IEEE P802.11  
Wireless LANs

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| **Remaining Ack related CRs on misc sections** |
| **Date:** 2018-05-01 |
| **Author(s):** |

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Abstract

Resolved the following **37 CIDs**

11056, 11057, 11136, 11138, 11258, 11500, 11511, 11861, 12125, 12156,

12157, 12171, 12172, 12211, 12213, 12241, 12243, 12288, 12292, 12339,

12435, 12625, 12626, 12629, 12737, 12818, 13231, 13232, 13233, 13703,

13704, 13705, 13857, 13858, 13859, 14325, 14341

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** |
| 11057 | Adrian Stephens | 203.50 | " - BitmapLength + 1" -- while the definition of operator logic is unambiguous, it is best to reduce the probability your readers will get it wrong. Witness all those "UR a genius if you can work out this .." posts on social media. | Consistently replace 63 with (BitmapLength-1) in this subclause. At the cited location this requires nested parens. | Rejected -   I am not able to see any inconsistency |
| 11136 | Adrian Stephens | 182.14 | "VHT MU PPDU or an HE MU PPDU sent by an AP" -- operator precidence. Does "or" bind less strongly than "[that is] sent by an AP"? | Reword to: "that were transmitted by an AP within a VHT MU PPDU or an HE MU PPDU".  Or, if only an AP can transmit these PPDU types, remove "sent by an AP".  Ditto at line 16, 26 ... and other occurances in this subclause. | Accepted.  Delete the phrase "sent by an AP" from the newly added text "HE MU PPDU sent by an AP" at line-14, line-16, line-20, line-26, line-34, line-36, line-38, line-43, |
| 11138 | Adrian Stephens | 183.19 | The "channel access" part of the figure goes unexplained.  Also the level of detail of this and subsequent similar figures differs. | Label the three oblique lines: "EDCA channel access". Ditto the following similar figures.  Add SIFS and TXOP labelling to Figure 10-12a. | Accepted |
| 11258 | Alfred Asterjadhi | 54.20 | If the Ack Policy set to HTP Ack can be carried in an HE SU PPDU as well then the rule here needs to be generalized. Say something like if the frame is carried in an HE PPDU that contains a Trigger frame or an UMRS Control field. | As in comment. Ensure the rule is consistent throughout. | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 11500 | Chunyu Hu | 95.25 | A transmitter-commanded RX buffer flushing mechanism is needed for MU-BAR. It is selective in that the receipient only flushes incomplete MSDUs up to and including the indicated end sequence number. Not receiver window move occurs. No BlockAck is transmitted in response. MSDUs and fragments of MSDUs that are not covered by the SEQ number range or which are completely assembled in the buffer are unaltered. Adding this function. | as in the comment | Rejected -   This is a new feature that requires significant change to the draft with minimal gains in broad scenarios. |
| 11511 | Chunyu Hu | 55.37 | "When the frame is carried in a DL HE MU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation)." doesnt cover the case the DL data is a A-MPDU that agregate trigger and data and transmitted in the non-HE PPDU. Please clarify. | as in the comment | Rejected –  Allowing HTP Ack in a non-HE PPDU has limited technical merits. |
| 11861 | Guoqing Li | 182.27 | Multi-STA BlockACK can also be used by the AP in this case | change to "to explicit BlockAckReq or Multi-STA BlockAckReq.." | Rejected –  BlockAckReq covers both compressed block ack req and multi-TID block ack req. So, no need to call it out explicitly. |
| 12125 | Joseph Levy |  | A BlockAck Frame by definition is not a Multi-STA BlockAck frame. Hence the behavior related to a Multi-STA BlockAck frame should not complicate the description of the BlockAck frame behavior. |  | Rejected -   Commentor doesn't point out which part of the text is ambigous about C-BA Vs M-BA. The text clearly differentiates the functionality of C-BA Vs M-BA |
