IEEE P802.11
Wireless LANs

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| **CIDs: Section 9.3.1.9 (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 (**33 CIDs**):

6275, 5824, 5880, 5764, 7474, 7309, 7391, 7526, 6951, 6950

7133, 4852, 3109, 3161, 3008, 3007, 3009, 3446, 5450, 5451

5452, 5057, 5128, 9624, 9623, 9622, 9361, 7732, 7731, 7728

7726, 8480, 10191

Interpretation of a Motion to Adopt

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6275 | John Coffey | 34.38 | Inconsistent usage: here we have "The TA field value is". In many (most?) other places in the draft we have "The TA field is". What distinction is intended between these two forms? If no distinction is intended, the same form should be used. | Delete "value". | Rejected - Comment is on baseline text. Both phrases are used in the baseline text, and is spread throughout the baseline text. |
| 5824 | Huizhao Wang | 34.10 | B5 bit is missing in the BlockAck's BA Control field | Add B5 into the "Reserved" field: B5 to B11 | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 5880 | James Lepp | 34.10 | After applying the changes described for Figure 9-33, the B5 will be missing. Is the intended change to have "BA Type" be bits 1-5, or have "Reserved" be bits 5-11? | Assign bit 5-11 as reserved. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 5764 | Hanseul Hong | 36.20 | B3 of fragment number subfield is always set to 0 | Make B3 of fragment number subfield reserved or use it in other purpose | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7474 | Lei Huang | 34.10 | "B6" in Figure 9-33 should be changed back to "B5" . | As per comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7309 | Kwok Shum Au | 34.10 | There are 7 reserved bits. In the figure, the starting bit of the Reserved field is not correct. | Replace "B6" with "B5". | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7391 | Laurent Cariou | 34.23 | 11ax defines some solutions to improve performance when experiencing coexistence issues with BT for example. (UL MU disable bit). In the same approach, a STA experiencing packet loss due to collisions for instance because of in-device coexistence issues should be able to inform the the originator that the packet losses are due to such collisions. Based on this, the originator can adapt betterly its rate selection, which we can show improves significantly the performance. | Use a reserved bit in the BA control to signal if the PPDU that elicited the BA transmission was received with collisions (for instance due to in-device coex) or not. | Rejected - There is no evidence of performance improvement due to 'collission' feedback.  |
| 7526 | Leonardo Lanante | 37.51 | AIDs for unassociated STAs are still undefefined. | Allow the AP to provide AIDs for unassociated STAs and make them eligible for scheduled OFDMA transmission. | Rejected - This is already resolved using CID 9120, and is already part of D1.2. No changes needed to D1.2 |
| 6951 | Joseph Levy | 34.23 | This is the frame format clause, therefore the use of the fields in the frame should not be described in this clause. The detailed use of a field in a MAC frame format should be described in the MAC clause. Therefore, remove or move to the MAC subclause the detailed requirements for the TA field in an HE-AP. | Remove or move the following text: "An HE AP that transmits a Multi-STA BlockAck frame with different values of the AID subfield in Per STA Info subfields sets the RA field to thebroadcast address. An HE AP that transmits a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per STA Info subfields sets the RA field to the address of the recipient STA that requested the Block Ack or to the broadcast address. An HE non-AP STA transmits 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 sets the RA field to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged." | Rejected - The text in this section serves declarative purpose. Normative behavior is described in Section 27.4 |
| 6950 | Joseph Levy | 34.23 | Changes made to the 3rd paragraph provide changes to the baseline text that while appearing to be a change do not change requirements. The baseline text should be modified in a minimal way. | Replace the first sentence with: "The RA field of the BlockAck frame that is not a Multi-STA BlockAck variant is the address of therecipient STA that requested the Block Ack. | Rejected - While backward compatibility is preserved, 11ax added Multi-BSS control frame response. So, the response may be sent to Transmitting BSS, or to the virtual AP that the STA is associated with. |
