IEEE P802.11  
Wireless LANs

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| **CIDs: Section 27.4 (part 2)** |
| **Date:** 2017-05-08 |
| **Author(s):** |

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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0s with the following CIDs (**56 CIDs**):

6098, 6648, 6645, 6644, 5807, 7078, 7087, 3070, 3069, 3214,

5037, 9525, 9394, 9395, 9443, 9447, 9446, 9445, 9567, 9288,

9330, 9876, 9887, 9886, 9885, 9884, 9883, 9881, 9880, 9879,

9878, 9877, 8150, 9719, 8551, 8550, 8215, 7657, 7939, 7938,

8050, 7804, 7799, 7800, 7801, 7803, 7805, 8695, 8471, 8466,

8465, 8462, 8461, 8549, 10328, 10331

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** |
| 6098 | Jian Yu | 162.27 | Duplicated RU | Delete RU in the bracket | Revised -  Updated the text.  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 6648 | John Coffey | 162.15 | Use of undefined term: "Single MPDU". From the capitalization, it must be inferred that this is a defined term, but where is the definition? The draft also uses "single MPDU", and for good measure both "VHT Single MPDU" and "VHT single MPDU". The baseline defines "VHT single MPDU" (note: no capitalization). It is unacceptable to force the reader to guess what is meant. | Clarify. | Rejected -   The definition is already present in 11ah |
| 6645 | John Coffey | 162.11 | Undefined term: "S-MPDU". No definition appears in the draft, and it isn't part of 802.11-2016 either. | Define the term. | Rejected -   The definition is already present in 11ah |
| 6644 | John Coffey | 162.10 | Undefined term: "S-MPDU". No definition appears in the draft, and it isn't part of 802.11-2016 either. | Define the term. | Rejected -   The definition is already present in 11ah |
| 5807 | Huizhao Wang | 162.27 | There is no text to describe how the "broadcast RU" is signaled | Remove the text: "broadcast RU" | Revised -  Updated the text add the clause that contains the definition  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 7078 | Junichi Iwatani | 161.37 | DL MU PPDU with MU-BAR should be explained in more detail somewhere in 27.4.4. Ack policy for PPDU with MU-BAR should be clarified. | as in comment | Rejected -   Handling of MU-BAR frame is already specified in section 27.4.4.1. The PPDU format that carries MU-BAR is irrelavent. Aggregation of MU-BAR with other MPDUs in an AMPDU is not allowed. |
| 7087 | Junichi Iwatani | 162.27 | There is no definition for "broadcast RU" | Define or explain | Revised -  Updated the text add the clause that contains the definition  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 3070 | Abhishek Patil | 162.28 | The following sentence is not relavent, since there can be only one group addressed M-BA in a DL MU PPDU: "A HE AP should only transmit a group addressed Multi-STA Block-Ack frame in a DL MU PPDU to a non-AP HE STA n on the (broadcast RU) RU (26/52/106/242/484/996) that includes the RU used for receiving the immediate preceding HE trigger-based PPDU from STA n" | Replace the sentence with: "The AP shall not include more than one group addressed M-BA in a DL MU PPDU" | Rejected -   Broadcast RU formats that could be used need to be specified here. |
| 3069 | Abhishek Patil | 162.14 | AP should not be responding to a STA that sent S/A-MPDU (no Multi-TID) using M-BA if the M-BA is indivudually addressed to the STA. | Modify the sentence as follows: Original text: "The AP shall respond with Ack frame or an individually addressed Multi-STA BlockAck frame to each of the STAs from which a Single MPDU that solicited an immediate response was received, and with a Compressed BlockAck frame or a Multi-STA BlockAck frame to each of the STAs from which an A-MPDU that solicited an immediate response was received, or a Multi-STA BlockAck frame to each of the STA from which a multi-TID A-MPDU that solicited an immediate response was received."  Proposed text: "The AP shall respond with Ack frame to each of the STAs from which a Single MPDU that solicited an immediate response was received, and with a Compressed BlockAck frame to each of the STAs from which an A-MPDU that solicited an immediate response was received, or a Multi-STA BlockAck frame to each of the STA from which a multi-TID A-MPDU that solicited an immediate response was received." | Revised -  Updated the text.  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 3214 | Ahmadreza Hedayat | 162.20 | "The control response frames for each STA shall be sent in the allocated RU that is identified by the AID of each STA." This is not clear; what is the relation between "allocated RU" and "AID of a STA"? Also there would be one control response frame for each STA, so it should be "The Control response frame for each STA ..." | As in the comment | Revised -  Updated the text.  TGax editor shall incorporate changes in 11-17-0621-00-00ax.  Relation between allocated RU & AID is specified in 28.3.10.8 (HE SIG-B) |