| 12156 | kaiying Lv | 55.20 | HE ER SU PPDU should also follow the rule.Change "a DL HE MU PPDU or HE SU PPDU" to "a DL HE MU PPDU ,HE SU PPDU or HE ER SU PPDU" | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12157 | kaiying Lv | 55.37 | Change "a DL HE MU PPDU" to "a DL HE MU PPDU,HE SU PPDU or HE ER SU PPDU" | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12171 | kaiying Lv | 182.62 | Please clarify which type of trigger frame can be carried in an HE MU PPDU when a QoS Data frame or QoS Null frame with ack policy HTP ACK. | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12172 | kaiying Lv | 184.31 | Please add HE ER SU PPDU to the list. | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12211 | kaiying Lv | 55.20 | HE ER SU PPDU should also follow the rule.Change "a DL HE MU PPDU or HE SU PPDU" to "a DL HE MU PPDU ,HE SU PPDU or HE ER SU PPDU" | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12213 | kaiying Lv | 55.37 | Change "a DL HE MU PPDU" to "a DL HE MU PPDU,HE SU PPDU or HE ER SU PPDU" | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12241 | kaiying Lv | 182.62 | Please clarify which type of trigger frame can be carried in an HE MU PPDU when a QoS Data frame or QoS Null frame with ack policy HTP ACK. | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12243 | kaiying Lv | 184.31 | Please add HE ER SU PPDU to the list. | as comment | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12288 | Kiseon Ryu | 182.01 | Regarding MU acknowledgement procedure defined in 10.3.2.10, some of text related to HE MU acknowledgement are redundant and duplicate with 27.4 HE block acknowledgement procedure. HE MU acknowledgement related text in 10.3.2.10 needs to be merged into the section 27.4. | As in the comment | Rejected -   All the HE block ack procedure is defined in Section 27.4. Section 10 defines the use of HE Block Ack in response to VHT PPDUs |
| 12292 | Kiseon Ryu | 55.37 | HTP Ack can be used not only for HE MU PPDU but also for HE SU PPDU. | Modify the text as: When the frame is carried in a DL HE MU PPDU or an HE SU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation). | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12339 | Lei Huang | 55.20 | HE ER SU PPDU is missing | change "DL HE MU PPDU or HE SU PPDU" to "DL HE MU PPDU, HE ER SU PPDU or HE SU PPDU" | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12435 | Liwen Chu | 185.30 | The MPDU with Normal Ack which his not correctly acknoeledged in a HE TB frame exchange can't be solicited through BAR or multi-TID BAR. | Change the text per the comment. | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12625 | Mark RISON | 55.37 | "When the frame is carried in a DL HE MU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation)." -- not true if ack policy is HTP Ack and no Trigger frame or UMRS was received | Change the cited text to "When the frame is carried in a DL HE MU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU, subject to reception of a Trigger frame or UMRS Control field, as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation)." | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12626 | Mark RISON | 55.18 | We need to look at the PPDU type to decide whether to respond to a DL MU PPDU anyway (because Action frames are allowed and do not have an ack policy), so the HTP Ack ack policy has no value -- just use Normal Ack/Implicit BAR | Delete the references to HTP Ack throughout the draft and instead state that the rules previously described as pertaining to that ack policy instead pertain to frames received by a non-AP STA in an HE MU PPDU | Rejected -   The assertion is not true. The HTP-Ack is used (section 27.4) when the eliciting PPDU is an HE SU PPDU to determine whether to respond in SU PPDU or HE TB PPDU |
| 12629 | Mark RISON | 182.60 | "an MMPDU that solicits an immediate response" -- it is not clear what this means | Change the cited text to "a Management frame other than an Action No Ack frame" | Revised -   Agree in principle. No need to call out Action No Ack frame, since the text already contains "that solicits immediate response"  TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 12737 | Mark RISON | 182.60 | The rules for HE MU PPDUs related to HTP Ack (i.e. only ack if received with Trigger or UMRS) don't apply to UL or direct links | Add "A non-AP STA shall not set the ack policy to HTP Ack." |  |
| 12818 | Mark RISON | 182.41 | The "carried in SU format" is not clear. Does it refer to HE SU PPDUs only or also to HE TB PPDUs? What is the point of this insertion anyway? | Delete the cited insertion | Rejected -   The purspose of "carried in SU format" is to differentiate with the next sentence of MU format |
