP HE STA(#6256) that is associated with an AP and that sends a Multi-STA BlockAck frame shall set the AID11 subfield(#Ed) in the Per AID TID Info field(#7734) of the Multi-STA BlockAck frame to 0 and the RA field to the MAC address of the intended recipient.(#8051) A non-AP HE STA that is not associated with an AP shall not send a Multi-STA BlockAck frame.(#8432)

(#8461, #8462)An HE AP that sends a Multi-STA BlockAck frame where the Per AID TID Info fields are addressed to more than one STA shall set the RA field to the broadcast address(#8463). An HE AP that sends a Multi-STA BlockAck frame where the Per AID TID Info fields are all addressed to a single recipient STA may set the RA field to either the address of the recipient STA or the broadcast address(#8464). An HE AP that sends a a Multi-STA BlockAck frame to an associated STA shall set the AID11 subfield in the Per AID TID Info field of the Multi-STA BlockAck frame to the 11 LSBs of the AID of the intended STA. An HE AP that sends a a Multi-STA BlockAck frame to an un-associated STA shall set the the AID11 subfield in the Per AID TID Info field of the Multi-STA BlockAck frame to 2045(#8432).

An HE STA that transmits a Multi-STA BlockAck frame shall use a rate, HT MCS, <VHT-MCS, NSS> tuple or <HE-MCS, NSS> tuple that is supported by all recipient STAs.(#6609)

(#9877, #8565)A non-AP HE STA(#10333) that has established a block ack agreement with an HE STA(#8466) shall examine each BA Information field received in the Multi-STA BlockAck frame from the HE STA(#9878) and shall process each BA information according to the procedure defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame) (#8432:).

A non-AP HE STA that has not established a block ack agreement with an HE STA shall examine each BA Information field received in the Multi-STA BlockAck frame as follows:

* If the Ack Type field is 1, then the Per AID TID Info field indicates either the acknowledgement of an [11740] EOF-MPDU that is a QoS Data frame when the TID is less than 8, or an [11740] EOF-MPDU that is a management frame or a PS-Poll frame when the TID field is set to 15. The BA Information field is intended to the STA if the AID of the BA Information field contains the STA's AID, and is processed according to the procedure defined in Acknowledgement context in a Multi-STA BlockAck frame27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame).
* If the Ack Type field is 0, the AID field is set to 2045, and the TID field is 15, then the RA field is the MAC address of an unassociated STA for which the Per AID TID Info subfield is intended. The BA Information field is intended to the STA if the RA field of the BA Information field contains the STA's MAC address, and is processed according to the procedure defined in Acknowledgement context in a Multi-STA BlockAck frame27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame).(#10328)

An HE AP shall not send to the STA a Multi-STA BlockAck frame that has Per STA Info fields for STAs associated with more than one BSS in a multiple BSSID set unless the HE AP has received from the STA an HE Capabilities element with the Rx Control Frame To MultiBSS subfield in HE MAC Capabilities Information field set to 1(#3060, #9444, #Ed).

An AP that transmits a Multi-STA BlockAck frame addressed to HE STAs shall set the TA field of the frame to the MAC address of the AP, except when dot11MultiBSSIDActivated is true and the Multi-STA BlockAck frame is directed to STAs from at least two different BSSs of the multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID.(#3060, #9444)

A non-AP HE STA(#6256) that is associated with a BSS corresponding to(#5175) a nontransmitted BSSID and has indicated support for receiving Control frames with TA set to the Transmitted BSSID (via the Rx Control Frame To MultiBSS subfield set to 1 in HE Capabilities element that it transmits) shall, upon receiving an MU BAR Control frame with TA set to the transmitted BSSID,(#3062) respond to an MU-BAR Trigger frame with RA(#) set either to the (nontransmitted) BSSID of the BSS(#5175) it is associated with or the transmitted BSSID (i.e., the TA of the soliciting MU-BAR Trigger frame(#10252, #7077)).

