### IEEE P802.11Wireless LANs

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| 11ax D2.0 MAC Comment Resolution for Dynamic Fragmentation Coexistence |
| Date: 2018-05-02 |
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Abstract

This submission proposes resolutions for comments of TGax Draft 2.0 with the following CID:

**12010,**

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Add discussion text
* Rev 2: Discussion text update

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 D2.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D2.0 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** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 12010 | James Yee | 231.45 | 27.3.2.4 | Limit the fragmentation support to either level 1/2 or level 1/3 does not fully utilize the potential efficiency improvement of dynamic fragmentation. Enabling level 3 dynamic fragmentation should also be allowed to use level 2 fragmentation for better bitmap utilization. | Please provide a mechanism enabling coexistence of level 2/3 dynamic fragmentation.  | Revised.Agree with the comment. Proposed resolution allows coexistence of level 2 and 3 dynamic fragmentation.TGax editor to make the changes shown in 11-18/0811r2 under all headings that include CID 12010. |

**Discussion:**

* **Current specs. allows a receiver to send BA corresponding to L3 or non-L3 dynamic fragments, but on the transmitter side, while negotiating at L3 dynamic fragmentation, the transmitter cannot use L2 dynamic fragmentation**
	+ **BA session teardown and re-negotiation are required to change the fragmentation level**
* **Is it possible to have implicit indication under current specs.?**
	+ **MPDU may be erroneous at the receiver**
	+ **By receiving status of SN range and number of fragments of MSDU,**
		- If received SN range > BL/4, L2 is applied (TRUE)
		- If received SN range <= BL/4, L3 is applied (NOT ALWAYS TRUE, some fragments may be lost)
		- If received >1 fragments of any SN, L3 is applied (TRUE)
		- If received <=1 fragments of all SNs, L2 is applied (NOT ALWAYS TRUE, some fragments may be lost))
* **Explict indication is required while sending L2 fragmenation with negotiated L3 fragmentation**
	+ During the BA negotiation stage: Add an indication to show the capability to transmit/receive L2 in ADDBA request/respond frame under L3 negotiation
	+ MPDU need carrying an indication showing the level of fragmentation (2 or 3):
	+ Proposed design, under L3 negotiation
		- L3 is used if
			* no indication is carried in the MPDU **or**
			* an indication is carried in the MPDU and is set to indicate using L3
		- L2 is used if an indication is carried in the MPDU and is set to indicate using L2

**Propose:**

***TGax editor: Modify “9.4.2.139 ADDBA Extension element” as the following:***

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1                      B2 | B3 | ~~B1~~B4 B7 |
|  | No-Fragmentation | HE Fragmentation Operation | L3 Fragmenation Extension Support (#12010) | Reserved |
| Bits: | 1 | 2 | 3 | ~~7~~ 4 |
|  | * ADDBA Capabilities field format
 |

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

The HE Fragmentation Operation subfield(#6347) and the L3 Fragmenation Extension Support subfield are ~~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 under negotiation for the TID which is defined in the ADDBA frame as defined in Table 9-242a (HE Fragmentation Operation subfield).