| 7133 | kaiying Lv | 36.55 | Change "and" to "or" | As in comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 4852 | Alfred Asterjadhi | 33.65 | The BlockACKReq includes the BAR Control which also has the encoding of the BlockAckReq frame variant, and for different variants there can be a different length. Similar observation for the M-BA, that can have different lengths. Clarify that the lenghts that are defined as of now (11ax) are also applicable for future amendments to ensure forward compatibility. | Presentation to be provided | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 3109 | Adrian Stephens | 34.10 | Bit numbering of the Reserved field is inconsistent | Change reserved to B5-B11. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 3161 | Ahmadreza Hedayat | 34.28 | It is not clear why an AP can set the RA to the broadcast address in this case: "An HE AP that transmits a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per STA Info subfields sets the RA field to the address of the recipient STA that requested the Block Ack or to the broadcast address." It seems that setting the RA to "the address of the recipient STA that requested the Block Ack" helps unintended STAs in not unnecessarily process the MBA. | As in the comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 3008 | Abhishek Patil | 34.23 | What is the BA Ack Policy subfield for M-BA in MU, ACK in SU, ACK in MU | Presentation to be provided which would reflect the requirements in the baseline. | Rejected - Specified in Section 27.4 |
| 3007 | Abhishek Patil | 34.10 | Correct bit number: B6 to B5 in Figure 9-33 | As in the comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 3009 | Abhishek Patil | 37.16 | AMSDU fragmentation is allowed. Remove the sentence, "For an A-MSDU, only the first bit of the subbitmap is used, as fragmentation is not allowed in an A-MSDU." | Remove the sentence "For an A-MSDU, only the first bit of the subbitmap is used, as fragmentation is not allowed in an A-MSDU." | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 3446 | Albert Petrick | 34.12 | In Figure 9-33 (BA Control Field) Bit (B5) in the Reserve sub-field is marked as deleted (strikethrough) as shown. The Reserved subfield now shows 7-bits (B6-B11). The text does not describe B5. Define B5 or correct Figure 9-33 | Fix as commented | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 5450 | Graham Smith | 34.23 | "The RA field of the BlockAck frame that is not a Multi-STA BlockAck variant is set to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged." Why did you change the existing text, it looked pretty clear as it was. Then insert a para so as to differentiate the HE additions. | Revert cited sentence back to original and then add para break. | Rejected - While backward compatibility is preserved, 11ax added Multi-BSS control frame response. So, the response may be sent to Transmitting BSS, or to the virtual AP that the STA is associated with. |
| 5451 | Graham Smith | 34.25 | "An HE AP that transmits a Multi-STA BlockAck frame with different values of the AID subfield in Per STA Info subfields sets the RA field to the broadcast address. An HE AP that transmits a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per STA Info subfields sets the RA field to the address of the recipient STA that requested the Block Ack or to the broadcast address." Why not then simply set the RA to the broadcast address and make this bit really simple for the AP? | Keep it simple and just set the RA to broadcast address. Replace all cited text with "An HE AP that transmits a Multi-STA BlockAck frame sets the RA field to the broadcast address." | Rejected - Setting it to broadcast when MBA is sent to an indivudual STA results in unnecessary processing power by other STAs. See also CID 3161 |
| 5452 | Graham Smith | 34.30 | "An HE non-AP STA transmits 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 sets the RA field to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged." Why do we have the instruction for the AID here? This is for the RA which is set to the address of the recipient. | Replace all cited text with "An HE non-AP STA transmits a Multi-STA BlockAck frame sets the RA field to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged." | Rejected - M-BA frame has an AID field that is used to identify each of the STAs. So, standard needs to specify how to populate the field.  |