| 13231 | Robert Stacey | 55.20 | DL HE MU PPDU is not defined anywhere. Intuitively it is an HE MU PPDU sent by an AP to one or more associated non-AP STAs. However, it could also be an HE MU PPDU with the UL/DL field set to 0. These are not the same thing (an HE MU PPDU with UL/DL field set to 0 could also be sent by a STA using TDLS). | Define DL HE MU PPDU | Revised -   Agree in principle.The right terminology is HE MU PPDU.So, changed DL HE MU PPDU to HE MU PPDU, which already has a definition  TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 13232 | Robert Stacey | 55.20 | "DL HE MU PPDU or HE SU PPDU that solicits..." It is not the PPDU that does the soliciting. It's the Trigger frame or frame caring a UMRS field that does the soliciting. Also,the enumerated type is dependent on the context. | Rewrite the Meaning column so that the enumerated type is defined for the context in which it appears. "- No explicit acknowledgement: bit 6 of the Frame Control field is 1. There might be a response frame... - PSMP Ack: bit 6 of the Frame Control field is 0 and the frame appears in a PSMP-DTT. - HTP Ack: the frame is carried in an A-MPDU that includes a Trigger frame or the frame carries a UMRS Control field..." | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 13233 | Robert Stacey | 55.38 | A Multi-STA BlockAck frame is a variant of a BlockAck frame. | Remove the redunancy. Change to read "the addressed recipient return an Ack frame or BlockAck frame carried..." | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 13703 | Tomoko Adachi | 184.01 | "BlockAck" is the correct terminology. And not a single BlockAck frame is sent but multiple BlockAck frames are sent. | Change "An example of a DL OFDMA BA is shown in Figure 10-12b ..." to "An example of multiple BlockAck frames sent in DL OFDMA is shown in Figure 10-12b ..." | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 13704 | Tomoko Adachi | 184.26 | The explanation of Figure 10-12b says the BlockAck frames are sent by DL OFDMA, not just DL MU. The title of Figure 10-12b should align with it. | Change the title of Figure 10-12b to "An example of an UL MU transmission with an immediate DL OFDMA transmission containing individually addressed BlockAck frames acknowledging the frames received from the respective STAs". | Rejected –  We do allow BA sent in DL MU MIMO format, though the particular example only shows DL OFDMA |
| 13705 | Tomoko Adachi | 185.18 | Figures 10-12a to 10-12c all have n STAs, but only Figure 10-12d has 4. If there is no special intention, the figure should align with others in series. | Change Figure 10-12d to show n STAs are involved in the sequence. | Accepted. |
| 13857 | Yongho Seok | 55.20 | "When the frame is not carried in a DL HE MU PPDU or HE SU PPDU that solicits an HE TB PPDU:" How about is an HE ER SU PPDU? If an HE SU PPDU can solicit an HE TB PPDU, an HE ER SU PPDU can also solicit an HE TB PPDU. | Include an HE ER SU PPDU that solicit an HE TB PPDU. Otherwise, remove an HE SU PPDU. | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 13858 | Yongho Seok | 55.20 | "When the frame is not carried in a DL HE MU PPDU or HE SU PPDU that solicits an HE TB PPDU:" An HE SU PPDU has to be limited to DL. | Change as the following: "When the frame is not carried in a DL HE MU PPDU or DL HE SU PPDU that solicits an HE TB PPDU:" | Rejected –  There is no PPDU termed DL HE MU/SU PPDU. Since UL HE SU PPDU cannot solicit HE TB PPDU, from the context it is clear that HE SU PPDU is a DL HE SU PPDU. |
| 13859 | Yongho Seok | 55.37 | "When the frame is carried in a DL HE MU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation)." The frame that is carried in an HE SU PPDU that solicits an HE TB PPDU is missed. | Change as the following: "When the frame is carried in a DL HE MU PPDU or HE SU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU or HE SU PPDU as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation)." | Revised -   Agree in principle.   TGax editor shall incorporate changes in 11-18-0724-01-00ax |
| 14325 | Zhou Lan | 95.25 | A transmitter-commanded RX buffer flushing mechanism is needed for MU-BAR. It is selective in that the receipient only flushes incomplete MSDUs up to and including the indicated end sequence number. Not receiver window move occurs. No BlockAck is transmitted in response. MSDUs and fragments of MSDUs that are not covered by the SEQ number range or which are completely assembled in the buffer are unaltered. Adding this function. | as in the comment | Rejected -   This is a new feature that requires significant change to the draft with minimal gains in broad scenarios. |
| 14341 | Zhou Lan | 55.37 | "When the frame is carried in a DL HE MU PPDU that solicits an HE TB PPDU the addressed recipient returns an Ack, BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the DL HE MU PPDU as defined in 10.3.2.10.2 (Acknowledgement procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation)." doesnt cover the case the DL data is a A-MPDU that agregate trigger and data and transmitted in the non-HE PPDU. Please clarify. | as in the comment | Rejected –  Allowing HTP Ack in a non-HE PPDU has limited technical merits. |

