IEEE P802.11
Wireless LANs

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| LB225 CR for Subclause 27.3.3-Part 1 |
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Abstract

This submission proposes resolutions of comments received from TGax LB225. (The proposed change is based on TGax Draft 1.0.)

* Part 1: 5928 3302 8158 8535 8544 7539 8545 9118 8546 8160 7544 5802 (12 CIDs)

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Minor change.

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** | **Clause** | **Page No.** | **Comment** | **Proposed Change** | **Resolution** |
| 5928 | 27.3.3.4 | 154.36 | Level 3 Dynamic fragmentation use is allowed under many constraints such as HT immediate ack and AMPDU sequence number range. The extra L3 Frag negotiation needed increases overhead. However, the usage scenarios and potential gain are not clear. | Provide the level 3 dynamic fragmentation usage scenarios and justify benefit/gain worthy of the complexity. Otherwise, suggest to remove level 3 dynamic fragmenation. | RevisedThe extra L3 Fra negotiation is not needed, so it will be removed. Instead, use the value of 3 for the HE Fragmentation Operation subfield in the ADDBA request frames to initiate Block Ack setup under fragmentation level 3 as level 2 and level 1.the Frag Level 3 can make multiple fragments of an MSDU included in the same A-MPDU, reducing the fragments transmission delay.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 3302 | 27.3.3.4 | 154.39 | The "L3 Frag BA Request frame", "L3 Frag BA Response" and "BA Response frame" are not defined and ambiguous. There are no figures, tables, text or timing flow between Requests and Responses. | Define "L3 Frag BA Request frame" and "L3 Frag BA Response", BA Response frames, add figures, tables and describe a procedure for L3 dynamic fragmentation. | RevisedThe L3 Frag BA request/Response frames were defined the subsection 9.6.5.1. Now, it will be moved to the the ADDBA Extension element.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 8158 | 27.3.3.4 | 154.39 | L3 frag BA request/ response indications are located in block ack action field (see page 99, line 1) , however Level 2 and Level 1 operation subfields are located in ADDBA extension element (see page 68, line 37) | suggest to remove the HE fragmentation operation subfield in the ADDBA capabilities field, and then put level 1 and level 2 indications into the block ack action field. | RevisedTo keep consistent description for all fragmentation levels, the L3 Frag BA request/Response indications are moved to the ADDBA Extension element.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 8535 | 273.3.4 | 154.39 | Level 3 fragmentation offers no benefit over level 2 fragmentation in terms of packing efficiency and, in fact, reduces performance since it reduces the available block ack window size. | Remove the level 3 fragmentation feature or replace it with a scheme that has better performance. A scheme with better performance is the following: Assign sequence numbers to MPDUs (not MSDUs). Add a start of MSDU (SOM) flag and end of MSDU flag (EOM) to the MPDU header (the Fragment Number field bits could be reused). The block ack window size would thus not be reduced to accommodate the fragment numbering. Multiple fragments of an MSDU could be included in the same A-MPDU. | RejectedThe proposed scheme has limited benefit but much more complexity, and meets the coexistence problem with the existing fragmentation schemes. However, the Frag Level 3 also can make multiple fragments of an MSDU included in the same A-MPDU, reducing the fragments transmission delay. |
| 8544 | 27.3.3.4 | 154.39 | Instead of defining new Action frames (L3 Frag BA Request/Response) for block ack setup for L3 fragmentation, it is more efficient to reuse the HE Fragmentation Operation subfield to indicate L3 fragmentation as well. | use the value of 3 for the HE Fragmentation Operation subfield in the ADDBA request frames to initiate Block Ack setup under fragmentation level 3. | AcceptedTGax editor please make the changes as shown in 11-17/0689 r1 |