| 5057 | David Kloper | 37.15 | The A-MSDU aggregation is often performed at a different layer than A-MPDU aggregation. As such we should allow fragmentation of A-MSDU. There are multiple references to prohibiting this, and we appear to allow reception of fragmented A-MSDU to be optional. See AMSDU Fragmentation support, p 76. | Update all references. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 5128 | Dorothy Stanley | 34.10 | The start of reserved was changed from B5 to B6 in Figure 9-33. But there is no new label for B5. | Add label for B5 | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 9624 | Yongho Seok | 34.31 | "An HE non-AP STA transmits 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 sets the RA field to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged."For more clarification, change it as the following:"An HE non-AP STA that transmits a Multi-STA BlockAck frame with a single Per STA Info subfield or with the same values of the AID subfield in Per STA Info subfields sets the RA field to either the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged." | As per comment. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 9623 | Yongho Seok | 34.27 | "An HE AP that transmits a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per STA Info subfields sets..."For more clarification, change it as the following:"An HE AP that transmits a Multi-STA BlockAck frame with a single Per STA Info subfield or..." | As per comment. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 9622 | Yongho Seok | 34.25 | "The RA field of the BlockAck frame that is not a Multi-STA BlockAck variant is set to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged."Because a management frame does not any block ack agreement, the BlockAck frame can't be used for an acknowledgment of a management frame.Remove "management frame". | As per comment. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 9361 | Weimin Xing | 37.16 | Fragmentation is allowed in an A-MSDU when dot11AMSDUFragmentationOptionImplemented is true. Delete the sentence "For an A-MSDU, only the first bit of the subbitmap is used, as fragmentation is not allowed in an A-MSDU " | As in comment | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 10191 | Yusuke Asai | 34.10 | The first bit of "Reserved" field is not B6 but B5. | Revise it. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7732 | Mark Hamilton | 36.36 | Ambigous use of "can only". Use declarative verbs in clause 9. | Reword this NOTE: "A Compressed ... is not sent to an ... whose ... is not 3." Same thing at P39L30. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7731 | Mark Hamilton | 35.50 | The baseline text that talks about the "GCR field" in subclause 9.3.1.9.1 (802.11-2016 P678L3) will need to be updated, since the subfield has been removed. | TGak has not made its modifications to this text either. Appropriate, and building/matching changes will need to be worked out. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7728 | Mark Hamilton | 34.27 | AID is not a subfield of the Multi-STA BlockAck frame, Per STA Info is the subfield. | Change "AID" to "Per STA Info". ("An HE AP that transmits a Multi-STA BlockAck frame with a single \_Per STA Info\_ subfield set the RA field ...") Same thing in the next setence, for the HE non-AP STA. | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |
| 7726 | Mark Hamilton | 34.23 | The implication of adding "or the address of the recipient STA..." is that this is not always the transmitter of the soliciting frame. If that is the case (there is a different possibility for transmitter and recipient), that case needs to be clarified. Also, "the recipient STA whose data/management frames are acknowledged" is confusing. | Delete after the "or", or clarify when this other alternative is supposed to be used. Reword the end of the sentence to clarify the STA being referenced. (STAs don't "own" frames, so "whose" is confusing. Perhaps it is the STA that transmitted the frames being acknowledged?) Same thing at P34L33 (for the HE non-AP STA). | Rejected - While backward compatibility is preserved, 11ax added Multi-BSS control frame response. So, the response may be sent to Transmitting BSS, or to the virtual AP that the STA is associated with. The normative text for this case is specified in Section 27.4.1 (P170L26) of 11axD1.2 |
| 8480 | Robert Stacey | 36.61 | With level 2 fragmentation, each bit does not necessarily acknowledge the successful reception of a single MSDU or A-MSDU. It could acknowledge a fragment thereof. | Change to read: "...acknowledges the successful reception of a single MSDU or A-MSDU or fragment thereof in the order of sequence number..." | Revised - Agree in principle. Updated the text. TGax editor shall incorporate changes in 11-17-0677-00-00ax |

