IEEE P802.11
Wireless LANs

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| **Resolutions to comments to subclause 9.3.1.9** |
| **Date:** 2018-11-12 |

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Abstract

This submission proposes resolutions for the following CIDs submitted to subclause 9.3.1.9 (**15 CIDs**):

* 16440,
* 15012,
* 15930,
* 15207, 15870, 15871, 16092, 16093, 16202, 16359, 16371, 16374, 16379, 16391, 17043

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.***

# 9.3.1.9

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 16440 | Matthew Fischer | 85.52 | It would be nice to have the ability to inform the transmitter of an AMPDU that missing acknowledgements for some MPDUs are not due to a poor MCS choice, but instead, to local interference that occurred during the AMPDU reception. An indication of such occurence should be signaled in the BA. | Add a mechanism in the BA frame, perhaps the MBA, to allow a recipient transmitting the MBA to indicate to the originator that missing acknolwedgements within the BA frame are due to local interference and not a poor MCS choice. | Rejected. Detailed proposal is required to decide. However, it may be presumed by the position of errors in the bitmap, how long is the error burst, etc, which can be done by the current format.  |
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# 9.3.1.9.1

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 15012 | Abhishek Patil | 86.04 | The 1st paragraph on pg 86 covers the RA rules for all BA types except Multi-STA BA. Add a sentence to the end of the paragraph providing reference to 9.3.1.9.7 for RA rules for multi-STA BA | Add the following sentence at the end of the 1st paragraph: "The RA of Multi-STA BA is set as described in 9.3.1.9.7" | Revised. Agree in principle. See the instructions to the TGax editor in doc. 11-18/1851r2. |
|  |  |  |  |  |  |

TGax Editor: Change texts under 9.3.1.8.1 in P802.11ax D3.2 as follows:

##### 9.3.1.8.1 Overview

Change Figure 9-41 (BA Control field) as follows:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | ~~B1~~ | ~~B2~~ | ~~B3 B4~~ | B1 B4 | B5 B11 | B12 B15 |
|  | BA AckPolicy | ~~Multi-TID~~ | ~~Compressed~~~~Bitmap~~ | ~~GCR~~~~Mode~~ | BA Type | Reserved | TID\_INFO |
| Bits: | 1 | ~~1~~ | ~~1~~ | ~~2~~ | 4 | 7 | 4 |

**Figure 9-41—BA Control field**

Change the 3rd paragraph as follows:

The RA field of ~~the BlockAck frame is the address of the recipient STA~~ a 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 frames are acknowledged. The RA field of a Multi-STA BlockAck frame is set as described in 9.3.1.8.7 (Multi-STA BlockAck variant).(#15012)

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 the 7th paragraph of this subclause as follows:

The ~~values of the Multi-TID, Compressed Bitmap, and GCR Mode subfields~~ BA Type subfield of the BA Control field determines which of the possible BlockAck frame variants is represented, as indicated in the Table 9-30 (BlockAck frame variant encoding).

Replace Table 9-24 with the following:

**Table 9-30—BlockAck frame variant encoding**

|  |  |
| --- | --- |
| **BA Type** | **BlockAck frame variant** |
| 0 | Basic |
| 1 | Extended Compressed |
| 2 | Compressed |
| 3 | Multi-TID |
| 4-5 | Reserved |
| 6 | GCR |
| 7-9 | Reserved |
| 10 | GLK-GCR |
| 11 | Multi-STA |
| 12-15 | Reserved |

Change the 8th paragraph as follows:

~~The GCR Mode subfield indicates whether the BlockAck frame was sent in response to a GCR Mode BlockAckReq or a GLK-GCR BlockAckReq frame. The GCR Mode subfield is 10 when the BlockAck frame is sent in response to a GCR BlockAckReq frame, 01 when the BlockAck frame is sent in response to a GLK-GCR BlockAckReq, and 00 otherwise.~~The GCR BlockAck frame is used in response to a GCR BlockAckReq frame and the GLK-GCR BlockAck frame is used in response to a GLK-GCR BlockAckReq frame.