| 5037 | Chittabrata Ghosh | 162.03 | There is a TBD in the sentence; define TBD | As in comment | Rejected -   Page/Line/Section reference is not right. There is no TBD in this section |
| 9525 | Yasuhiko Inoue | 162.27 | broadcast RU should be defined. | As in the comment. | Revised -  Updated the text add the clause that contains the definition  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9394 | Woojin Ahn | 160.27 | If an askedforack MPDU was aggregated with another askedforack MPDU in an A-MPDU and one of the askedforack MPDU was the only MPDU successfully received by the intended recipient, than the recipient may respond with an Ack frame in which case the originator cannot process the acknowledgement | The recipient should respond with an M-BA frame unless it received the whole A-MPDU successfully | Rejected -   It is already captured as part of Multi-TID AMPDU in section 27.4.4., that it is responded with M-BA. Ack is used in response to an S-MPDU. |
| 9395 | Woojin Ahn | 160.27 | If an MPDU with EOF 1 and non-zero length is aggregated with Action No Ack in an A-MPDU, then the A-MPDU is neither an S-MPDU nor a multi-TID A-MPDU, in which case, the A-MPDU must be responded by compressed BA that doesn't have Ack type field. | If there is only one MPDU that solicits an immediate response in an A-MPDU, the recipient should respond with an Ack frame even if the MPDU was not the only MPDU in the A-MPDU | Rejected -   An MPDU with EOF=1 cannot be followed by another MPDU |
| 9443 | Xiaofei Wang | 157.48 | "BlockAck" is missing after "Multi-STA". | insert "BlockAck" after "received Multi-STA" | Rejected -   Valid comment. However, It is already addressed through CID #6256, which is included in D1.2. No change to draft text |
| 9447 | Xiaofei Wang | 158.33 | is the limitation of Multi-STA BlockAck frame contains only one Per STA info for both all ACK context, regardless whether all MPDUs are successfully received? The normative behavior is not clear as stated by the text | please clarify and rephrase the sentence | Rejected -   MBA carries only one per-AID-TID info as is specified in the text. Section 9.3.1.9.7 specifies that M-BA with AckType=1 is sent when all MPDUs are received sucessfully. So, no update needed to the text |
| 9446 | Xiaofei Wang | 158.25 | It is unclear what "a recipient" is receiving; a recipient of a data frame, control frame, management frame, or beacon? Lack of description of such a recipient is confusing and impact the clarity of the described normative behavior | please provide clarification of this sentence so that the normative behavior is clear. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9445 | Xiaofei Wang | 158.16 | It is unclear what the HE non-AP STA is responding to? Is it a MU-BAR? Such behavior needs to clearly stated. | Please provide missing trigger to which the HE non-AP STA is responding to. | Rejected -   Valid comment. However, It is already addressed through CID #3062, which is included in D1.2. No change to draft text |
| 9567 | Yonggang Fang | 162.01 | A non-AP STA that sends a trigger-based PPDU as a UL MU transmission should not select the acknowledgement rule independently. For example, one STA intends to be acknowledged immediately, while another wants to be deferred acknowledgement. This will increase the implementation complexity of HE AP. Suggest the non-AP STAs that send a trigger-based PPDU use the same acknowledgement rule. | define a new rule of acknowledgement to the entire trigger based PPDUs. | Rejected -   Originator of the A-MPDU should be continued to be allowed to pick the Ack policy as is the case today. |