An HE STA that transmits a Multi-TID BlockAckReq frame shall contains the TID Values of the Per TID Info subfields of the BAR Information field of the Multi-TID BlockAckReq frame for the MPDUs of which TIDs correspond to AC that has the same or higher priority with respect to the primary AC, except when the Multi-TID BlockAckReq frame is carried in an HE TB PPDU in which case the HE STA contains the TID Values of the Per TID Info subfields of the BAR Information field of the Multi-TID BlockAckReq frame for the MPDUs of which TIDs correspond to any AC.

An HE STA that transmits a BlockAckReq frame carried in an HE TB PPDU contains the TID Values of the Per TID Info subfields of the BAR Information field of the BlockAckReq frame for the MPDUs of which TIDs correspond to any AC.(17/1272r0)

* Acknowledgement context in a Multi-STA BlockAck frame(#8482)

A recipient of an A-MPDU sets the Ack Type and TID subfields in the AID TID Info field(#7734) of the Multi-STA BlockAck frame sent as a response depending on the acknowledgement context as follows:(#8432)

* An HE AP that receives an A-MPDU that includes only one MPDU, and the MPDU is an EOF-MPDU [12832] prior to association may generate a Multi-STA BlockAck frame using the procedure described in pre-association ack context.
* The recipient of an A-MPDU that does not include an EOF MPDU but does include one or more non-EOF-MPDUs that are QoS Data frames with Ack Policy field equal to Normal Ack, or Implicit Block Ack Request belonging to the same block ack agreement may generate a Multi-STA BlockAck frame as follows:
* If all MPDUs in the AMPDU are received successfully, then the recipient may follow the procedure described in the All Ack context.
* Otherwise, the recipient may follow the procedure described in the BlockAck context.
* If the recepient supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes an MPDU that is a management frame that solicits an acknowledgement, and one or more MPDUs that are QoS Data frames with the Ack Policy field equal to Normal Ack, or Implicit Block Ack Request, then the recepient shall generate Multi-STA BlockAck frame as follows:
* If all MPDUs in the AMPDU are received successfully, then the recipient may follow the procedure described in the All Ack context.
* Otherwise :
* For the MPDU that is a management frame, the recipient shall create a per AID TID info field using the procedure described in Ack context with the TID value set to 15.
* For the EOF-MPDUs that are QoS data frames, the recipient shall create a per AID TID info field using the procedure described in Ack context with the TID set to the TID of the QoS Data frame
* For the non-EOF-MPDUs that are QoS data frames, the recipient shall create a per AID TID info field using the procedure described in BlockAck context with the TID set to the TID of the QoS Data frame
* If the recipient supports multi-TID aggregation and if the A-MPDU does not include an EOF MPDU but does include one or more non-EOF-MPDUs that are QoS Data frames with Ack Policy field equal Implicit Block Ack Request and are belonging to more than one block ack agreement, then the recepeintshall generate a Multi-STA BlockAck frame as follows:
* If all MPDUs in the AMPDU are received successfully, then the recipient may follow the procedure described in the All Ack context
* Otherwise, for each TID included the received A-MPDU, the recipient shall create a per AID TID info field using the procedure described in BlockAck context with the TID set to the TID of the QoS Data frame

The procedure for different acknowledgment context for generating Multi-STA BlockAck frame is defined below:

* All Ack context: if the originator had set the All Ack Support subfield in the HE Capabilities element to 1(#Ed), then the recipient may set the Ack Type field to 1 and the TID subfield to 14 to indicate the successful reception of all the MPDUs (#6619)carried in the eliciting A-MPDU or multi-TID A-MPDU(#5979). Otherwise the recipient shall not set the Ack Type field to 1 and the TID subfield to 14. The Multi-STA BlockAck frame shall contain only one Per AID TID Info field(#7734) addressed to an originator in the Multi-STA BlockAck frame.
* Pre-association ack context: A recipient receiving a single management frame from the unassociated STA, that requires an acknowledgment, shall set the Ack Type field to 0, AID subfield to 2045, and the TID field to 15 in the Per AID TID Info field, and the BA information set to the intended recipient's MAC address to indicate the successful reception of that management frame.(#9120)
* Ack context: If the recipient had set the Ack-Enabled A-MPDU Support subfield in the HE Capabilities element to 1, then the recipient receiving an [11740] EOF-MPDU (#8481), that requires an acknowledgment, shall set the Ack Type field to 1 and the TID field to the TID value of if that EOF-MPDU(#3203) is a QoS Data frame or to the TID value of 15 if the EOF-MPDU is a management frame or PS-Poll frame(#5652, #5651, #5065).