# 9.3.1.9.3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 15930 | Mark Hamilton | 87.22 | These changes to BlockAck are not backwards compatible, and are not described as only applicable to HE links. | Add text that if either STA (at either end of a link) are non-HE, then the Fragment Number subfield still must be set to 0. (And, by implication, the Block Ack Bitmap must be only 8 octets.) | Revised. Agree in principle. See the instructions to the TGax editor in doc. 11-18/1851r2. |
|  |  |  |  |  |  |

TGax Editor: Change texts under 9.3.1.8.2 in P802.11ax D3.2 as follows:

##### 9.3.1.8.2 Compressed BlockAck variant

Change 9.3.1.8.3 (including Figure 9-42 (BA Information field (Compressed BlockAck))) 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~~ is(#15143) shown in Figure 9-42 (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 10.26.6.5 (Generation and transmission of BlockAck frames by an HT STA, DMG STA or S1G 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 |

**Figure 9-42—BA Information field (Compressed BlockAck)**

The Fragment Number subfield of the Block Ack Starting Sequence Control field is set as defined in Table 9-30a (Fragment Number subfield encoding for the Compressed BlockAck variant). The Fragment Number subfield of the Block Ack Starting Sequence Control subfield is set to all 0s when the Compressed BlockAck frame is sent to or from a non-HE STA.(#15930)

Insert the following table:

**Table 9-30a—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 | 64 |
| 0 | 1 | 0 | Reserved | Reserved |
| 0 | 2 | 0 | 32 | 256 |
| 0 | 3 | 0 | Reserved | Reserved |
| 0 | 0 | 1 | ON | 8 | 16 |
| 0 | 1 | 1 | Reserved | Reserved |
| 0 | 2 | 1 | 32 | 64 |
| 0 | 3 | 1 | Reserved | Reserved |
| 1 | Any | Any |  | Reserved | Reserved |
| NOTE—A Compressed BlockAck frame with B0 of the Fragment Number subfield set to 1 is not sent to an HE STA whose Fragmentation Support subfield(#16339) in the HE Capabilities element it transmits is not set to 3 (see 27.3 (Fragmentation and defragmentation)). |

Change the remainder of 9.3.1.8.2 as follows:

If B0 of the Fragment Number subfield is 0, the Block Ack Bitmap subfield of the BA Information field of the Compressed BlockAck frame indicates the receive status of up to 64 or 256 MSDUs and/or A-MSDUs depending upon the value of B2-B1 in the Fragment Number subfield as shown in Table 9-30a (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 in the order of sequence number, with the first bit of the Block Ack Bitmap subfield corresponding to the MSDU, ~~or~~ A-MSDU, or fragment thereof with the sequence number that matches the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield.

If B0 of the Fragment Number subfield is 1, the Block Ack Bitmap subfield of the BA Information field of the Compressed BlockAck frame indicates the receive status of up to 16 or 64 MSDUs and/or A-MSDUs depending upon the value B2-B1 in the Fragment Number subfield as shown in Table 9-30a (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 per-formed modulo 4096. If bit position *n* of the Block Ack Bitmap subfield is 0, it indicates that the MPDU has not been received.

NOTE—If 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 4 fragments of each of the MSDUs or A-MSDUs as indicated in Table 9-30a (Fragment Number subfield encoding for the Compressed BlockAck variant).