| 9288 | Tomoko Adachi | 161.38 | The referred clause number is wrong. | Change "... 10.3.2.11.4 (MU acknowledgement procedure for an UL MU transmission) ..." to "... 10.3.2.10.3 (Acknowledgement procedure for an UL MU transmission) ...". | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9330 | Tomoko Adachi | 162.24 | The support of reception of MU Multi-STA BlockAck frame should be specified by a subfield. | Change the part "... if the receivers of group-addressed Multi-STA BlockAck frame announce the support the reception of MU Multi-STA BlockAck frame." to "... if the receivers of group-addressed Multi-STA BlockAck frame announce the support the reception of MU Multi-STA BlockAck frame by the Group Addressed Multi-STA BlockAck In DL MU Support subfield in the HE MAC Capabilities Information field." | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 10328 | Zhou Lan | 157.00 | "An HE STA can use Compressed BlockAck frame or Multi-STA BlockAck frame after setting up a block ack agreement." Please clarify if Block ACK aggrement is required in the following cases. 1) Multiple STAs send single management frame in a trigger based PPDU and expecting acknoledgement from AP. 2) OFDMA random access for association and authentication | per comment | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 10331 | Zhou Lan | 157.36 | change "HE STA" to "HE AP" if this is the case to ack a trigger based PPDU | per comment | Rejected -   Valid comment. However, It is already addressed through CID #7654, which is included in D1.2. No change to draft text |
| 9876 | Young Hoon Kwon | 157.29 | Clarification is needed in case the AP is a member of multi-BSSID set. | As in the comment. | Rejected -   Valid comment. However, It is already addressed through CIDs #3060, #9444, which is included in D1.2. No change to draft text |
| 9887 | Young Hoon Kwon | 161.51 | In bullet 2), Multi-STA BlockAck frame has two different cases: TID set to 14 with Ack Type 1, and Ack Type 0. However, in bullet 3) it just says Multi-STA BlockAck without having any details. It would be better for bullet 2) and bullet 3) to have same level of description. | Modify the sentence of bullet 3) to "... then the HE AP shall send a Multi-STA BlockAck frame 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 carried in a DL SU PPDU format.". | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9886 | Young Hoon Kwon | 161.22 | For bullets 2) and 3), it's better to mention a non-AP STA's behavior when the STA didn't receive Trigger frame correctly. | As in the comment. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9885 | Young Hoon Kwon | 161.20 | In case of a S-MPDU context, isn't it possible to have Trigger frame in the A-MPDU? Maybe not. | Modify the sentence of bullet 1) to "If the DL MU PPDU carries a S-MPDU intended to it that solicits an immediate response, and an UL MU Response Scheduling A-Control field is present, ...". | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9884 | Young Hoon Kwon | 161.16 | It's better to further describe that this this rule is applied for the case that the AP solicts immediate response in HE trigger-based format. | Modify the text to "A non-AP STA that receives a DL MU PPDU that solicits an immediate response in an HE trigger-based PPDU format shall follow the following acknowledgment procedure:". | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9883 | Young Hoon Kwon | 160.58 | It's better to further describe that this this rule is applied for the case that the AP solicts immediate response in SU format. | Modify the text to "A non-AP STA that receives a DL MU PPDU that solicits an immediate response in SU PPDU format shall follow the following acknowledgment procedure:". | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9881 | Young Hoon Kwon | 159.08 | The last paragraph is identical to the description shown in sub-clause 27.4.1 (P157L49), and it does not give any additional information. Also, the second and third bullets of this paragraph is not organized properly. It's better to delete this paragraph. | Delete the last paragraph of the sub-clause 27.4.2. | Rejected -   Valid comment. However, It is already addressed through CIDs #7734, #3063, #6621 which is included in D1.2. No change to draft text |
| 9880 | Young Hoon Kwon | 159.05 | Not sure what does "each received Multi-STA BlockAck frame" mean. For a soliciting PPDU, there's only one Multi-STA BlockAck frame available. However, the Multi-STA BlockAck frame may include multiple Per STA Info field. Clarification is needed. | As in the comment. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9879 | Young Hoon Kwon | 158.36 | As it is a single MPDU, it shall not be a plural. | Modify the sentence to "... and the TID field to the TID value of that MPDU to indicate ...". | Rejected -   Valid comment. However, It is already addressed through CIDs #5652, #5651 which is included in D1.2. No change to draft text |