* BlockAckReq frame format
* Overview

Change the 4th paragraph as follows:

The TA field value is the address of the STA transmitting the BlockAckReq frame or a bandwidth signaling TA. In a BlockAckReq frame transmitted by a VHT STA or an HE STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT, the TA field value is a bandwidth signaling TA.(#8478)(#9642)

* BlockAck frame format
* Overview

Change Figure 9-33 as follows:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | ~~B1~~ | ~~B2~~ | ~~B3 B4~~ | B1         B4 | ~~B5~~B5 B11 | B12 B15 |
|  | BA Ack Policy | ~~Multi-TID~~ | ~~Compressed Bitmap~~ | ~~GCR Mode~~ | BA Type | Reserved | TID\_INFO |
| Bits: | 1 | ~~1~~ | ~~1~~ | ~~2~~ | 4 | ~~8~~7 | 4 |
| * BA Control field [#5824, #5880, #7474, #7309, #3109, #3446, #5128, #10191]
 |

Change the 3rd paragraph as follows:

The RA field of the BlockAck frame that is not a Multi-STA BlockAck variant is ~~the address of the recipient STA that requested the Block Ack~~ set to the TA field of the soliciting frame or the address of the recipient STA whose data[#9622] frames are acknowledged. An HE AP that transmits a Multi-STA BlockAck frame with different values of the AID11[#7728] subfield in Per AID TID Info subfields(#7734) sets the RA field to the broadcast address. An HE AP that transmits a Multi-STA BlockAck frame with a single Per AID TID Info [#9623] subfield or with the same values of the AID11[#7728] subfield in Per AID TID Info subfields(#7734) sets the RA field to the address of the recipient STA that requested the Block Ack [#3161]. An HE non-AP STA(#6256) that [#9624] transmits a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per AID TID Info subfields(#7734) and sets the RA field to the TA field of the soliciting frame or the address of the recipient STA whose data/management frames are acknowledged.

Change the 4th paragraph as follows:

The TA field value is the address of the STA transmitting the BlockAck frame or a bandwidth signaling TA in the context of HT-delayed Block Ack. In a BlockAck frame transmitted in the context of HT-delayed Block Ack by a VHT STA or an HE STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT, the TA field value is a bandwidth signaling TA.

Change the 6th paragraph of this subclause as follows:

For BlockAck frames sent under Delayed and HT-delayed agreements, the BA Ack Policy subfield of the BA Control field has the meaning shown in Table 9-23 (BA Ack Policy subfield). For BlockAck frames sent under other types of agreement, the BA Ack Policy subfield is reserved. An HE STA does not send a Multi-STA BlockAck frame under Delayed and HT-delayed agreements.

Change Table 9-24 as follows:

|  |
| --- |
| * BlockAck frame variant encoding
 |
| ~~Multi-TID subfield value~~ | ~~Compressed Bitmap subfield value~~ | ~~GCR subfield value~~ | BA Type (B1 B2 B3 B4) | BlockAck frame variant |
| ~~0~~ | ~~0~~ | ~~00~~ | 0000 | Basic BlockAck |
| ~~01~~ | 0001 | Reserved |
| ~~10~~ | 0010 | Reserved |
| ~~11~~ | 0011 | Reserved |
| ~~0~~ | ~~1~~ | ~~00~~ | 0100 | Compressed BlockAck |
| ~~01~~ | 0101 | GLK-GCR BlockAck |
| ~~10~~ | 0110 | GCR BlockAck |
| ~~11~~ | 0111 | Reserved |
| ~~1~~ | ~~0~~ | ~~00~~ | 1000 | Extended Compressed BlockAck |
| ~~01~~ | 1001 | Reserved |
| ~~10~~ | 1010 | Reserved |
| ~~11~~ | 1011 | Reserved |
| ~~1~~ | ~~1~~ | ~~00~~ | 1100 | Multi-TID BlockAck |
| ~~01~~ | 1101 | ~~Reserved~~ Multi-STA BlockAck |
| ~~10~~ | 1110 | Reserved |
| ~~11~~ | 1111 | Reserved |

Change the 7th paragraph of this subclause as follows:

The ~~values of the Multi-TID, Compressed Bitmap, and GCR~~ BA Type subfield~~s~~ of the BA Control field determines which of the BlockAck frame variants is represented, as indicated in the Table 9-24 (BlockAck frame variant encoding).