| 7539 | 27.3.3.4 | 154.41 | The level 3 dynamic fragmentation currently has its own BA action frame for BA agreement negotiation, unlike level 1 and 2 that uses ADDBA extention of the existing BA action frame. It should be consolidated using the same mechanism as in level 1 and 2 | Revise the description and ADDBA extension to include level-3 negotiation | RevisedAgree with the commenter in principle. Add the description of Frag Level 3 negotiation to the ADDBA extention element and delete the the corresponding description in the subsection 9.6.5.1.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 8545 | 27.3.3.4 | 154.41 | Instead of defining new Action frames (L3 Frag BA Request/Response) for block ack setup for L3 fragmentation, it is more efficient to reuse the HE Fragmentation Operation subfield to indicate L3 fragmentation as well. | use the value of 3 for the HE Fragmentation Operation subfield in the ADDBA response frames to accept Block Ack setup under fragmentation level 3. | AcceptedIt is a duplicate one of CID 8544.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 9188 | 27.3.3.4 | 154.42 | In "The receiver STA that accepts the HT-Immediate block ack session shall respond with an L3 Frag BA Response if it has allocatedresources for operating in a block ack session with level 3 fragmentation enabled", what does "allocated resources" mean? In general, allocated resource means frequency resource unit by trigger frame in this specification. However, "allocated resources" in that sentence doesn't look like frequency resource. It may be about hardware stuff. | Change to "The receiver STA that accepts the HT-Immediate block ack session shall respond with an L3 Frag BA Response if it can support operating in a block ack session with level 3 fragmentation enabled" | RevisedAgree with the comment in principle. Proposed resolution accounts for the suggested change.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 8546 | 27.3.3.4 | 154.46 | More detail is required for the block acknowledgment record used during L3 fragmentation. It is mentioned that the block acknowledgment record maintains "up to" 4 bits per MSDU. Does it mean that it is also possible to have fewer than 4 (e.g. only 2) bits per MSDU if the MSDU only contain 2 fragments? If this is the case, a separate table would be required to track the number of fragments present in each received MSDU. If this is the intended effect, please provide more detail on how the recipient maintains and updates the block acknowledgment record (and other tables if applicable) under L3 fragmentation. | Please clarify the meaning of "up to" 4 bits per MSDU. If the block acknowledgement record may maintain variable number of bits per MSDU, please provide more detail on how the recipient maintains and updates the block acknowledgment record (and other tables if applicable) under L3 fragmentation. | RevisedProvide the resolution to clarify the meaning of "up to 4 bits per MSDU”TGax editor please make the changes as shown in 11-17/0689 r1 |
| 8160 | 27.3.3.4 | 154.60 | Level 3 supports to fragment MMPDU, however, there is not description for MMPDU. Actually, it appeared in draft D0.3~D0.5 | add the following description at the end of this sentence: and up to one dynamic fragment of an MMPDUin an A-MPDU | RevisedThe description for A-MPDU fragments is not complete. Add “in an A-MPDU ” after “and up to four dynamic fragments of an A-MSDU for each A-MSDU”TGax editor please make the changes as shown in 11-17/0689 r1 |
| 7544 | 27.3.4.1 | 155.52 | The capability of rx fragmentation level is not necessarily the same as what level of fragmentation preferred to tx. There should be a requirement that in ADDBA response frame the value of HE Fragmentation Operation subfield should not be greater than the value of HE Fragmentation Operation subfield in the ADDBA Request frame | add 'The value of HE Fragmentation Operation subfield in ADDBA Response frame shall not be greater than the value of HE Fragmentation Operation subfield in the ADDBA Request frame | RevisedAgree with the comment in principle. Proposed resolution accounts for the suggested change.TGax editor please make the changes as shown in 11-17/0689 r1 |
| 5802 | 27.3.4.44 | 157.09 | The rule of dropping the dynamic fragments after receiving BAR needs to further clarified that it only apply to the fragments which have not yet fully assembled to become a complete MSDU, MMPDU, A-MPDU | Replace the text: "A recipient shall discard any fragments", with following text: "A recipient shall dicard any fragments which have not fully assembled as MSDU, A-MSDU, or MMPDU" | AcceptedTGax editor please make the changes as shown in 11-17/0689 r1 |