If a received A-MPDU contains more than one EOF-MPDUs that solicits an immediate acknowledgment, then the Multi-STA BlockAck frame shall contain multiple occurrences of unique AID TID Info fields(#7734), with Ack Type field equal to 1, one for each such successfully received EOF-MPDU.(#9446)

The allowed values for the TID field in this context are 0 to 7 (for indicating acknowledgement of QoS Data or QoS Null frames) or 15 (for indicating acknowledgement of management frame or PS Poll frame [12631] (#9120)).
* BlockAck context: The recipient shall set the Ack Type field to 0 and the TID field of a Per AID TID Info field(#7734) to the TID value of MPDUs requesting block acknowledgement that are carried in the eliciting A-MPDU or multi-TID A-MPDU.

The Multi-STA BlockAck frame may contain multiple occurrences of these Per AID TID Info fields(#7734) addressed to an originator, one for each MPDU that is requesting block acknowledgement, in which case the Block Ack Starting Sequence Control and Block Ack Bitmap fields shall be set according to 10.24.7 (HT-immediate block ack extensions) for each block ack session, and according to 27.3 (Fragmentation and defragmentation) for each block ack session with dynamic fragmentation.

The allowed values for the TID field in this context are 0 to 7 (for indicating block acknowledgement of QoS Data frames).

Variable bitmap lengths can be included in the Per AID TID Info field(#7734) when the originator and recipient negotiate their use as defined in 27.4.3 (Negotiation of block ack bitmap lengths).

(#8467)Upon reception of the Multi-STA BlockAck frame the originator shall examine each Per AID TID Info field and shall perform the following operations for each Per AID TID Info field(#7734) that has an AID field addressed to the originator (i.e., the AID subfield is an AID if the originator is a non-AP STA, is 0 when the originator is an AP, and is 2045 when the originator is an unassociated HE STA(#9120)):

* If the Ack Type field is 0 and the TID field is less than 8(#9120) then the BlockAck Starting Sequence Control, TID and BA Bitmap fields of the Per AID TID Info field(#7734) are processed according to 10.24.7 (HT-immediate block ack mechanism), 27.3 (Fragmentation and defragmentation), and as defined below.
* If the Ack Type field is 0 and the TID field is 15, then the Per AID TID Info field indicates the acknowledgement of a single management frame sent by the unassociated STA as defined by the acknowledgement context.(#9120)
* If the Ack Type field is 1 and the TID is less than or equal to 7 or is equal to 15, then the Per AID TID Info field(#7734) indicates the acknowledgement of an[11740] EOF-MPDU that is a QoS Data frame identified by the value of the TID, a management frame frame [12631]or a PS-Poll frame(#3063, #6621)(#6096).
* If the Ack Type field is 1 and the TID subfield of AID TID Info field(#7734) is 14, then the Per AID TID Info field(#7734) indicates the acknowledgement of all MPDUs carried in the eliciting PPDU as defined by the acknowledgement context.
* Negotiation of block ack bitmap lengths

Both the Compressed BlockAck frame and Multi-STA BlockAck frame allow different Block Ack Bitmap subfield lengths. The length of the Block Ack Bitmap subfield is indicated in the Fragment Number subfield of the Block Ack Starting Sequence Control field as defined in 9.3.1.9 (BlockAck frame format). The Block Ack Bitmap subfield length in bits(#7801) of a BlockAck frame used during a BA session depends on the negotiated buffer size between the originator and the recipient as indicated below:

* When a Compressed BlockAck frame is used:
* If the negotiated buffer size is within [1, 64] then a BlockAck Bitmap length of 64 shall be used during the BA session
* If the negotiated buffer size is within [65, 256](#5654) then a BlockAck Bitmap length of either 64 or 256 shall be used during the BA session
* When a Multi-STA BlockAck frame is used:
* If the negotiated buffer size is within [1, 64] then a BlockAck Bitmap length of either 32 or 64 shall be used during the BA session
* If the negotiated buffer size is within [65, 128] then a BlockAck Bitmap length of 32, 64 or 128 shall be used during the BA session(#5655, #7534, #9882)
* If the negotiated buffer size is within [129, 256] then a BlockAck Bitmap length of 32, 64, 128 or 256 shall be used during the BA session(#5655, #7534, #9882)