* Ack Policy subfield

Change Table 9-9 (Ack Policy subfield in QoS Control field of QoS Data frames) as follows (only relevant row shown):

|  |  |  |
| --- | --- | --- |
| * Ack Policy subfield in QoS Control field of QoS Data frames | | |
| Bits in QoS Control field | | Meaning |
| Bit 5 | Bit 6 |
| 0 | 1 | No explicit acknowledgment, ~~or~~ PSMP Ack or HE TB PPDU (HTP) Ack.  When the frame is not carried in a HE MU PPDU or HE SU PPDU or HE ER SU PPDU that solicits a response in an HE TB PPDU: [11258, 12156, 12211, 12339, 13231, 13857]  When bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is set to 1: There might be a response frame to the frame that is received, but it is neither the Ack frame nor any Data frame of subtype +CF-Ack. The Ack Policy subfield for QoS CF-Poll and QoS CF-Ack +CF-Poll Data frames is set to this value.  When bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is set to 0: The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP downlink transmission time (PSMP-DTT) is to be received in a later PSMP uplink transmission time (PSMP-UTT). The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP-UTT is to be received in a later PSMP-DTT.  [11258, 12157, 12213, 12292, 13859] When the frame is carried in a HE MU PPDU or HE SU PPDU or HE ER SU PPDU that carries MPDU(s) that solicits a response in an HE TB PPDU the addressed recipient returns an Ack, [13233] Compressed BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU a SIFS after the PPDU, subject to reception of a Trigger frame or TRS Control field in the PPDU[12625], as defined in 10.3.2.10.2 (Acknowledgment(#11208) procedure for DL MU PPDU in MU format) and 27.5.3 (UL MU operation).  NOTE—Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) indicates the absence of a data Frame Body field. When equal to 1, the QoS Data frame contains no Frame Body field, and any response is generated in response to a QoS CF-Poll or QoS CF-Ack +CF-Poll frame, but does not signify an acknowledgment of data. When set to 0, the QoS Data frame contains a Frame Body field, which is acknowledged as described in 10.29.2.7 (PSMP acknowledgment rules). |

* MU acknowledgment(#11208) procedure

Insert a new subclause heading before the first paragraph as follows:

* Acknowledgment(#11208) procedure for DL MU PPDU in SU format

Change the subclause as follows:

The acknowledgment procedure performed by a STA that receives MPDUs that were transmitted within a VHT MU PPDU or an HE MU PPDU sent by an AP is the same as the acknowledgment procedure for MPDUs that were not transmitted within a VHT MU PPDU or an HE MU PPDU sent by an AP, except if(#11060) the STA is an HE STA that follows the rules defined in 27.3 (Fragmentation and defragmentation) and in 27.4 (HE acknowledgment(#11208) procedure(#13250)).

NOTEAll MPDUs transmitted within a VHT MU PPDU or an HE MU PPDU sent by an AP are contained within A-MPDUs, and the rules specified in 9.7.3 (A-MPDU contents) prevent an immediate response carried in SU format to more than one of the A-MPDUs.

Responses to A-MPDUs within a VHT MU PPDU or an HE MU PPDU for DL transmission that are not immediate responses to the VHT MU PPDU or the HE MU PPDU sent by an AP are transmitted in response to explicit BlockAckReq frames by the AP. Examples of VHT MU PPDU frame exchange sequences are shown in Figure 10-11 (An example of a TXOP containing a VHT MU PPDU transmission with an immediate acknowledgment to the VHT MU PPDU) and Figure 10-12 (An example of a TXOP containing a VHT MU PPDU transmission with no immediate acknowledgment to the VHT MU PPDU).

Recovery within the TXOP that contains a VHT MU PPDU or an HE MU PPDU sent by an AP can be performed according to the rules of 10.22.2.7 (Multiple frame transmission in an EDCA TXOP). BlockAckRequest frames related to A-MPDUs within a VHT MU PPDU or an HE MU PPDU sent by an AP can be transmitted in a TXOP separate from the one that contained the VHT MU PPDU or the HE MU PPDU sent by an AP.

NOTE 1—A BlockAck frame or an Ack frame is sent in immediate response to the BlockAckReq frame for HT-immediate or HT-delayed Block Ack, respectively. An Ack frame might be sent in immediate response carried in SU format to an S-MPDU in the VHT MU PPDU or the HE MU PPDU sent by an AP. Responses to S-MPDUs for more than one STA contained in an HE MU PPDU are transmitted as specified in 10.3.2.10.2 (Acknowledgment(#11208) procedure for DL MU PPDU in MU format). A Multi-STA BlockAck frame is sent in immediate response to a Multi-TID BlockAckReq frame(#12817).

NOTE 2—A BlockAckReq~~uest~~ frame would typically not be sent to a STA in the case where the A-MPDU to the STA contained no MPDUs requiring acknowledgment. It could be sent if MPDUs in a previous A-MPDU remain unacknowledged.