|  |
| --- |
| * HE Fragmentation Operation subfield
 |
| Value | Meaning in ADDBA Request frame | Meaning in ADDBA Response frame |
| 0 | The originator does not intend to send fragmented MSDUs or A-MSDUs (if supported by the transmitter) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame. | The recipient does not support the reception of fragmented MSDUs or A-MSDUs for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame. |
| 1 | The originator intends to send fragmented MSDUs or A-MSDU (if supported by the transmitter) under fragmentation level 1 (see 27.3.2.2 (Level 1 dynamic fragmentation)) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame. | The recipient supports the reception of fragmented MSDUs or A-MSDU (if supported) defined in 27.3.2.2 under a block ack agreement ~~under fragmentation level 1~~ only for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame. |
| 2 | The originator intends to send fragmented MSDUs or A-MSDUs (if supported by the transmitter) under fragmentation level 2 (see 27.3.2.3 (Level 2 dynamic fragmentation)) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame. | The recipient supports the reception of fragmented MSDUs or A-MSDU (if supported) defined in 27.3.2.3 under a block ack agreement ~~under fragmentation levels 1 and 2~~ for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame. |
| 3 | The originator intends to send fragmented MSDUs or A-MSDUs (if supported by the transmitter) under fragmentation level 3 (see 27.3.2.4 (Level 3 dynamic fragmentation)) for the TID specified in the Block Ack Parameter Set field of the ADDBA Request frame. | ~~The recipient supports the reception of fragmented MSDUs or A-MSDU (if supported) under fragmentation levels 1, 2 and 3 for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame.~~If L3 Fragmenation Extension Support subfield is set 0, the recipient supports the reception of fragmented MSDUs or A-MSDU (if supported) defined in 27.3.2.4.1 under a block ack agreement for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame.If L3 Fragmenation Extension Support subfield is set 1, the recipient supports the reception of fragmented MSDUs or A-MSDU (if supported) defined both in 27.3.2.4.1 and 27.3.2.4.2 under a block ack agreement for the TID specified in the Block Ack Parameter Set field of the ADDBA Response frame. (#12010) |

When set to 1, the L3 Fragmenation Extension Support subfield in the ADDBA Response frame indicates the HE STA is capble of receiving A-MPDU containing MPDUs whose range of the Sequence Number subfields being equal to or smaller than the length of the Block Ack Bitmap field of the Compressed BlockAck or Multi-STA BlockAck frame that corresponds to a TID under level 3 dynamic fragmentation and up to one fragment per sequence number. Otherwise, the L3 Fragmenation Extension Support subfield is set to 0.

The L3 Fragmenation Extension Support subfield in the ADDBA Request frame is reserved. (#12010)

***TGax editor: Modify “9.2.4.6a.7 CAS Control” as the following:***

Change Figure9-15j as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | ~~B3~~ B4           B7 |
|  | AC Constraint | RDG/More PPDU | SR PPDU Indication | L3 Fragmentation Extension (#12010) | Reserved |
| Bits: | 1 | 1(#3156) | 1(#3156) | 1(#3156) | ~~5~~ ~~4~~ |
|  | * Control Information subfield format when the Control ID subfield is 6(#9811)
 |

***Add the paragraph as follows to the end of 9.2.4.6.4.8 :***

The L3 Fragmentation Extension subfield indicates whether the MPDU carrying the CAS Control subfield uses level 3 dynamic fragmentation extension. For a TID negotiated with both level 3 dynamic fragmentation and level 3 dynamic fragmentation extension at the recipient, the L3 Fragmentation Extension subfield is set to 1 if inside a PPDU, MPDUs belong to the TID are sent with level 3 dynamic fragmentation extension. Otherwise, the subfield is set to 0. This subfield is reserved if the TID of the MPDU is not negotiated with level 3 dynamic fragmentation.(#12010)

***TGax editor: Modify “27.3.2.4 Level 3 dynamic fragmentation” as the following:***

…

The level 3 fragmentation allows multiple fragments of an MSDU or A-MSDU included in the same A-MPDU, reducing the fragments’ transmission delay. ~~In the level 3 fragmentation, the block acknowledgment record maintains 4 bits per MSDU or A-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 or A-MSDU.~~

~~An originator STA may transmit to a recipient STA the following:~~

* ~~One dynamic fragment of an MSDU, A-MSDU (if supported by the recipient), or MMPDU in an MPDU that is not in an A-MPDU or S-MPDU using level 1 dynamic fragmentation.~~
* ~~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 or A-MSDU (if supported by the recipient) for each MSDU or A-MSDU, and up to one dynamic fragment of an MMPDU in an A-MPDU, where the A-MPDU contains at least one dynamic fragment using level 3 dynamic fragmentation under block ack agreement.~~
* ~~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~~ *~~B~~~~L~~*~~/4, where~~ *~~B~~~~L~~* ~~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 ).~~