| 9878 | Young Hoon Kwon | 157.48 | What does "each received Multi-STA" mean? Clarification is needed. | As in the comment. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 9877 | Young Hoon Kwon | 157.45 | The sentence "An HE non-AP STA shall transmit a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per STA Info subfields and shall set the RA field to the address of the recipient STA that requested the Block Ack frame." is misleading because in P157L28 already mentioned that "An HE non-AP STA that sends a Multi-STA BlockAck frame shall set the AID subfield in the Per STA Info field of the Multi-STA BlockAck frame to 0 and the RA field to the BSSID when the intended receiver of the frame is the AP.". So, delete this sentence or clarification is needed. | As in the comment. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8150 | Michael Montemurro | 158.10 | "If an HE AP does not receive an HE Capabilities element with the Rx Control Frame To MultiBSS set to 1 from a STA," doesn't make sense. | Change "To MultieBSS" to "To MultiBSS bit" at cited location and 158.17. | Rejected -   Valid comment. However, It is already addressed through CIDs #3060, #9444 which is included in D1.2. No change to draft text |
| 9719 | Yongho Seok | 161.14 | "An Action frame in the DL MU PPDU is always responded with an HE trigger-based PPDU." The MMPDU is missing. Change it as the following: "An Action frame or a MMPDU in the DL MU PPDU is always responded with an HE trigger-based PPDU." | As per comment. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8551 | Rojan Chitrakar | 162.23 | The sentence "... announce the support the reception of MU multi-STA BlockAck frame.", refers to non-existence capability "MU multi-STA BlockAck frame". The closest thing appears to be "Group Addressed Multi-STA Block-Ack In DL MU Support" but that bit refers to support for the reception of a group-addressed Multi-STA BlockAck frame sent in a "non-broadcast" RU instead of a broadcast RU as stated in this clause. | Replace "reception of MU multi-STA BlockAck frame" with the correct HE capability subfield. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8550 | Rojan Chitrakar | 160.46 | "soliciting" should be "solicited" | replace "soliciting" with "solicited" | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8215 | Osama Aboulmagd | 157.28 | It is not clear to me under what conditions a non-AP STA sends a Multi-STA BlockAck frame. My undertanding is Multi-STA BlockAck is to acknowlege trigger-based PPDU transmitted by multiple non-AP STAs. I aslo understand that a non-AP STA will never send a trigger frame. | specify those conditions where a non-AP STA will send a Multi-STA BA | Rejected -   It is specified in 27.4.2. M-BA is also sent by an HE non-AP STA in response to Multi-TID AMPDU |
| 7657 | Liwen Chu | 162.22 | Since broadcast RU is used to carry group-addressed M-BA. It is mandatory supported by all STAs. Reqrite the paragraph. | As in comment | Rejected -   Support of group addressed M-BA is optional |
| 7939 | Mark RISON | 160.34 | "when these frames are carried in an A-MPDU or multi-TID A-MPDU" -- it can do so even if they are not (e.g. using the Ack Policy in an MPDU sent in an 11abg PPDU) | Delete the cited text | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 7938 | Mark RISON | 160.34 | "in an A-MPDU or multi-TID A-MPDU" -- a multi-TID A-MPDU is an A-MPDU | Delete "or multi-TID A-MPDU" | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8050 | Massinissa Lalam | 157.36 | I was under the impression that only an HE AP is the recipient of an HE trigger-based PPDU, meaning that "An HE STA may send a Multi-STA BlockAck frame in response to an HE trigger-based PPDU." should be replaced by "An HE AP may send a Multi-STA BlockAck frame in response to an HE trigger-based PPDU." | As in comment. | Rejected -   In IEEE spec, HE STA refers to AP functionality also. So, the statement is correct. |
| 7804 | Mark Hamilton | 160.21 | Unclear reference, using "it", and vague requirements using "are" (and "may be"?). | Reword this paragraph, to be clear about actors, and use 'shall' as appropriate. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 7799 | Mark Hamilton | 157.33 | This sentence could use some re-wording clarification. However, the concept is already stated in 10.7.6.5.2, anyway - except that sentence says "An AP that ..." which seems overly limiting. | At P123L38 change "An AP that transmits" to "A STA that transmits" | Rejected -   Valid comment. However, It is already addressed through CIDs #6609 which is included in D1.2. No change to draft text |