# 9.3.1.9.7

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| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 15207 | Amelia Andersdotter | 90.33 | Why is it necessary that an unassociated STA is uniquely identified? | Not sure. | Rejected. This is because an AID is allocated during the Association process and an unassociated STA does not have it.  |
| 15870 | Liwen Chu | 89.28 | "A non-AP HE STA sets the RA field to the TA field of the soliciting frame or to the address of the recipient STA whose Data or Management frames are acknowledged." | Remove "that transmits a Multi-STA BlockAck frame with a single Per AID TID Info field or with multiple Per AID TID Info subfields each carrying the same AID value, " from the sentence | Accepted.  |
| 15871 | Liwen Chu | 92.37 | acknowledging a fragment with one bit in BA Bitmap is missing. | Add the missed case in the subclause. | Revised. Agree in principle. See the instructions to the TGax editor in doc. 11-18/1851r2. |
| 16092 | Mark RISON | 91.46 | This para and the next one duplicate Table 9-24b. For example "If the Ack Type subfield is 1 and the TID subfield is less than 8 or equal to 15, then the Block Ack StartingSequence Control and Block Ack Bitmap subfields are not present" is shown in Table 9-24b as the first cell from the top saying "Not present". Similarly "If the Ack Type subfield is 0 and the TID value of the Per AID TID Info subfield is smaller than 8, then theBlock Ack Starting Sequence Control and Block Ack Bitmap subfields are present." is the first cell from the top saying "Present" | Delete the para at the referenced location | Revised. Agree in principle. See the instructions to the TGax editor in doc. 11-18/1851r2.The duplication of the Table is deleted. Also, the explanation which is covered in 27.4 is deleted from this subclause.  |
| 16093 | Mark RISON | 91.46 | This para contains behavioural requirements, e.g. "The Ack Type subfield is not set to 1 when responding to an MU-BAR Trigger frame. ", which do not belong in Clause 9, which is about formats | Move the behavioural requirements to Clause 27 | Revised. Agree in principle. See the instructions to the TGax editor in doc. 11-18/1851r2. |
| 16202 | Mark RISON | 91.38 | "an Action frame carried in an [...] S-MPDU" -- other MMPDUs can also be carried in an S-MPDU and need to be acked | After "Sent as a response to an Action frame carried in an A-MPDU or S-MPDU," append "a Management frame, other than an Action No Ack frame, carried in an S-MPDU," | Revised. Agree in principle. Note that, from the description saying it is sent as a response to a Mangement frame, it is obvious that the Management frame is other than an Action No Ack frame. See the instructions to the TGax editor in doc. 11-18/1851r2. |
| 16359 | Mark RISON | 91.30 | "multi-TID A-MPDU that solicit an immediate block acknowledgment" / "multi-TID A-MPDU that solicits an immediate response" -- this is known by the transmitter but not necessarily by the receiver (because corruption might hide the multi-TIDness) | Reword in terms of "receives QoS Data or QoS Null frames with ack policy other than No Ack or Block Ack and with more than one TID, or receives a QoS Data or QoS Null frame with ack policy other than No Ack or Block Ack and an Action frame" | Revised. See the instructions to the TGax editor in doc. 11-18/1851r2.Note that Ack Type subfield being 1 and TID subfield being 14 can be only used when all the MPDUs carried in the A-MPDU are received correctly. If there is any error in the A-MPDU, this combination can’t be used.  |
| 16371 | Mark RISON | 91.05 | "Pre-association ack context: A recipient receiving a Management frame from the unassociated STA, that requires an acknowledgment, shall set the Ack Type field to 0, AID subfield to 2045, and the TID field to 15 in the Per AID TID Info field, and the RA field of the Per AID TID Info field to the intended recipient's MAC address to indicate the successful reception of that Management frame." And in 27.1 we have "If the Ack Type field is 0, and the AID field is 2045, and the TID field is 15, then Per AID TID Info field indicates the acknowledgement of an EOF-MPDU that is a Management frame soliciting immediate acknowledgment. The RA field in the Per AID TID Info field is the MAC address of an unassociated STA for which the Per AID TID Info subfield is intended." And in 27.4.2 we have "If the Ack Type field is 0 and the TID field is 15, then the Per AID TID Info field indicates the acknowledgment of a single Management frame sent by the unassociated STA as defined by the acknowledgment context." However in the associated context this combination is reserved, and a different combination is used for Management frames | Align all of these so that it's always Ack Type 1 and TID 15 to ack an MMPDU | Revised. See the instructions to the TGax editor in doc. 11-18/1851r2.Table 9-24b (Table 9-30b in D3.2) is for the case when AID11 is not 2045, while the first two references from the commenter are for the case when AID11 is 2045 and the third reference from the commenter is also mentioning especially of the case when AID11 is 2045 from the context. Note that, when the AID11 is 2045, the settings of the Ack Type and TID subfields are fixed to 0 and 15, respectively, regardless of the original meaning of the subfields.  |
| 16374 | Mark RISON | 91.52 | "The responding STAdetermines that all the MPDUs carried in the eliciting A-MPDU are successfully received if the all theMPDUs that precede the first MPDU delimiter with EOF equal to 1 and MPDU Length field equal to 0 arereceived successfully." -- since now HE allows EOF-MPDUs to be spread around with EOF=1 non-MPDUs this is too strict | Change the cited text to "The responding STA determines that all the MPDUs carried in the eliciting A-MPDU are successfullyreceived if there were no delimiter CRC errors and there were no MPDU FCS errors in that A-MPDU." and move to 27.4.2.a) | Revised. See the instructions to the TGax editor in doc. 11-18/1851r2.Note that an EOF-MPDU has a non-zero value in the MPDU Length field because an MPDU is carried therein. By saying that MPDUs preceding the first MPDU delimiter with EOF equal to 1 and MPDU Length field equal to 0, EOF-MPDUs are included while EOF padding subframes are excluded. And the cited text in 9.3.1.9.7 is moved to 27.4.2.  |
| 16379 | Mark RISON | 90.10 | The reserved field has no value. There is no point trying to "keep the basic length of the Per AID TID Info subfield the same with the unit length of the BA Information field of the Multi-TID BlockAck" (per CID 12596 resolution) | Delete the Reserved field in Figure 9-38c | Revised. An originator STA that is not subject to the Per AID TID Info subfield with the AID11 subfield being 2045 is also required to parse 10 octets following the AID TID Info subfield as the remainder. There is already such implementation. The proposed change will not be a simple software change and saving a couple of octets won’t justify the change at this stage. See the instructions to the TGax editor in doc. 11-18/1851r2. A SP was taken whether to accept this resolution during the AM1 session on Nov.14, 2018 and the result was Y33: N2: A5.  |
| 16391 | Massinissa Lalam | 89.10 | I do not see why 4 octets should be reserved in the Per AID TID Info subfield when AID subfield is 2045 (aka ack to a non-associated STA). Those should be removed to reduce the overhead of an acknowledging frame which will most likely be sent with a low MCS ... in particular if several non-associated STAs (in a dense deployment) need to have their transmissions acknowledged.Remove these reserved octets. | As in comment. | Revised. An originator STA that is not subject to the Per AID TID Info subfield with the AID11 subfield being 2045 is also required to parse 10 octets following the AID TID Info subfield as the remainder. There is already such implementation. The proposed change will not be a simple software change and saving a couple of octets won’t justify the change at this stage. See the instructions to the TGax editor in doc. 11-18/1851r2. Refer to the SP result in 16379.  |
| 17043 | Yongho Seok | 91.38 | "Action frame/PS-Poll acknowledgment context: Sent as a response to an Action frame carried in an AMPDU or S-MPDU, or PS-Poll frame in an S-MPDU."Management frame that solicits an Ack frame is also included in this context.Please change "Action frame" to "Management frame". | As in comment. | Revised. Agree in principle. See the instructions to the TGax editor in doc. 11-18/1851r2. |
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|  |  |  |  |  |  |