Insert a new subclauses 10.3.2.10.2 and 10.3.2.10.3 as follows:

* Acknowledgment(#11208) procedure for DL MU PPDU in MU format

A non-AP STA that is the recipient, within an HE MU PPDU, of a QoS Data frame or QoS Null frame with ack policy HTP Ack, of an MU-BAR Trigger frame or a GCR MU-BAR Trigger frame, or of [12629] a Management frame that solicits an immediate response, shall send the immediate response according to the scheduling information that is carried either in the Trigger frame(s) or TRS Control subfield(#13136)(#14137). If no valid [12171, 12241] Basic Trigger variant of Trigger frame(s) (see 9.3.1.23 (Trigger frame format)) or TRS Control subfield(#13136)(#14137) (see 9.2.4.6a.1 (TRS Control(#13136))) is received, then the STA shall not respond. An example of UL OFDMA acknowledgment(#11208) to an HE MU PPDU is shown in Figure 10-12a (An example of an HE MU PPDU transmission with an immediate UL OFDMA acknowledgment(#11208)(#12661)).

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| * An example of an HE MU PPDU transmission with an immediate UL OFDMA acknowledgment(#11208)(#12661) |

An AP may use an MU-BAR Trigger frame or a GCR MU-BAR Trigger frame to solicit acknowledgment frames from multiple HE STAs to which the AP has sent QoS Data frame(s) with the Ack Policy subfield equal to Block Ack or from which the AP has not received immediate acknowledgment(#11208) frames after sending QoS Data frame(s) with the Ack Policy subfield equal to HTP Ack in an HE MU PPDU.

* Acknowledgment(#11208) procedure for an UL MU transmission

When receiving frames from more than one STA that are part of an UL MU transmission (see 9.42.2) and that require an immediate acknowledgment(#11208) (i.e., the Ack Policy subfield of the eliciting QoS Data frame is equal to Normal Ack or Implicit Block Ack Request), an AP may send either multiple BlockAck frames (or Ack frames) in an HE MU PPDU, or a Multi-STA BlockAck frame (see 27.4 (HE acknowledgment(#11208) procedure(#13250))). A Multi-STA BlockAck frame may be transmitted in a non-HT PPDU, non-HT duplicate PPDU, HT PPDU, VHT PPDU, HE SU PPDU, HE ER SU PPDU and OFDMA HE MU PPDU. After a successful reception of an UL frame requiring acknowledgment, transmission of the DL acknowledgment(#11208) shall commence after a SIFS, without regard to the busy/idle state of the medium. When(#11137) an AP transmits an immediate acknowledgment(#11208) in an HE MU PPDU in response to an A-MPDU sent in an HE TB PPDU, the AP should send it within the 20 MHz channel(s) where the pre-HE modulated fields of the HE TB PPDU sent by the STA are located. The immediate acknowledgment(#11208) is an Ack frame, Compressed BlockAck frame or Multi-STA BlockAck frame.

An example of [13703] multiple BlockAck frames sent in DL OFDMA is shown in Figure 10-12b (An example of an UL MU transmission with an immediate DL MU transmission containing individually addressed BlockAck frames acknowledging the frames received from the respective STAs).

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| * An example of an UL MU transmission with an immediate DL MU transmission containing individually addressed BlockAck frames acknowledging the frames received from the respective STAs |

An example of a Multi-STA BlockAck frame acknowledgment(#11208) in a non-HT, HT, VHT, HE SU, [12172, 12243] or HE ER SU PPDU is given in Figure 10-12c (An example of UL MU transmissions with an immediate Multi-STA BlockAck frame acknowledging the MPDUs).

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| * An example of UL MU transmissions with an immediate Multi-STA BlockAck frame acknowledging the MPDUs |

An example of a Multi-STA BlockAck frame acknowledgment(#11208) in a non-HT Duplicate PPDU is given in Figure 10-12d (An example of UL MU transmissions with an immediate DL non-HT duplicate PPDU containing the Multi-STA BlockAck frame).

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|  |
| * An example of UL MU transmissions with an immediate DL non-HT duplicate PPDU containing the Multi-STA BlockAck frame |

An AP may use an MU-BAR Trigger frame or a GCR MU-BAR Trigger frame to solicit acknowledgment frames from multiple HE STAs to which the AP has sent QoS Data frame(s) with the Ack Policy subfield equal to Block Ack or from which the AP has not received immediate acknowledgment(#11208) frames after sending QoS Data frame(s) with the Ack Policy subfield equal to HTP Ack in an HE MU PPDU.

A STA may send a BlockAckReq frame or Multi-TID BlockAckReq frame to solicit the acknowledgment frame(s) from an AP [12435] .