IEEE P802.11
Wireless LANs

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| EDMG A-MPDU with multiple TID comment resolution |
| Date: 2018-01-16 |
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Resolution of CIDs 1956, 2272 is presented

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 1956 | 197.10 | 10.63 | Presented definition does not cover several cases. Two capabilities EDMG Multi-TID Aggregation Support subfield and EDMG Multi-TID BlockAck Support subfield introduces excessive complexity. Relevant normative behavior is also not defined. Propose to keep single capability to be aligned with TGax flow and fix the normative behavior text. | Proposed changes are presented in separate submission |

Proposal: **Revised**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2272 | 119.37 | 10.24.6 | There is a recipient requirement that no more than 256 bytes for all the bitmaps, There should also be a originator requirement to limit the number of TIDs | Add a originator requirement "The originator shall not aggregate data frames from different TIDs which requires more than 256 bytes for all the BlockAck Bitmap subfields in an EDMG multi-TID BlockAck frame" |

Proposal: **Revised**

*Discussion: Besides of .11ay support of multi-TID A-MPDU is presented in HT networks as part of PSMP feature and in the new established HE (802.11ax) networks. A flow to support the single STA multi-TID A-MPDU of .11ax and .11ay does not require substantial differences. Removal of EDMG Multi-TID BlockAck Support subfield and keeping only the EDMG Multi-TID Aggregation Support subfield makes the flows very similar that allows reuse of the implementations. Other changes are mostly to share the normative rules between subclauses 10.24.6 and 10.63 to keep the subclauses aligned with the relevant content.*

*The proposed flow is compliant with IEEE P802.11ax/D2.0.*

**9.3.1.9.8 EDMG Multi-TID BlockAck variant**

*Editor, change the text as presented below*

*P35L9*

The BlockAck Bitmap Subfield Length is an integer in the range 0 – 4 that indicates the number of octets of the BlockAck bitmap in the BA Information field. The bitmap length is equal to 2(3+ BlockAck Bitmap Subfield Length). as negotiated during the Block Ack establishment (10.24) of the TID indicated in the TID subfield of thePer-TID Info subfield.

**9.4.2.250.6 MAC Capability field**

*Editor, change the text as presented below*

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 B7 |
|  | EDMG Multi-TID Aggregation Support | EDMG All Ack Support | Reserved |
| Bits: | 4 | 1 | 3 |

**Figure 39 – EDMG Multi-TID capability subfield format**

The EDMG Multi-TID Aggregation Support subfield contains the number of TIDs minus one of QoS Data frames that the STA is able to receive or aggregate in a multi-TID A-MPDU as described in 10.63. A value of zero indicates that the STA does not support EDMG multi-TID aggregation.

The EDMG All ACK Support subfield indicates support for the reception of a Multi-TID BlockAck frame under the all ack context when AckType subfield value is 11 (10.63.2 Acknowledgement context in a Multi-TID BlockAck frame). The EDMG All ACK Support subfield is set to 1 if the reception of a Multi-TID BlockAck frame under the all ack context is supported and is set to 0 otherwise.

**10.24.6 Selection of BlockAck and BlockAckReq variants**

*Editor, change the text as presented below*

An EDMG STA that indicates 0 in the EDMG Multi-TID Aggregation Support subfield shall not initiate transmission of Multi-TID BlockAckReq variant.

An EDMG STA shall not initiate transmission of Multi-TID BlockAckReq variant to another STA that indicates 0 in the EDMG Multi-TID Aggregation Support subfield

An EDMG STA that indicates non-zero value in the EDMG Multi-TID Aggregation Support subfield shall respond with EDMG Multi-TID BlockAck variant to Multi-TID BlockAckReq variant.

An EDMG STA that indicates non-zero value in the EDMG Multi-TID Aggregation Support subfield shall respond with EDMG Multi-TID BlockAck variant to A-MPDU that contain MPDUs of different TIDs and Ack policy equal to Normal Ack.

An EDMG Multi-TID BlockAck frame shall not include more than one BA Information field for a specific TID/TSID.

**10.63 EDMG A-MPDU with multiple TIDs**

*Editor, implement as presented below*

**10.63.1 General**

An EDMG STA with dot11AMPDUwithMultipleTIDOptionImplemented equal to true shall set the EDMG Multi-TID Aggregation Support subfield in the MAC Capability field in the EDMG Capabilities element it transmits to a nonzero value. An EDMG STA with dot11AMPDUwithMultipleTIDOptionImplemented equal to false shall set the Multi-TID Aggregation Support subfield of the EDMG Capabilities element it transmits to 0.

A first EDMG STA may transmit a multi-TID A-MPDU to a second EDMG STA if the first EDMG STA has received from the second STA an EDMG Capabilities element where the EDMG Multi-TID Aggregation Support subfield is nonzero. Otherwise the first EDMG STA shall not transmit a multi-TID A-MPDU to the second EDMG STA.