Change the 7th paragraph of this subclause as follows:

The BA Type field indicates whether the BlockAck frame was sent in response to a GCR BlockAckReq frame. The BA Type is set to GLK-GCR BlockAck or GCR BlockAck when the BlockAck frame is sent in response to a GCR BlockAckReq frame[#7731].

* Compressed BlockAck variant

Change subclause 9.3.1.9.3 (including Figure 9-34) as follows:

The TID\_INFO subfield of the BA Control field of the Compressed BlockAck frame contains the TID for which this BlockAck frame is sent.

The BA Information field of the Compressed BlockAck frame comprises the Block Ack Starting Sequence Control subfield and the Block Ack Bitmap subfield, as shown in Figure 9-35 (BA Information field (Compressed BlockAck)). The Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield contains the sequence number of the first MSDU or A-MSDU for which this BlockAck frame is sent. The value of this subfield is defined in 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA). ~~The Fragment Number subfield of the Block Ack Starting Sequence Control subfield is set to 0.~~

|  |  |  |
| --- | --- | --- |
|  | Block Ack Starting Sequence Control | Block Ack Bitmap |
| Octets: | 2 | 8 or 32 |
| * BA Information field (Compressed BlockAck)
 |

The Fragment Number subfield is set as defined in Table 9-24a (Fragment Number subfield encoding for the Compressed BlockAck variant)

Insert the following table:

|  |
| --- |
| * Fragment Number subfield encoding for the Compressed BlockAck variant
 |
| Fragment Number subfield | Fragmentation Level 3 (ON/OFF) | Block Ack Bitmap subfield length (octets) | Maximum number of MSDUs/A-MSDUs that can be acknowledged |
| B3 | B2-B1 | B0 |
| 0 | 0 | 0 | OFF | 8 octets | 64 |
| 0 | 1 | 0 | Reserved | Reserved |
| 0 | 2 | 0 | 32 octets | 256 |
| 0 | 3 | 0 | Reserved | Reserved |
| 0 | 0 | 1 | ON | 8 octets | 16 |
| 0 | 1 | 1 | Reserved | Reserved |
| 0 | 2 | 1 | 32 octets | 64 |
| 0 | 3 | 1 | Reserved | Reserved |
| 1 | Any | Any | Reserved | (value indicated by B2 to B0) x 4 octets [#4852] | Reserved |
| NOTE—A Compressed BlockAck frame with B0 of the Fragment Number subfield set to 1 is not sent to an HE STA whose HE Fragmentation Support subfield in the HE Capabilities element it transmits is not set to 3 (see 27.3 (Fragmentation)). [#7732]NOTE – When B3 is set to 1, the Block Ack Bitmap subfield length is derived as 4 times the value that is set using the bits B2 to B0. For example, if the bits B2 to B0 is set to 011, then the Block Ack Bitmap subfield length is 12 octets [#4852, #5764] |

Change the remainder of 9.3.1.9.3 as follows:

When B0 of the Fragment Number subfield is 0, the Block Ack Bitmap subfield of the BA Information field of the Compressed BlockAck frame is used to indicate the receive status of up to 64 or 256 MSDUs [#7133] or A-MSDUs depending upon the value of B2-B1 in the Fragment Number subfield as shown in Table 9-24a (Fragment Number subfield encoding for the Compressed BlockAck variant),~~The Block Ack Bitmap subfield of the BA Information field of the Compressed BlockAck frame is 8 octets in length and is used to indicate the received status of up to 64 MSDUs and A-MSDUs.~~ Each bit that is equal to 1 in the compressed Block Ack Bitmap subfield acknowledges the successful reception of a single MSDU or A-MSDU or fragment thereof [#8480]in the order of sequence number, with the first bit of the Block Ack Bitmap subfield corresponding to the MSDU or A-MSDU with the sequence number that matches the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield.