TGax Editor: Change texts under 9.3.1.8.7 in P802.11ax D3.2 as follows, while renumbering the NOTEs:

Insert a new subclause after 9.3.1.8.6:

##### 9.3.1.8.7 Multi-STA BlockAck variant

The Multi-STA BlockAck frame is supported if either UL MU or multi-TID A-MPDU operation is sup-ported and acknowledges MPDUs carried in an HE TB PPDU or multi-STA multi-TID, multi-STA single TID, or single-STA multi-TID A-MPDUs.

An HE AP that transmits a Multi-STA BlockAck frame with different values of the AID11 subfield in Per AID TID Info subfields 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 subfield or with the same values of the AID11 subfield in Per AID TID Info subfields sets the RA field to the address of the recipient STA that solicited the BlockAck frame. A non-AP HE STA(#15870) sets the RA field to the TA field of the soliciting frame or to the address of the recipient STA whose Data or Management frames are acknowledged.

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 as defined in Figure 9-46a (BA Information field format (Multi-STA BlockAck)).

|  |  |
| --- | --- |
|  | Repeated for each <AID, TID> tuple |
|  | Per AID TID Info |
| Octets: | variable |

**Figure 9-46a—BA Information field format (Multi-STA BlockAck)**

If the AID11 subfield of the AID TID Info subfield is not 2045, then the Per AID TID Info subfield has the format shown in Figure 9-46b (Per AID TID Info subfield format if 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 |

**Figure 9-46b—Per AID TID Info subfield format if the AID11 subfield is not 2045**

If the AID11 subfield of the AID TID Info subfield is 2045, then the Per AID TID Info subfield has the format shown in Figure 9-46c (Per AID TID Info subfield format if the AID11 subfield is 2045), where the RA subfield indicates the MAC address of an unassociated STA for which the Per AID TID Info subfield is intended.