| 7800 | Mark Hamilton | 157.36 | This sentence implies that any STA that gets an HE trigger-based PPDU can always send a Multi-STA Block Ack. But, the sentence at P157L49 implies that only some HE STAs will support Multi-STA BlockAck. These are inconsistent. Is there anything preventing an AP from sening a Multi-STA BlockAck to a STA that doesn't support it? Also, PICS is blank for this, so unclear if support is Mandatory or not. | If Multi-STA support is optional, where is it indicated (only "All ACK Support" and "Group Addressed Multi-STA Block-Ack In DL MU Support" is currently in the HE Capabilities)? Text needs to be added to clarify that it is optional. The PICS entry is blank, and should indicate Optional. | Rejected -   Support of M-BA is mandatory for HE non-AP STAs that sends HE TB PPDU |
| 7801 | Mark Hamilton | 159.29 | Clarify that these bitmap lengths are in bits. | Add "in bits" after "The Block Ack Subfield length" at the start of this sentence. | Accepted -   TGax editor shall incorporate changes as suggested by the commentor |
| 7803 | Mark Hamilton | 160.03 | Use proper normative verbs | Change "can be used by" to "is supported by" | Accepted -   TGax editor shall incorporate changes as suggested by the commentor |
| 7805 | Mark Hamilton | 160.31 | Use proper normative verbs | Change "can" to "shall" | Rejected -   The first sentence is expected to be a declarative statement |
| 8695 | Sigurd Schelstraete | 161.15 | Improve wording "An Action frame in the DL MU PPDU is always responded with an HE trigger-based PPDU." | Change to e.g. "The response to an action frame in the DL MU PPDU is always an HE trigger-based PPDU." | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8471 | Robert Stacey | 159.26 | A change to the block ack setup procedure is needed to account for the potentially larger window size. A statement in REVmc/D8.0 P1384L45 limits the transmit window size to 64: "If the value in the Buffer Size field of the ADDBA Response frame is smaller than the value in the ADDBA Request frame, the originator shall change the size of its transmission window (WinSizeO) so that it is not greater than the value in the Buffer Size field of the ADDBA Response frame and is not greater than the value 64." | Change the statement in REVmc to read: "If the value in the Buffer Size field of the ADDBA Response frame is smaller than the value in the ADDBA Request frame, the originator shall change the size of its transmission window (WinSizeO) so that it is not greater than the value in the Buffer Size field of the ADDBA Response frame and is not greater than the value 64 if the sender of the ADDBA Response frame is a non-HE STA and not greater than 256 if the sender of the ADDBA Response frame is an HE STA." | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8466 | Robert Stacey | 157.48 | What does it mean to support "Multi-STA BlockAck"? The term is not defined. "shall examine": this is not testable so the shall is not appropriate. There is no such thing as a "Multi-STA". There is no such thing as a BA agreement. | Delete the first sentence and change the second to read: "A STA that receives a Multi-STA BlockAck frame performs the following operations for each BA Information field in the Multi-STA BlockAck frame that is addressed to it:" | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8465 | Robert Stacey | 157.43 | The last sentence in this paragraph is already covered by a previous statement at P157L28. | Delete sentence. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8462 | Robert Stacey | 157.37 | "A Multi-STA BlockAck frame contains one or more...": the states are obvious from a glance at the frame format. | Delete the second sentence. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8461 | Robert Stacey | 157.37 | "An HE STA may send a Multi-STA BlockAck frame in response to an HE trigger-based PPDU." This statement is incomplete. It may do that but only if certain conditions are met and, in fact, it shall do that if those conditions are met. It cannot, for example, do that if the HE trigger-based PPDU carries frames a management frame of type Action No Ack. | Delete the first sentence: the conditions under which a Multi-STA BlockAck frame are transmitted need to be more explicitly stated. | Revised -  Updated the text  TGax editor shall incorporate changes in 11-17-0621-00-00ax |
| 8549 | Rojan Chitrakar | 160.08 | Either incomplete or unclear sentence: "The values in the recipient's record ..." | Re-write the sentence in an easier to understand manner. | Rejected -   Valid comment. However, It is already addressed through CIDs #5805, #6623 which is included in D1.2. No change to draft text |