The recipient shall not include in the Buffer Size field of an ADDBA Response frame a value that would cause the BlockAck Bitmap length of its block ack responses to exceed the BlockAck Bitmap length that is derived by the Buffer Size field of the ADDBA Request frame sent by the originator. When the Buffer Size field in the ADDBA Request frame is set to 0, the Buffer Size field of an ADDBA Response frame is within [1, 64].(17/1272r0) The originator sets the Duration field value accounting for the largest BlockAck Bitmap length based on negotiated buffer size.(#8122)

A recipient shall not include in a Multi-STA BlockAck frame a Per AID TID Info field with a 32-bit BlockAck Bitmap field addressed to an originator if the 32-bit BA Bitmap Support field in the HE MAC Capabilities Information field in the HE Capabilities element received from that originator is 0.(#6622)

NOTE—A Multi-STA BlockAck frame might include Per AID TID Info fields with a 32-bit BlockAck Bitmap field addressed to other originators and the nonsupporting originator needs to able to parse these fields to locate a possible Per AID TID Info field addressed to it.(#6622)

A recipient that is the intended receiver of an (multi-TID) A-MPDU, (multi-TID) BlockAckReq frame, MU-BAR Trigger frame or GCR MU-BAR Trigger frame(#3202) that solicits an immediate BlockAck frame response for each TID shall follow the rules defined in 10.24.7 (HT-immediate block ack extensions) except that:

* *WinSizeR* is set to the smaller of *BitmapLength* and the value of the Buffer Size field of the associated ADDBA Response frame that established the block ack agreement, where the *BitmapLength* is the largest value for the BlockAckBitmap that is supported(#7803) by the recipient
* The Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield shall be set to any value in the range from (*WinEndR*  *BitmapLength* + 1) to *WinStartR*
* The values in the recipient's record of status of MPDUs beginning with the MPDU for which the Sequence Number subfield value is equal to *WinStartR* and ending with the MPDU for which the Sequence Number subfield value is equal to *WinEndR* shall be included in the BlockAck Bitmap, wherein the length of the BlockAck Bitmap field shall be greater than or equal to *WinEndR*  *WinStartR*(#5805, #6623)

(#7966)NOTE—An HE STA can generate a BlockAck frame with variable length Block Ack Bitmap field in which case the STA ensures that the BlockAck frame response fits within the remaining duration of the TXOP.

If a STA sets(#7804) the HE Fragmentation Support subfield in the HE Capabilities element to 3, then the LSB of the Fragment Number subfield of the BA frame may be set to 1. If the LSB of the Fragment Number subfield of the BA frame is set to 1, then the BA Bitmap fields are re-mapped as defined in 27.3 (Fragmentation and defragmentation).

* Per-PPDU acknowledgment selection rules
* General

A STA that [11092. 11810] transmits a PPDU can solicit different immediate responses for the frames contained in the PPDU by using the Ack Policy field of QoS Data or QoS Null frames, the type of the frame (e.g., [12486]the type of management frame, (multi-TID) BAR, MU-BAR Trigger frame(#Ed), GCR MU-BAR Trigger frame,(#3204) etc.), [12891] number of TIDs in the AMPDU and the EOF field setting of the delimiter(#7938, #7939).