NOTE X—An originator STA not supporting the OFDMA random access procedure and associated with an AP is also required to ignore 10 octets following the AID TID Info subfield as the remainder of the Per AID TID Info subfield when the AID11 subfield is 2045.(#16379,#16391)

|  |  |  |  |
| --- | --- | --- | --- |
|  | AID TID Info | Reserved | RA |
| Octets: | 2 | 4 | 6 |

**Figure 9-46c—Per AID TID Info subfield format if the AID11 subfield is 2045**

The AID TID Info subfield is shown in Figure 9-46d (AID TID Info subfield format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B10 | B11 | B12 | B15 |
|  | AID11 | Ack Type | TID |
| Bits: | 11 | 1 | 4 |

**Figure 9-46d—AID TID Info subfield format**

The AID11 subfield carries the 11 LSBs of the AID of the non-AP STA for which the Per AID TID Info subfield is intended. If the Multi-STA BlockAck frame is sent to(#16334) an AP, the AID11 subfield is set to 0. A value equal to 2045 in the AID11 subfield is used as a unique identifier for any unassociated STA. If the AID11 subfield is set to 2045, then the Ack Type subfield and TID subfield are set to 0 and 15, respectively.

NOTE 1—More than one Per AID TID Info subfield with the same value in the AID11 subfield but different values in the TID subfield can be present in the Multi-STA BlockAck frame.

If the AID11 subfield is not 2045, then the context and the presence of each optional subfield in a Per AID TID Info subfield in a Multi-STA BlockAck frame is(#16092) defined in Table 9-30b (Context of the Per AID TID Info subfield and presence of optional subfields if the AID11 subfield is not 2045).

**Table 9-30b—Context of the Per AID TID Info subfield and presence of optional subfields if the AID11 subfield is not 2045**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ack Type subfield values** | **TID subfield values** | **Presence of Block Ack Starting Sequence Control subfield and Block Ack Bitmap subfields** | **Context of a Per AID TID Info subfield in a Multi-STA BlockAck frame** |
| 0 | 0–7 | Present | Block acknowledgment context:Sent as an acknowledgment(#16092) to QoS Data frames that solicit a BlockAck frame response(#16359) or to a BlockAckReq frame. |
| 1 | 0–7 | Not present | Acknowledgment context:Sent as an acknowledgment(#16092) to an QoS Data or QoS Null frame that solicits an Ack frame response. |
| 0 or 1 | 8–13 | N/A | Reserved |
| 0 | 14 |  N/A | Reserved |
| 1 | 14 | Not present | All ack context(#16049):Sent as an acknowledgment(#16092) to an A-MPDU or multi-TID A-MPDU that solicits an immediate response and all MPDUs contained in the A-MPDU or multi-TID A-MPDU are received successfully. |
| 0 | 15 | N/A | Reserved |
| 1 | 15 | Not present | Management frame/PS-Poll acknowledgment context:Sent as an acknowledgment(#16092) to a Management(#16202, #17043) frame carried in an A-MPDU or S-MPDU, or PS-Poll frame in an S-MPDU. |
| NOTE—Additional rules for acknowledgment, block acknowledgment and all ack(#16049) are defined in 27.4.2 (Acknowledgment context in a Multi-STA BlockAck frame) for a multi-TID A-MPDU. |

(#16092)(#16093)(#16092)

(#16092)

If the Ack Type subfield is 0, the Fragment Number subfield encoding indicates the length of the BlockAck bitmap subfield as defined in Table 9-30c (Fragment Number subfield encoding for the Multi-STA BlockAck variant).