An EDMG STA shall construct a multi-TID A-MPDU as defined in 9.7 (Aggregate MPDU (A-MPDU)) and 10.13 (A-MPDU operation)

Sum of Block Ack bitmap fields negotiated as defined in 10.24.2 (Setup and modification of the block ack parameters) of all Block Ack agreements identified by TIDs to be included in the Multi-TID A-MPDUs shall be less or equal to 2048.

An EDMG STA may aggregate in a multi-TID A-MPDU QoS Data frames with multiple TIDs as defined in Table 9-425 (A-MPDU contents in the data enabled immediate response context) or Table 9-426 (A-MPDU contents in the data enabled no immediate response context).

An EDMG STA may aggregate MPDUs from any TIDs in multi-TID A-MPDU for transmission in SP.

A multi-TID A-MPDU shall not be transmitted in TXOP, except when the TXOP limit is not zero for the AC that is used to gain access to the medium. This AC is defined as the primary AC. When TXOP limit is not zero then the STA may aggregate QoS Data frames from one or more TIDs in the A-MPDU under the following conditions:

* The A-MPDU is transmitted by STA within the obtained TXOP
* The A-MPDU shall contain one or more MPDUs with any of the TIDs that correspond to the primary AC
* When no more MPDUs can be aggregated in the A-MPDU from any of the TIDs that correspond to the primary AC then the A-MPDU may additionally contain one or more MPDUs with TIDs that do not correspond to the primary AC if the TIDs correspond to any AC that has a higher priority with respect to the primary AC and the addition of these MPDUs does not cause the STA to exceed the current TXOP duration

The Multi-TID BlockAck frame shall be used to acknowledge the MPDUs in a multi-TID A-MPDU. The rules for Multi-TID BlockAck are defined in subclause 10.24.6 Selection of BlockAck and BlockAckReq variants.

A multi-TID A-MPDU frame transmitted in an EDMG SU PPDU may contain an MPDU or EDMG single MPDU that solicits an immediate acknowledgment of any TID.

When multi-TID A-MPDU frame is sent in response to MPDU with RD Grant set to one and the AC constraint set to one as per 10.28.3 (Rules for RD initiator) the lowest priority AC indicated in the frame that solicited the A-MPDU is defined as the primary AC. An EDMG STA with dot11AMPDUwithMultipleTIDOptionImplemented set to true may transmit multi-TID A-MPDU and aggregate QoS Data frames from one or more TIDs in the A-MPDU under the following conditions:

* The A-MPDU is transmitted by STA within the TXOP or SP the A-MPDU is solicited
* The A-MPDU shall contain one or more MPDUs with any of the TIDs that correspond to the primary AC
* When no more MPDUs can be aggregated in the A-MPDU from any of the TIDs that correspond to the primary AC then the A-MPDU may additionally contain one or more MPDUs with TIDs that do not correspond to the primary AC if the TIDs correspond to any AC that has a higher priority with respect to the primary AC and the addition of these MPDUs does not cause the STA to exceed the current TXOP or SP duration.

When multi-TID A-MPDU frame is sent in SP in response to MPDU with RD Grant set to one and the AC constraint set to zero as per 10.28.3 (Rules for RD initiator) an EDMG STA may aggregate MPDUs from any TIDs in the multi-TID A-MPDU for transmission in the SP. Transmission of the multi-TID A-MPDU does not cause the STA to exceed the current SP duration.

**10.63.2 Acknowledgement context in a Multi-TID BlockAck frame**

A recipient of a multi-TID A-MPDU sets the AckType of the Multi-TID BlockAck frame sent as a response depending on the acknowledgement context as follows:

If all MPDUs in the multi-TID AMPDU are received successfully, then the recipient may follow the procedure described in the All Ack context, otherwise it shall use procedure defined in BlockAck context:

1. All Ack context: if the originator had set the EDMG All Ack Support subfield in the MAC Capability field in the EDMG Capabilities element to 1, then the recipient may set the AckType field to 11 to indicate the successful reception of all the MPDUs carried in the eliciting multi-TID A-MPDU. Otherwise the recipient shall not set the Ack Type field to 11. The Multi- STA BlockAck frame shall contain only one Per-TID Info subfieldfield in the Multi-TID BlockAck frame.
2. BlockAck context: The recipient shall set the Ack Type field to 0 and the TID field of a Per-TID Info subfieldto the TID value of MPDUs requesting block acknowledgement that are carried in the eliciting multi-TID A-MPDU. The Block Ack Starting Sequence Control and Block Ack Bitmap fields shall be set according to 10.24.7 (HT-immediate block ack extensions) for each block ack agreement.

**References:**

1. IEEE P802.11ay/D1.0, November 2017
2. IEEE P802.11ax/D2.0, October 2017