* Block acknowledgement
* Overview

(#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 (A-MPDU with multiple TIDs)) 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 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 sends a Multi-STA BlockAck frame shall set the AID11 subfield in the Per AID TID Info field of the Multi-STA BlockAck frame to 2045 and the RA field to the BSSID if the intended recipient is an unassociated HE STA.(#9120)

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)

[#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).

[#9877, #8465]

A non-AP HE STA(#10333) (#5174, #6060, #6611) (#6612) (#Ed) that has established a block ack agreement with an HE STA [#8466] shall perform the following operation for each BA Information field received in the Multi-STA BlockAck frame from the HE STA as follows[#9878]:

* If the Ack Type field is 0 and TID field is less than 8(#9120), then the Block Ack Starting Sequence Control, TID and Block Ack Bitmap fields of the STA Info field are processed according to 10.24.7 (HT-immediate block ack extensions) and 27.3 (Fragmentation).
* If the Ack Type field is 1, then the Per AID TID Info field(#7734) indicates either the acknowledgement of a single MPDU identified by the value of the TID, or a single MPDU that is an Action frame or a PS-Poll frame when the TID field is set to 15(#5065, #5650), or of all MPDUs carried in the eliciting PPDU, when the TID field is set to 14.

[#10328] 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 a single MPDU identified by the value of the TID, or a single MPDU that is an Action frame or a PS-Poll frame when the TID field is set to 15.
* If the Ack Type field is 0 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

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 27.4 (Block acknowledgement), 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 27.4.3 (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 27.4.3 (Negotiation of block ack bitmap lengths)(#9737).

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)).

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

A recipient of an S-MPDU, or A-MPDU, or a multi-TID A-MPDU [#9446] 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.

* 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 MMPDU from the unassociated STA, that requires an acknowledgment, shall set the Ack Type field to 0 and the TID field to 15 to indicate the successful reception of that MMPDU.(#9120)
* Ack context: A recipient receiving a single MPDU, that requires an acknowledgment, shall set the Ack Type field to 1 and the TID field to the TID value of that MPDU(#3203) to indicate the successful reception of that MPDU or to the TID value of 15 to indicate the successful reception of the MPDU that is an Action frame or PS-Poll frame(#5652, #5651, #5065).  
    