When B0 of the Fragment Number subfield is 1, the Block Ack Bitmap subfield of the BA Information field of the Compressed BlockAck frame is used to indicate the receive status of up to 16 or 64 MSDUs and A-MSDUs depending upon the value B2-B1 in the Fragment Number subfield as shown in Table 9-24a (Fragment Number subfield encoding for the Compressed BlockAck variant). If bit position *n* of the Block Ack Bitmap subfield is 1, it acknowledges receipt of an MPDU with sequence number value *SN* and fragment number value *FN* with *n* = 4 × (*SN* – *SSN*) + *FN*, where *SSN* is the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield and the operations on the sequence numbers are performed modulo 4096. If bit position *n* of the Block Ack Bitmap subfield is 0, it indicates that the MPDU has not been received.

NOTE—When the B0 of the Fragment Number subfield is equal to 1 then the Block Ack Bitmap subfield is split into (Block Ack Bitmap subfield length)/4 subbitmaps, each of which indicates receive status for up to 4 fragments of each of the MSDUs as indicated in Table 9-24a (Fragment Number subfield encoding for the Compressed BlockAck variant).[#3009, #5057, #9361].

Insert a new subclause after 9.3.1.9.6:

* Multi-STA BlockAck variant

(#9814)The Multi-STA BlockAck frame (#9815)is supported if either UL MU or multi-TID A-MPDU operation is supported and is used to acknowledge multi-STA multi-TID, multi-STA single TID, or single-STA multi-TID A-MPDUs.(#7733, #9363, #9625, #8186)

The TID\_INFO subfield of the BA Control field of the Multi-STA BlockAck frame is reserved.

The BA Information field of the Multi-STA BlockAck frame comprises one or more Per AID TID Info subfields(#7734) as defined in Figure 9-38a (BA Information field format (Multi-STA BlockAck)(#9814)).

|  |  |
| --- | --- |
|  | Repeated for each <AID, TID> tuple |
|  | Per AID TID Info |
| Octets: | variable |
| * BA Information field format (Multi-STA BlockAck)(#9814)
 |

The Per AID TID Info subfield when the AID11 subfield of the AID TID Info subfield is not 2045(#9120) is shown in Figure 9-38b (Per AID TID Info subfield format when the AID11 subfield is not 2045).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | AID TID Info | Block Ack Starting Sequence Control | Block Ack Bitmap |
| Octets: | 2 | 0 or 2 | 0, 4, 8, 16 or 32 |
| * Per AID TID Info subfield format when the AID11 subfield is not 2045
 |

The Per AID TID Info subfield when the AID11 subfield of the AID TID Info subfield is 2045 is shown in Figure 9-38b (Per AID TID Info subfield format when the AID11 subfield is not 2045).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | AID TID Info | Block Ack Starting Sequence Control (0) | Reserved | RA |
| Octets: | 2 | 2 | 2 | 6 |
| * Per AID TID Info subfield format when the AID11 subfield is 2045
 |

(#9120)

Where Block Ack Starting Sequence Control subfield is set to 0 and RA subfield indicates the MAC address of an unassociated STA for which the Per STA Info subfield is intended.(#9120)

The AID TID Info subfield(#7734) is shown in Figure 9-38d (AID TID Info subfield(#7734) format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B10 | B11 | B12 B15 |
|  | AID11(#6075) | Ack Type | TID |
| Bits: | 11 | 1 | 4 |
| * AID TID Info subfield(#7734) format
 |

The AID11 subfield carries the 11 LSBs of the AID(#7735) of the non-AP STA for which the Per AID TID Info subfield(#7734) is intended.(#9626) If the Multi-STA BlockAck frame(#Ed) is intended for an AP, the AID11 subfield is set to 0. A value 2045 in the AID11 subfield is used as a unique identifier for any unassociated STA. The Ack Type subfield and TID subfield are set to 0 and 15, respectively, when AID11 subfield is set to 2045.(#9120)

NOTE—More than one Per AID TID Info subfield(#7734) with the same value in the AID11 subfield but different values in the TID subfield can be present in the Multi-STA BlockAck frame.(#Ed)

* The format of Table 9-24b has changed and the edits for #9120 cannot be directly applied. Since the Per AID TID field has a unique format it is treated separately.