**Discussion: *…***

**TGax Editor*: Please insert a paragraph at the end of subsection 27.3.4.1 of 11ax Draft 1.0 (CID 7544):***

**27.3.4 Procedure at the recipient**

**27.3.4.1 General**

**…**

A HE STA shall set the value of HE Fragmentation Operation subfield in ADDBA Response frame less than or equal to the value of HE Fragmentation Operation subfield in the received ADDBA Request frame. (#7544)

**TGax Editor*: Please modify*** the ***subsection 27.3.3.4 of 11ax Draft 1.0 (CID 5982, 3302, 8158, 8544, 7539, 8545, 9118, 8546, 8160):***

**27.3.3.4 Level 3 dynamic fragmentation**

An originator STA may transmit fragmented MSDUs or A-MSDU if supported by the recipient under a block ack agreement or fragmented MMPDU to a recipient STA using level 3 dynamic fragmentation provided the following conditions are met:

— The HE Fragmentation Support field in the HE Capabilities element received from the STA is 3

— For the block ack agreement associated with the TID of the MSDU, the ADDBA Extension element is present and the HE Fragmentation Operation subfield is 3 in the ADDBA Response frame received from the STA. (#5982, 3302, 8158, 8544, 7539, 8545, 9118)

 (#8546)

The level 3 fragmentation allows multiple fragments of an MSDU included in the same A-MPDU, reducing the fragments transmission delay (#5982). In the level 3 fragmentation, the block acknowledgment record maintains 4 bits per MSDU (one bit for each fragment of the MSDU) if at least one MPDU's Fragment Number field is of nonzero value that solicits the immediate response in the received A-MPDU, otherwise 1 bit per MSDU (#8546).

An originator STA may transmit to a recipient STA, which has indicated a value 3 in the HE Fragmentation Support field of its HE Capabilities element, an MPDU, S-MPDU, or A-MPDU that contains:

— One dynamic fragment of an MSDU, A-MSDU if supported by the recipient, or MMPDU in an MPDU or S-MPDU

• The originator STA shall follow the rules defined in 10.13.8 (Transport of S-MPDUs) for generating the S-MPDU

— Up to four dynamic fragments of an MSDU for each MSDU and up to one dynamic fragment of an MMPDU in an A-MPDU, and up to four dynamic fragments of an A-MSDU for each A-MSDU in an A-MPDU (#8160) if supported by the recipient

• The originator STA shall set the Fragment Number subfield of each MPDU to a value less than 4

• The originator STA shall follow the rules defined in 10.24.7.7 (Originator’s behavior) for generating the A-MPDU with the exception that the A-MPDU shall contain MPDUs whose range of the Sequence Number subfields does not exceed BL/4, where BL is the length of the Block Ack Bitmap field of the BlockAck or Multi-STA BlockAck frame that corresponds to a TID of a transmitted fragment (see 10.24.7 (HT-immediate block ack extensions) and 27.4 (Block acknowledgement).

**TGax Editor*: Please modify*** the ***subsection 27.3.4.4 of 11ax Draft 1.0(CID 5982, 3302, 8158, 8544, 7539, 8545, 9118, 5802):***

**27.3.4.4 Level 3 dynamic fragmentation**

Upon reception of an MPDU or A-MPDU that carries one or more dynamic fragments, the recipient STA responds with one of the following frames:

— An Ack frame when the received fragment is contained in an MPDU or S-MPDU that solicits the immediate response. The recipient STA shall follow the rules defined in 10.3.2.9 (Ack procedure) for generating the Ack frame and the rules defined in 27.4 (Block acknowledgement) for generating the Multi-STA BlockAck frame that contains the acknowledgement for the soliciting S-MPDU carried in a Trigger-based PPDU.

— A BlockAck frame when the received fragments, one or more fragments for each MSDU or AMSDU, are contained in an A-MPDU where at least one MPDU's Fragment Number field is of nonzero value that solicits the immediate response(#5982, 3302, 8158, 8544, 7539, 8545, 9118). The recipient STA shall follow the rules in 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA) for generating the BlockAck frame, except that the STA shall:

• Set to 1 the LSB of the Fragment Number subfield in the Block Ack Starting Sequence Control subfield of the BlockAck frame or Multi-STA BlockAck frame that corresponds to a TID of a received fragment

• Set to 1 each bit in position B of the Block Ack Bitmap field that corresponds to a successfully received fragment and shall set it to 0 otherwise, with B calculated as:

B = 4× (SN – SSN) + FN, where the operations on the sequence numbers are performed module 4096

SN is the value of the Sequence Number subfield of an MPDU containing the fragment for which the receive status is indicated

SSN is the value of the Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield of the BlockAck frame

• Update the corresponding block ack record only when an MSDU or A-MSDU that is received in fragments is successfully reconstructed (see 10.6 (Defragmentation)). Otherwise it shall not update the block ack record for that MSDU.

The recipient STA shall discard any fragments which have not fully assembled as MSDU, A-MSDU, or MMPDU (#5802) that have been received during an HT-immediate BA session for a TID if it receives a BlockAckReq frame from the originator STA for that TID when the fragments have a Sequence Number field value that is less than the value of the Starting Sequence Number field of the BlockAckReq frame (where the comparison of the two values is performed modulo 4096).