  **[**[#9446] If a multi-TID A-MPDU contains one or more MPDUs with each MPDU corresponds to a unique TID and has the EOF subfield set to 1 in a nonzero length MPDU delimiter, solicits an immediate Ack frame, then the Multi-STA BlockAck frame may contain multiple occurrences of unique AID TID Info fields(#7734), one for each such successfully received MPDU requesting an acknowledgment.  
    
  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 an Action frame or a management frame sent by the unassociated HE STA, e.g., Association Request(#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) 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).

An originator shall examine [#9880] the Multi-STA BlockAck frame (#6620) received in response to a soliciting PPDU.

Upon reception of the Multi-STA BlockAck frame the originator performs 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 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 MMPDU 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 either a single MPDU identified by the value of the TID, or an Action frame or a PS-Poll frame(#3063, #6621).
* 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 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. 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 can be used 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 [#7804]a STA sets 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).

* Per-PPDU acknowledgment selection rules
* General

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, MU-BAR Trigger frame(#Ed), GCR MU-BAR Trigger frame,(#3204) etc.) and the EOF field setting[#7938, #7939].

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)

* HE MU PPDU(#8391) soliciting an SU PPDU response

To solicit an immediate response in an SU PPDU with an HE MU PPDU(#8391), an AP shall set the Ack Policy field of the QoS Data and QoS Null frames to Normal Ack or Implicit BAR(#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 an Action frame or an MMPDU that solicits a response.(#6625)

A non-AP STA that receives an HE MU PPDU(#8391) that solicits an immediate response in SU PPDU format [#9883] shall follow the following acknowledgment procedure:

* If the HE MU PPDU(#8391) carries an(#6626) S-MPDU that is 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)
* If the HE MU PPDU(#8391) carries an A-MPDU that includes a QoS Data frame or QoS Null frame addressed to it and with the Ack Policy field equal to Implicit BAR, then the STA shall respond with a Compressed BlockAck frame carried in an SU PPDU.(#6628)
* If the HE MU PPDU(#8391) carries an A-MPDU that includes more than one QoS Data frame or QoS Null frame addressed to it with the Ack Policy field equal to Implicit BAR and with more than one TID, then the STA shall respond with a Multi-STA BlockAck frame carried in an SU PPDU.(#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).

* HE MU PPDU(#8391) soliciting an HE TB PPDU response

An AP that sends a HE MU PPDU(#8391) that intends to solicit an immediate response carried in an HE TB PPDU shall set the Ack Policy to HTP Ack(#4723)(#Ed) for each of the (A-)MPDUs for which it intends to solicit an immediate response (see 10.3.2.11.3 (MU acknowledgement procedure for HE MU PPDU in MU format) for an example of this sequence). [#9719]If an HE MU PPDU carries an Action frame or an MMPDU frame that solicits an immediate acknowledgement (#8391), the response is always carried in an[#8695] HE TB PPDU. [#9886, #9884] A non-AP STA that receives a HE MU PPDU that solicits an immediate response shall not respond if it has not received the UL resource allocation information either through UL MU Response Scheduling A-Control field, or a Trigger frame in the soliciting PPDU. A non-AP STA that receives a HE MU PPDU(#8391) that solicits an immediate response shall follow the following acknowledgment procedure, if it has received the UL resource allocation information either through UL MU Response Scheduling A-Control field, or a Trigger frame in the soliciting PPDU:

* If the HE MU PPDU(#8391) carries a S-MPDU intended to it that solicits an immediate response, and either a frame with a UMRS Control field(#Ed)[#9885], then the STA shall respond with an Ack frame carried in the HE TB PPDU sent as a response.
* If the HE MU PPDU(#8391) carries an A-MPDU intended to it that solicits an immediate response, and either a Trigger frame or a frame with a UMRS Control field(#Ed) is present, then the STA shall respond with a Compressed BlockAck frame carried in the HE TB PPDU sent as a response.
* If the HE MU PPDU(#8391) carries a multi-TID A-MPDU intended to it that solicits an immediate response, and either a Trigger frame or a frame with a UMRS Control field(#Ed) is present, then the STA shall respond with a Multi-STA BlockAck frame carried in the HE TB PPDU(#6637) sent as a response.
* HE TB PPDU soliciting a DL SU PPDU response