If the AID11 subfield is not 2045, then the TID subfield contains the TID for which the acknowledgment or block acknowledgment contained in the Per AID TID Info subfield applies and is set as defined in Table 9-24b (Context of the Per AID TID Info subfield(#7734) and presence of optional subfields(#3162) when the AID11 subfield is not 2045).

|  |
| --- |
| * Context of the Per AID TID Info subfield(#7734) and presence of optional subfields(#3162) when the AID11 subfield is not 2045
 |
| Ack Type subfield values | TID subfield values | Block Ack Starting Sequence Control subfield | Block Ack Bitmap subfield | Context of a Per AID TID Info subfield(#7734) in a Multi-STA BlockAck frame |
| 0 | 0-7 | Present | Present | Block acknowledgment context:Sent as a response to MPDUs in an A-MPDU that solicit an immediate block acknowledgement or to a BlockAckReq frame. |
| 1 | 0-7 | Not present | Not present | Acknowledgment context:Sent as a response to an MPDU or S-MPDU(#3213) that solicits an immediate acknowledgment. |
| 0 or 1 | 8 to 13 | N/A | N/A | Reserved |
| 0 | 14 | N/A | N/A | Reserved |
| 1 | 14 | Not present | Not present | All-ack context:Sent as a response to an A-MPDU that solicits an immediate response and all MPDUs contained in the A-MPDU are received successfully. |
| 0 | 15 | N/A | N/A | Reserved |
| 1 | 15 | Not present(#3162, #7312, #7475, #9364) | Not present | Action frame/PS-Poll acknowledgment context:(#5065)Sent as a response to an Action Ack frame carried in an A-MPDU, or PS-Poll frame in an S-MPDU that solicits an immediate acknowledgment. |
| NOTE—Additional rules for acknowledgement, block acknowledgment and all-ack are defined in 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame(#8482)) for a multi-TID A-MPDU.(#8477, #7311, #8113, #8187) |

(#6076, #7736, #7934, #3112, #8475, #9816, #9817)

If the ACK Type subfield is 0 and the TID value of the Per AID TID Info subfield is 15, then the Block Ack Starting Sequence Control, 2 octets reserved and RA fields are present and the Per AID TID Info field acknowledges a Management frame sent by an unassociated non-AP STA.(#9120)

If the Ack Type subfield is 1 and the TID value of the AID TID Info subfield(#7734) is less than 8 or equal to 15, then the Block Ack Starting Sequence Control and Block Ack Bitmap subfields are not present and the Per AID TID Info subfield(#7734) acknowledges successful reception of a single MPDU indicated by the TID of the AID TID Info subfield(#7734). If the Ack Type subfield is 1 and the TID subfield of the AID TID Info subfield(#7734) is 14, then the Block Ack Starting Sequence Control and Block Ack Bitmap are not present and the Per AID TID Info subfield(#7734) acknowledges successful reception of all the MPDUs carried in the eliciting A-MPDU. The responding STA determines that all the MPDUs carried in the eliciting A-MPDU are successfully received if the all the MPDUs that precede the first MPDU delimiter with EOF equal to 1 and MPDU Length field equal to 0 are received successfully.(#5058, #5926) The Ack Type field is not set to 1 when responding to (#8474)an MU-BAR Trigger frame(#10252). If the Ack Type subfield is 0 and the TID value of the Per AID TID Info subfield is smaller than 8(#9120), then the Block Ack Starting Sequence Control and Block Ack Bitmap subfields are present.

The context and the presence of each optional subfields in a Per AID TID Info subfield(#7734) in a Multi-STA BlockAck frame is as defined in Table 9-24b (Context of the Per AID TID Info subfield(#7734) and presence of optional subfields(#3162) when the AID11 subfield is not 2045).