**Table 9-30c—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 | 64 |
| 0 | 1 | 0 | 16 | 128 |
| 0 | 2 | 0 | 32 | 256 |
| 0 | 3 | 0 | 4 | 32 |
| 0 | 0 | 1 | ON | 8 | 16 |
| 0 | 1 | 1 | 16 | 32 |
| 0 | 2 | 1 | 32 | 64 |
| 0 | 3 | 1 | 4 | 8 |
| 1 | Any | Any |  | Reserved | Reserved |
| NOTE—A Multi-STA BlockAck frame with B0 of the Fragment Number subfield set to 1 can only be sent to an HE STA whose Fragmentation Support subfield(#16339) in the HE Capabilities element it transmits is 3 (see 27.3 (Fragmentation and defragmentation)). |

If B0 of the Fragment Number subfield of the Block Ack Starting Sequence Control subfield is 0, the BA Information field of the Multi-STA BlockAck frame contains an 8-octet, 16-octet, 32-octet or 4-octet BlockAck Bitmap subfield depending on B2-B1 of the Fragment Number subfield as defined in Table 9-30c (Fragment Number subfield encoding for the Multi-STA BlockAck variant) indicating the receive status of up to 64, 128, 256 or 32 MSDUs (or fragments thereof) and/or A-MSDUs (or fragments thereof), respectively. 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 fragment thereof) or A-MSDU (or fragment thereof)(#15871) with the sequence number that matches the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield.

If 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 BlockAck frame indicates the receive status of up to 16, 32, 64 or 8 MSDUs and/or A-MSDUs depending on B2-B1 of the Fragment Number subfield as shown in Table 9-30c (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 opera-tions on the sequence numbers are performed modulo 4096. If bit position *n* of the Block Ack Bitmap sub-field is 0, it indicates that the MPDU has not been received.

NOTE 2—If 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 or A-MSDUs as indicated inTable 9-30c (Fragment Number subfield encoding for the Multi-STA BlockAck variant). For an A-MSDU, only the first bit of the subbitmap is used, if(#15208) fragmentation is not allowed in an A-MSDU.

TGax Editor: Add the following paragraph at the end of 27.4.5 in P802.11ax D3.2:

Whenever a non-AP HE STA responds with a Multi-STA BlockAck frame in response to a Compressed BlockAckReq frame, Multi-TID BlockAckReq frame, MU-BAR Trigger frame, or GCR MU-BAR Trigger frame, the Ack Type subfield of the Multi-STA BlockAck frame shall be set to 0.(#16093)

TGax Editor: Change the following two paragraphs at the end of 27.4.2 in P802.11ax D3.2:

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

a) All ack context(#16049): if the originator had set the All Ack Support subfield in the HE Capabilities element to 1, 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 carried in the eliciting A-MPDU or multi-TID AMPDU. 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 addressed to an originator in the Multi-STA BlockAck frame. The recipient determines that all the MPDUs carried in the eliciting A-MPDU are received if all the MPDUs that precede the first MPDU delimiter with EOF equal to 1 and MPDU Length field equal to 0 are received.(#16374)

…

Upon reception of the Multi-STA BlockAck frame the originator shall examine each Per AID TID Info field and shall perform the following operations(#16371):

— If the AID subfield is 0 for an AP originator or the non-AP STA’s AID for a non-AP STA originator, the Ack Type field is 0, and the TID field is less than 8 then the BlockAck Starting Sequence Control, TID and BA Bitmap fields of the Per AID TID Info field are processed according to 10.24.7 (HT-immediate block ack mechanism), 27.3 (Fragmentation and defragmentation), and as defined below.(#16371)

— If the AID subfield is 2045, the Ack Type field is 0, and the TID field is 15, then the Per AID TID Info field indicates the acknowledgment of a single Management frame sent by the unassociated STA as defined by the acknowledgment context.(#16371)

— If the AID subfield is 0 for an AP originator or the non-AP STA’s AID for a non-AP STA originator, 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 indicates the acknowledgment of an EOF-MPDU that is a QoS Data frame identified by the value of the TID, a Management frame or a PS-Poll frame.(#16371)

— If the AID subfield is 0 for an AP originator or the non-AP STA’s AID for a non-AP STA originator, the Ack Type field is 1, and the TID subfield of AID TID Info field is 14, then the Per AID TID Info field indicates the acknowledgment of all MPDUs carried in the eliciting A-MPDU as defined by the acknowledgment context.(#16371)