* Responding to an HE SU PPDU with an SU PPDU(#9351, #8432)

An HE STA that receives an HE SU PPDU with an A-MPDU that contains MPDUs that solicits acknowledgment and that does not include a Trigger frame, or a frame with UMRS Control field shall respond using an SU PPDU as follows:

* If the A-MPDU includes only one MPDU, and the MPDU is an EOF-MPDU that is either a QoS Data frame or QoS Null frame with the Ack Policy field equal to Normal Ack, or [12486, 12889] a management frame that solicits acknowledgement, then the STA shall respond with an Ack frame.(#9395)
1. If the HE STA supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes more than one MPDU, only one of which solicits acknowledgement and the MPDU that solicits acknowledgement is an EOF MPDU that is a QoS Data frame or a QoS Null frame with Ack Policy subfield equal to Normal Ack, or a manamgement frame that solicits acknowledgement, then the HE STA shall respond with an Ack frame.
2. If the A-MPDU does not include an EOF MPDU but does include one or more non-EOF-MPDUs that are QoS Data frames [11758, 12888] belonging to the same block ack agreement and with the Ack Policy field equal to Implicit Block Ack Request for at least one MPDU, then the STA shall either respond with a Compressed BlockAck frame as defined in 10.24.7.5 [12487], or a Multi-STA BlockAck frame with the Ack Type field set to 1 and the TID field set to 14 as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame) if the recipient has indicated the all ack support by setting the All Ack Support subfield in the HE MAC Capabilities Information field to 1.
3. If the HE STA supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes a management frame that solicits an acknowledgement, and one or more QoS Data frames with the Ack Policy field equal to Normal Ack, or Implicit Block Ack Request, then the STA shall respond with a Multi-STA BlockAck frame as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame),
4. If the HE STA supports multi-TID aggregation and if the A-MPDU includes two or more QoS Data frames [11759, 12888] with the Ack Policy field equal to Implicit Block Ack Request and and are belonging to more than one block ack agreeement, [12486. 12887], then the STA shall respond with a Multi-STA BlockAck frame as defined in as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame).
* Responding to an HE MU PPDU(#8391) with an SU PPDU(#8432)

If an AP intends to solicit an immediate response in an SU PPDU the following apply:

* An AP shall set the Ack Policy field of the QoS Data [11760] to Normal Ack or Implicit Block Ack Request(#5566)(#10253) in at most one A-MPDU in the HE MU PPDU(#8391) (see 10.3.2.10.1 (Acknowledgement procedure for DL MU PPDU in SU format)(#3066) for an example of this sequence).
* The A-MPDUs in the HE MU PPDU(#8391) shall not contain [12630] a management frame that solicits a response.(#6625)

A non-AP HE STA that receives an HE MU PPDU(#8391) with an A-MPDU that contains MPDUs that solicits acknowledgment and that does not include a Trigger frame, or a frame with UMRS Control field shall respond using an SU PPDU as follows:

1. If the A-MPDU carries only one MPDU and the MPDU is an EOF-MPDU that is either a QoS Data frame or QoS Null frame addressed to it and with the Ack Policy field equal to Normal Ack, then the STA shall respond with an Ack frame carried in an SU PPDU.(#6627)
2. If the HE STA supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes more than one MPDU, only one of which solicits acknowledgement and the MPDU that solicits acknowledgement is an EOF MPDU that is a QoS Data frame or a QoS Null frame with Ack Policy subfield equal to Normal Ack, then the HE STA shall respond with an Ack frame.
3. If the A-MPDU does not include an EOF MPDU but does include one or more non-EOF-MPDUs that are QoS Data frames [11762] belonging to the same block ack agreement and with the Ack Policy field equal to Implicit Block Ack Request(#5566) for at least one MPDU, then the STA shall either respond with a Compressed BlockAck frame as defined in 10.24.7.5 [12487], or a Multi-STA BlockAck frame with the Ack Type field set to 1 and the TID field set to 14 as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame) if the recipient has indicated the all ack support by setting the All Ack Support subfield in the HE MAC Capabilities Information field to 1.
4. If the HE-STA supports multi-TID aggregation and if the A-MPDU include two or more QoS Data frames [11763] addressed to it with the Ack Policy field equal to Implicit Block Ack Request(#5566) and are belonging to more than one block ack agreeement, [12486] then the STA shall respond with a Multi-STA BlockAck frame as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame). (#6629)

NOTE—A control response frame carried in an SU PPDU that is an immediate response to an HE MU PPDU(#6630) follows the rules defined in 10.7.6.5 (Rate selection for control response frames).