**TGax Editor*: Please modify*** the ***subsection 9.4.2.139 of 11ax Draft 1.0 (CID 5982, 3302, 8158, 8544, 7539, 8545):***

* ADDBA Extension element (11ad)

***Change Figure 9-531 (ADDBA Capabilities field format) as follows:***

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 | B1 B2 | B3 B7 |
|  | No-Fragmentation | HE fragmentation operation | Reserved |
| Bits: | 1 | 2 | 7 |
| * ADDBA Capabilities field format
 |

***Change the last paragraph as follows:***

The No-Fragmentation subfield determines whether a fragmented MSDU can be carried in the MPDU sent under the block ack agreement. When this subfield set to 1 in the ADDBA Request frame, it indicates that the non-HE originator is not fragmenting sent MSDUs. When this subfield set to 1 in the ADDBA Response frame, it indicates that the non-HE recipient is not capable of receiving fragmented MSDUs. The NoFragmentation subfield is reserved when transmitted by an HE STA.

***Insert the following as the new last paragraph:***

The HE fragmentation Operation subfield is reserved when transmitted by a non-HE STA. The HE fragmentation operation subfield when transmitted by an HE STA indicates the level of dynamic fragmentation that is supported as a recipient for the TID which is defined in the ADDBA frame as follows:

— A value of 0 in the ADDBA Request frame indicates that the originator does not intend to send fragmented MSDUs or A-MSDU if supported by the recipient (#5982, 3302, 8158, 8544, 7539, 8545) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame.

— When this subfield set to 1 in the ADDBA Request frame, it indicates that the originator intends to send fragmented MSDUs or A-MSDU if supported by the recipient (#5982, 3302, 8158, 8544, 7539, 8545) under fragmentation level 1 (see 27.3.3.2 (Level 1 dynamic fragmentation)) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame.

— When this subfield set to 2 in the ADDBA Request frame, it indicates that the originator intends to send fragmented MSDUs or A-MSDU if supported by the recipient (#5982, 3302, 8158, 8544, 7539, 8545) under fragmentation level 2 (see 27.3.3.3 (Level 2 dynamic fragmentation)) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame.

— When this subfield set to 3 in the ADDBA Request frame, it indicates that the originator intends to send fragmented MSDUs or A-MSDU if supported by the recipient under fragmentation level 3 (see 27.3.3.4 (Level 3 dynamic fragmentation)) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame. (#5982, 3302, 8158, 8544, 7539, 8545)

— When this subfield set to 0 in the ADDBA Response frame, it indicates that the recipient is not capable of receiving fragmented MSDUs or A-MSDU if supported by the recipient (#5982, 3302, 8158, 8544, 7539, 8545) for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame.

— When this subfield set to 1 in the ADDBA Response frame, it indicates that the recipient is capable of receiving fragmented MSDUs or A-MSDU if supported by the recipient (#5982, 3302, 8158, 8544, 7539, 8545) under fragmentation level 1 only for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame.

— When this subfield set to 2 in the ADDBA Response frame, it indicates that the recipient is capable of receiving fragmented MSDUs or A-MSDU if supported by the recipient (#5982, 3302, 8158, 8544, 7539, 8545) under fragmentation levels 1 and 2 for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame.

— When this subfield set to 3 in the ADDBA Response frame, it indicates that the recipient is capable of receiving fragmented MSDUs or A-MSDU if supported by the recipient under fragmentation levels 1, 2 and 3 for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame. (#5982, 3302, 8158, 8544, 7539, 8545)

**TGax Editor*: Please modify*** the ***subsection 9.6.5.1 of 11ax Draft 1.0 (CID 5982, 3302, 8158, 8544, 7539, 8545):***

**9.6.5 Block Ack Action frame details**

**9.6.5.1 General**

***Change Table 9-302 (Block Ack Action field values) as follows:***

|  |
| --- |
| Table 9-302 Block Ack Action field values  |
| **Block Ack Action field values** | **Meaning** |
| 0 | ADDBA Request |
| 1 | ADDBA Response |
| 2 | DELBA |
|  | (#5982, 3302, 8158, 8544, 7539, 8545) |
|  | (#5982,3302, 8158, 8544, 7539, 8545) |
|  | (#5982,3302, 8158, 8544, 7539, 8545) |
| 6–127 (#3130) | Reserved  |
| … | … |

**TGax Editor*: Please modify*** the ***subsection 9.3.1.9.3 of 11ax Draft 1.0 (CID 8546):***

**9.3.1.9.3 Compressed BlockAck variant**

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 (#8546) 4 fragments of each of the MSDUs as indicated in Table 9-24a (Fragment Number subfield encoding for the Compressed BlockAck variant). For an A-