27.3.2.4.1 Basic level 3 dynamic fragmentation (#12010)

An originator STA may transmit to a recipient STA the following: (#Ed) (#Ed)

* One dynamic fragment of an MSDU, A-MSDU (if supported by the recipient), or MMPDU in an MPDU that is not in an A-MPDU or S-MPDU using level 1 dynamic fragmentation.
* The originator STA shall follow the rules defined in 10.13.8 (Transport of S-MPDUs) for generating the S-MPDU. (#5473)
* Up to four dynamic fragments of an MSDU or A-MSDU (if supported by the recipient)(#12469) for each MSDU or A-MSDU, and up to one dynamic fragment of an MMPDU in an A-MPDU, where the A-MPDU contains at least one dynamic fragmentusing level 3 dynamic fragmentation under block ack agreement.
* The originator STA shall set the Fragment Number subfield of each MPDU to a value less than 4.
* **If the dynamic fragments carry CAS A-control subfield, the L3 Fragmentation Extension subfiled is set to 0.** (#12010)
* 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 ).

27.3.2.4.2 Level 3 dynamic fragmentation extension (#12010)

Using level 3 dynamic fragmentation and if the block ack agreement associated with the TID of the MSDU or A-MSDU, **the L3 Fragmentation Extension Support subfield is set to 1 in the ADDBA Response frame received from the STA,** an originator STA may transmit to a recipient STA the following: (#Ed) (#Ed)

* Up to one dynamic fragment of an MSDU or A-MSDU if supported by the recipient for each MSDU or A-MSDU and up to one dynamic fragment of an MMPDU in an A-MPDU format where the A-MPDU contains at least one dynamic fragment using level 3 dynamic fragmentation under block ack agreement.**(#5473, #8447)**
* **The dynamic fragments shall carry CAS A-control subfield in which the L3 Fragmentation Extension subfiled is set to 1.**
* The originator STA (#8446)follows the rules defined in 10.24.7.7 (Originator’s behavior) for generating the A-MPDU and the rules defined in for generating the multi-TID A-MPDU (that can contain the fragment of the MMPDU).

***TGax editor: Modify “27.3.3.4 Level 3 dynamic defragmentation” as the following:***

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 (HE block acknowledgement procedure) for generating the Multi-STA BlockAck frame that contains the acknowledgement for the soliciting S-MPDU carried in an HE TB PPDU or ack-enabled multi-TID A-MPDU(#7540, #7541).
* A BlockAck frame when the received fragments, one or more fragments for each MSDU or A-MSDU, are contained in an A-MPDU where at least one MPDU's Fragment Number field is of non-zero value that solicits the immediate response(#5928, #3302, #8158, #8544, #7539, #8545, #9118) **or when the received fragment from each MSDU or A-MSDU carries CAS A-control field in which the L3 Fragmentation Extension subfiled is set to 0**(#12010). 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 modulo(#9117) 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 *FN* is the value in the Fragment Number subfield(#9116)
* 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.
* A BlockAck frame when the received fragment of each MSDU or A-MSDU contained in **an A-MPDU carries CAS A-control field in which the L3 Fragmentation Extension Used subfiled is set to 1**. The recipient STA shall follow the rules defined in 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA) for generating the BlockAck frame and the rules in for generating the Multi-STA BlockAck frame, except that the STA shall:
* Set to 0 the LSB of the Fragment Number subfield in the Block Ack Starting Sequence Control subfield of the Compressed BlockAck frame or Multi-STA BlockAck frame that corresponds to a TID of a received fragment
* Set to 1 each bit of the Block Ack Bitmap field that corresponds to a Sequence Number subfield and TID subfield of a successfully received fragment contained in the soliciting A-MPDU or multi-TID A-MPDU
* 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, do not update the block ack record for that MSDU or A-MSDU. (#12010)