* Responding to an HE MU PPDU(#8391) or HE SU PPDU with an HE TB PPDU(#8432)

An AP that sends an HE MU PPDU(#8391) or HE SU PPDU that solicits(#6631) an immediate response carried in an HE TB PPDU shall set the Ack Policy to HTP Ack(#4723)(#Ed) for each of the [12896]QoS Data frames for which it intends to solicit an immediate response (see 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) for an example of this sequence). If [12631] a management frame that solicits an immediate acknowledgement is carried in an HE MU PPDU, then the response is carried in an HE TB PPDU.(#9719) A non-AP STA that receives an HE MU PPDU or HE SU PPDU(#8492) with an A-MPDU that contains QoS Data [11763, 13517]addressed to it with Ack Policy field equal to HTP Ack, or [12486, 12897] a management frame that solicits an immediate acknowledgement shall not respond if it has not received the UL resource allocation information either through UMRS Control field or a Trigger frame in the soliciting PPDU.

A non-AP STA that receives an HE MU PPDU(#8391) or HE SU PPDU(#8492) with an A-MPDU that contains MPDUs that solicits acknowledgment and includes a Trigger frame, or a frame with UMRS Control field shall respond using an HE TB PPDU as follows: (#9886, #9884)

1. If the A-MPDU includes only one MPDU, and the MPDU is an EOF-MPDU that is either a QoS Data frame or QoS Null frame with the Ack Policy field equal to HTP Ack [12486] or a management frame that solicits acknowledgement, , then the STA shall respond with an Ack frame
2. If the HE STA supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes more than one MPDU, only one of which solicits acknowledgement and the MPDU that solicits acknowledgement is an EOF MPDU that is a QoS Data frame or a QoS Null frame with Ack Policy subfield equal to Normal Ack, or a manamgement frame that solicits acknowledgement, then the HE STA shall respond with an Ack frame.
3. If the A-MPDU does not include an EOF MPDU but does include one or more non-EOF-MPDUs that are QoS Data frames[11763, 12488, 13520], belonging to the same block ack agreement and with the Ack Policy field equal to HTP Ack for at least one MPDU, then the STA shall respond with a Compressed BlockAck frame as defined in 10.24.7.5, [12487]or a Multi-STA BlockAck frame with the Ack Type field set to 1 and the TID field set to 14 as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame) if the recipient has indicated the all ack support by setting the All Ack Support subfield in the HE MAC Capabilities Information field to 1.
4. If the HE STA supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes a management frame that solicits an acknowledgement, and one or more QoS Data frames with the Ack Policy field equal to Normal Ack, or Implicit Block Ack Request, then the STA shall respond with a Multi-STA BlockAck frame as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame),
5. If the HE STA supports multi-TID aggregation and if A-MPDU includes two or more QoS Data frames [11763]with [12828] the Ack Policy field equal to HTP Ack, and [12828] are belonging to more than one block ack agreeement [12486, 12898], then the STA shall respond with a Multi-STA BlockAck frame.
* Responding to an HE TB PPDU with a DL SU PPDU(#8432)

A non-AP STA that sends an HE TB PPDU as a response to a Basic Trigger frame(#8485) that solicits(#9287) an immediate response shall set the Ack Policy [12899] of the QoS Data frames to Normal Ack/Implicit Block Ack Request(#5566) (see 10.3.2.10.3 (Acknowledgement procedure for an UL MU transmission)(#9288) for an example of this sequence).

[12900] If the HE TB PPDU carries MPDUs only from one STA and if the HE AP intends to send the response in a DL SU PPDU format, then the HE AP shall respond using DL SU PPDU as follows:

* If the A-MPDU includes only one MPDU, and the MPDU is an EOF-MPDU that is either a QoS Data frame or QoS Null frame with the Ack Policy field equal to Normal Ack, or a management frame that solicits acknowledgement , then the HE AP shall respond with either an Ack frame or a Multi-STA BlockAck frame with the Ack Type field set to 1.
1. If the HE AP supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes more than one MPDU, only one of which solicits acknowledgement and the MPDU that solicits acknowledgement is an EOF MPDU that is a QoS Data frame or a QoS Null frame with Ack Policy subfield equal to Normal Ack, or a manamgement frame that solicits acknowledgement, then the HE AP shall respond with an Ack frame or a Multi-STA BlockAck frame with the Ack Type field set to 1.
2. If the A-MPDU does not include an EOF MPDU but does include one or more non-EOF-MPDUs [12902] that are QoS Data frames belonging to the same block ack agreement and and with the Ack Policy field equal to Implicit Block Ack Request for at least one MPDU, then the HE AP shall respond with a Compressed BlockAck frame as defined in 10.24.7.5, or a Multi-STA BlockAck with the Ack Type field set to 1 and the TID field set to 14 if the recipient has indicated the all ack support by setting the All Ack Support subfield in the HE MAC Capabilities Information field to 1 or a Multi-STA BlockAck frame with the Ack Type field set to 0 as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame).
3. If the HE AP supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU carries a management frame that solicits acknowledgement, and one or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request, then the HE AP shall respond with a Multi-STA BlockAck frame as defined in Acknowledgement context in a Multi-STA BlockAck frame as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame), [11740]..
4. If the HE AP supports multi-TID aggregation and if the A-MPDU includes two or more QoS Data frames, (#3298) with the Ack Policy field equal to Normal Ack or Implicit Block Ack Request and are belonging to more than one block ack agreeement,, then the HE AP shall respond with a Multi-STA BlockAck frame as defined in Acknowledgement context in a Multi-STA BlockAck frame [12143, 12904].

If the HE TB PPDUs carry MPDUs from more than one STA, and if the AP sends the response in DL SU PPDU, [12906] then the AP shall respond with a Multi-STA BlockAck frame carried in a DL SU PPDU format that contains the appropriate settings in each Per AID TID Info field(#7734) intended to each STA as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame).

* Responding to an HE TB PPDU with an HE MU PPDU(#8432)

A non-AP STA that sends an HE TB PPDU as a response to a Basic Trigger frame(#8385) that solicits(#6643) an immediate response shall set the Ack Policy to Normal Ack/Implicit Block Ack Request(#5566) for each of the [12908] QoS Data frames carried in the A-MPDU (see 10.3.2.10.3 (Acknowledgement procedure for an UL MU transmission)(#7083) for an example of this sequence).

[12909] If an AP intends to send response to an HE TB PPDU that it received using an HE MU PPDU, then the AP shall respond to each A-MPDU that it received using the following procedure::

[12911]

1. If the A-MPDU received from a STA includes only one MPDU, and the MPDU is an EOF-MPDU that is either a QoS Data frame or QoS Null frame with the Ack Policy field equal to Normal Ack, or a management frame that solicits acknowledgement, then the STA shall respond with an Ack frame carried in the HE MU PPDU.(#9395)
2. If the HE AP supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU includes more than one MPDU, only one of which solicits acknowledgement and the MPDU that solicits acknowledgement is an EOF MPDU that is a QoS Data frame or a QoS Null frame with Ack Policy subfield equal to Normal Ack, or a manamgement frame that solicits acknowledgement, then the HE AP shall respond with an Ack frame carried in the HE MU PPDU.(#9395).
3. If the A-MPDU does not include an EOF MPDU but does include one or more non-EOF-MPDUs that are QoS Data frames belonging to the same block ack agreement and with the Ack Policy field equal to Implicit Block Ack Request for at least one MPDU, then the HE AP shall respond with a Compressed BlockAck frame as defined in 10.24.7.5, a Multi-STA BlockAck with the Ack Type field set to 1 and the TID field set to 14 or a Multi-STA BlockAck frame with the Ack Type field set to 0 as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame)carried in the HE MU PPDU.
4. If the HE STA supports ack-enabled aggregation by setting the Ack-Enabled Aggregation Support subfield in the HE MAC Capabilities Information field to 1, and if the A-MPDU carries a management frame that solicits an immediate acknowledgement, and one or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request, then the HE AP shall respond with a Multi-STA BlockAck frame as defined in Acknowledgement context in a Multi-STA BlockAck frame as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame), carried in the HE MU PPDU.
5. If the HE STA supports multi-TID aggregation and if the A-MPDU includes two or more QoS Data frames, (#3298) with the Ack Policy field equal to Implicit Block Ack Request and are belonging to more than one block ack agreeement, then the HE AP shall respond with a Multi-STA BlockAck frame as defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame),