If the Ack Type field is 0, the Fragment Number subfield encoding indicates the length of the BlockAck bitmap subfield as defined in Table 9-24c (Fragment Number subfield encoding for the Multi-STA BlockAck variant).

|  |
| --- |
| * Fragment Number subfield encoding for the Multi-STA BlockAck variant
 |
| Fragment Number subfield | Fragmentation Level 3 (ON/OFF) | Block Ack Bitmap subfield length (octets) | Maximum number of MSDUs/A-MSDUs that can be acknowledged |
| B3 | B2-B1 | B0 |
| 0 | 0 | 0 | OFF | 8 octets | 64 |
| 0 | 1 | 0 | 16 octets | 128 |
| 0 | 2 | 0 | 32 octets | 256 |
| 0 | 3 | 0 | 4 octets | 32 |
| 0 | 0 | 1 | ON | 8 octets | 16 |
| 0 | 1 | 1 | 16 octets | 32 |
| 0 | 2 | 1 | 32 octets | 64 |
| 0 | 3 | 1 | 4 octets | 8 |
| 1 | Any | Any |  | Reserved | Reserved |
| NOTE 1—A Multi-STA BlockAck frame with B0 of the Fragment Number subfield set to 1 can only be sent to an HE STA whose HE Fragmentation Support subfield in the HE Capabilities element it transmits is 3 (see 27.3 (Fragmentation)). |

When B0 of the Fragment Number subfield of the Block Ack Starting Sequence Control subfield is 0, the (#7737)BA Information field of the Multi-STA BlockAck frame contains an 8-octet, 16-octet, 32-octet or 4-octet Block Ack Bitmap subfield depending on B2-B1 of the Fragment Number subfield as defined in the Table 9-24c (Fragment Number subfield encoding for the Multi-STA BlockAck variant) indicating the receive status of up to 64, 128, 256 or 32 MSDUs or A-MSDUs respectively(#7314). Each bit that is equal to 1 in the Block Ack Bitmap subfield acknowledges the successful reception of a single MSDU or A-MSDU in the order of sequence number with the first bit of the Block Ack Bitmap subfield corresponding to the MSDU or A-MSDU with the sequence number that matches the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield.

When B0 of the Fragment Number subfield of the Block Ack Starting Sequence Control subfield is 1, the Block Ack Bitmap subfield of the BA Information field of the Multi-STA Block Ack frame is used to indicate the receive status of up to 16, 32, 64 or 8 MSDUs or(#7134) A-MSDUs depending on B2-B1 of the Fragment Number subfield as shown in the Table 9-24c (Fragment Number subfield encoding for the Multi-STA BlockAck variant). If bit position *n* of the Block Ack Bitmap subfield is 1, it acknowledges receipt of an MPDU with sequence number value *SN* and fragment number value *FN* with *n* = 4 × (*SN* – *SSN*) + *FN*, where *SSN* is the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield and the operations on the sequence numbers are performed modulo 4096. If bit position *n* of the Block Ack Bitmap subfield is 0, it indicates that the MPDU has not been received.

NOTE—When B0 of the Fragment Number subfield is 1 then the Block Ack Bitmap field is split into Block Ack Bitmap field length/4 subbitmaps, each of which indicates receive status for 4 fragments of each of the MSDUs as indicated in Table 9-24c (Fragment Number subfield encoding for the Multi-STA BlockAck variant). For an A-MSDU, only the first bit of the subbitmap is used, when(#9362, #3010, #9818) fragmentation is not allowed in an A-MSDU.

[…]

* MU-BAR variant

The Trigger Dependent Common Info field is not present in the MU-BAR Trigger frame(#10252). The Trigger Dependent User Info field of the MU-BAR Trigger frame(#10252) is defined in Figure 9-52i (Trigger Dependent User Info field for the MU-BAR variant).

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | BAR Control | BAR Information |
| Octets: | 2 | variable |
| * Trigger Dependent User Info field for the MU-BAR variant
 |

The BAR Control subfield is defined in 9.3.1.8 (BlockAckReq frame format) , where the TID\_INFO is set to ((length of the BAR information expressed in number of octets – 4) / 4) [CID4852].

The BAR Information subfield is defined in 9.3.1.8 (BlockAckReq frame format).(#8478, #9642)