A non-AP STA that sends an HE TB PPDU as a response to a Basic variant Trigger frame that intends to solicit an immediate response shall set the Ack Policy to Normal Ack/Implicit BAR (see 10.3.2.10.3 (Acknowledgement procedure for an UL MU transmission) (#9288) for an example of this sequence). If the HE AP intends to send the response in a DL SU PPDU format, then the HE AP shall follow the following acknowledgment procedure:

* If the HE TB PPDU carries a Single MPDU from a single STA that solicits an immediate response, 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 carried in a DL SU PPDU format.
* If the HE TB PPDU carries an A-MPDU from a single STA that solicits an immediate response, then the HE AP shall respond with a Compressed BlockAck frame, 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 carried in a DL SU PPDU format.
* 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 [#9887] 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 carried in a DL SU PPDU format.

If the HE TB PPDU carries Single MPDUs, A-MPDUs, or multi-TID A-MPDUs from more than one STA, or a combination of Single 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 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 the previous subclauses.

* HE TB PPDU soliciting a HE MU PPDU(#8391) response

A non-AP STA that sends an HE TB PPDU as a response to a Basic variant Trigger frame that intends to solicit an immediate response shall set the Ack Policy to Normal Ack/Implicit BAR (see 10.3.2.11.4 (MU acknowledgement procedure for an UL MU transmission) for an example of this sequence). If the HE AP intends to send the response in an HE MU PPDU format, then the HE AP shall follow the following acknowledgment procedure:

* If the HE TB PPDU carries an S-MPDU from more than one STA, or (multi-TID) A-MPDU from more than one STA, or a combination of an S-MPDU from some STAs and (multi-TID) A-MPDU from other STAs, then the HE-AP shall do one of the following:
* The AP shall respond with Ack frame [#3069 ]to each of the STAs from which a Single MPDU that solicited an immediate response was received, and with a Compressed BlockAck frame [#3069] to each of the STAs from which an A-MPDU that solicited an immediate response was received, or a Multi-STA BlockAck frame to each of the STA from which a multi-TID A-MPDU that solicited an immediate response was received. The control response frame [#3214] for each STA shall be sent in the allocated RU that is identified by the AID of each STA.
* The AP may respond with group addressed Multi-STA BlockAck frame(s) in an HE MU PPDU if the receivers of group-addressed Multi-STA BlockAck frame announce the 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[#9330, #8551]. The Ack Type field shall be set according to the acknowledgement context.. A HE AP should only transmit a group addressed Multi-STA BlockAck frame in a HE MU PPDU(#8391) to a non-AP HE STA *n* on the [#6089]broadcast RU (26/52/106/242/484/996) [see 28.3.10.8.5 HE SIG-B) [#5807, #7087, #9525] that includes the RU used for receiving the immediate 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).

10.24.2 Setup and modification of the block ack parameters

***Change the paragraph as follows***

***[…]***

When a block ack agreement is established between two HT STAs or two DMG STAs, the originator may change the size of its transmission window if the value in the Buffer Size field of the ADDBA Response frame is larger than the value in the ADDBA Request frame. If the value in the Buffer Size field of the ADDBA Response frame is smaller than the value in the ADDBA Request frame, the originator shall change the size of its transmission window (WinSizeO) so that it is not greater than the value in the Buffer Size field of the ADDBA Response frame and is not greater than the value 64 if the sender of the ADDBA Response frame is a non-HE STA and not greater than 256 if the sender of the ADDBA Response frame is an HE STA [#8471]