The AP may respond with group addressed Multi-STA BlockAck frame(s) in an HE MU PPDU if [12489, 12831] the intended receivers of the frame have set the Group Addressed Multi-STA BlockAck In DL MU Support [12489]subfield of the HE MAC Capabilities Information field(#9330, #8551) to ‘1’. The Ack Type field shall be set according to the acknowledgement context. [12831] If an HE AP chooses to send a group addressed Multi-STA BlockAck frame in an HE MU PPDU(#8391) to a non-AP HE STA *n*, then the HE AP shall only transmit the frame on the broadcast RU (26/52/106/242/484/996) (see 28.3.10.8.6 (HE-SIG-B per-user content))(#6098, #5807, #7087, #9525) that includes the RU used for receiving the immediately(#6655) preceding HE TB PPDU from STA *n*. There shall be no more than one group addressed Multi-STA BlockAck frame (#Ed)carried in a broadcast RU of the HE MU PPDU(#8391).

* HE block acknowledgment request and response rules(#8469, #3059)

An HE AP may solicit BlockAck frame responses from multiple HE STAs using an(#6624) MU-BAR Trigger frame(#Ed) or GCR MU-BAR Trigger frame. (#7656)The MU-BAR Trigger frame(#Ed) shall contain either Compressed BlockAckReq variant or Multi-TID BlockAckReq variant in each of the Per User Info fields. An HE AP shall not send a Multi-TID BlockAckReq (neither as part of a Per User Info field intended to the STA in an MU-BAR Trigger frame(#10252) nor as a BAR frame) to a STA that has not indicated support for multi-TID A-MPDU. (Multi-TID) BlockAckReq, BlockAckReq, GCR MU-BAR Trigger, and MU-BAR Trigger frames(#10252) indicate the length of the solicited(#8550) block ack responses according to the FN settings defined in 9.3.1.9 (BlockAck frame format). An HE STA that receives a Multi-TID A-MPDU that solicits an immediate response shall send the acknowledgement using a Multi-STA BlockAck frame. An HE STA that receives a single-TID A-MPDU in an HE SU PPDU that solicits an immediate response shall send the acknowledgement using a Compressed BlockAck frame.(#3065)

An HE STA that receives a BlockAckReq frame or an(#6613) MU-BAR Trigger frame(#10252) that contains a Compressed BlockAckReq variant in the User Info field addressed to the STA, or a GCR MU-BAR Trigger frame that contains a Compressed BlockAckReq variant in the Common Info field(#3201) shall respond with a Compressed BlockAck frame(#Ed) as defined in 10.24.7 (HT-immediate block ack extensions) or a Multi-STA BlockAck frame as defined in HE block acknowledgement procedure, with Starting Sequence Number subfield set to the Starting Sequence Number subfield of the Block Ack Request Starting Sequence Control subfield and the length of the Block Ack Bitmap subfield calculated as defined in Negotiation of block ack bitmap lengths(#9737).

An HE STA that receives a Multi-TID BlockAckReq frame or an(#6614) MU-BAR Trigger frame(#10252) that contains a Multi-TID BlockAckReq variant in the User Info field addressed to the STA or a GCR MU-BAR Trigger frame that contains a Multi-TID BlockAckReq variant in the Common Info field(#3201) shall respond with a Multi-STA BlockAck frame that contains a Per AID TID Info field with a Block Ack Bitmap subfield for each of the TIDs (with values less than 8) contained in the BlockAckReq frame, with Starting Sequence Number subfield set to the Starting Sequence Number subfield of the Block Ack Request Starting Sequence Control subfield and the length of the Block Ack Bitmap subfield calculated as defined in Negotiation of block ack bitmap lengths

3.1 Definitions

***Instruction to editor: Insert the following [11740]***

EOF-MPDU: An MPDU carried in an A-MPDU subframe that has the EOF field in the MPDU delimeter set to 1.

non-EOF-MPDU: An MPDU carried in an A-MPDU subframe that has the EOF field in the MPDU delimeter set to 0.