IEEE P802.11
Wireless LANs

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| 11ax D3.0 Comment Resolution 27.10.4 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D3.0 with the following CIDs:

* 15700, 15701, 16213, 16225, 16280, 16281, 16284, 16289, 16295, 16355,
* 16356, 16413, 16492, 16493, , 16684, 17041, 17042, 17066, 17067,
* 17068, 17147.

Revisions:

* .

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** | **PP** | **LL** | **Comment** | **Proposed Change** | **Resolution** |
| 15700 | 349 | 37 | Clairfy ACK Enabled Aggregation Support: only to set ACK Enabled Aggregation Support to 1 when dot11AckEnabledAMPDUOptionImplementedequal to true | Change the text:"An HE STA shall set the Ack-Enabled Aggregation Support subfield to 1 in the HE MAC Capabilities Informationfield in the HE Capabilities element it transmits."To:"An HE STA shall set the Ack-Enabled Aggregation Support subfield to 1 in the HE MAC Capabilities Informationfield in the HE Capabilities element it transmits if dot11AckEnabledAMPDUOptionImplementedequal to true" | **Revised.****Gererally agree with the commenter.****TGax editor: please make changes in 11-18/1859r4 under CID 15700**  |
| 15701 | 349 | 52 | non-EOF MPDUs should be all under block ack agreements | Change the text:"One or more non-EOF MPDUs that are not under the block ack agreements"To:"One or more non-EOF MPDUs that are under the block ack agreements" | **Rejected****Discussion: there are some frames which are not non-EoF MPDUs in A-MPDU, e.g. Action no Ack, control frames etc.** |
| 16213 | 351 | 5 | "One or more non-EOF-MPDUs each of which is a QoS Data frame with the Ack Policy field set toImplicit Block Ack Request, HTP Ack, or Block Ack and belonging to a block ack agreement, andone or more EOF-MPDUs each of which is a QoS Data frame with the Ack Policy field set to Nor-mal Ack or HTP Ack and with a different TID." -- it is not clear whether "different TID" means different between the EOF-MPDUs if there is more than one, or between the EOF-MPDU(s) and the non-EOF-MPDU(s) | Change "with a different TID" to "where the TIDs of the EOF-MPDUs differ if there is more than one", in the second, third and fourth bullet | **Revised.****See the changes in *Table 9-532d* A-MPDU contents in the** ack-enabled multi-TID A-MPDU **(data enabled immediate response) in HE PPDU context** |
| 16225 |  |  | "An HE STA may aggregate in a multi-TID A-MPDU QoS Data frames with multiple TIDs as defined inTable 9-425 (A-MPDU contents in the data enabled immediate response context) or Table 9-426 (A-MPDUcontents in the data enabled no immediate response context)." duplicates "An HE STA shall construct a multi-TID A-MPDU as defined in 9.7" above | Delete the (first) cited text | **Accepted** |
| 16280 | 349 | 37 | "An HE STA shall set the Ack-Enabled Aggregation Support subfield to 1 in the HE MAC Capabilities Infor-mation field in the HE Capabilities element it transmits. An HE STA with dot11AckEnabledAMPDUOp-tionImplemented equal to false shall set the Ack-Enabled Aggregation Support subfield to 0." is self-contradictory when that MIB variable is true | Insert "with dot11AckEnabledAMPDUOp-tionImplemented equal to false " before the first "shall" in the cited text at the referenced locatino | **Revised.****See CID 15700** |
| 16281 | 349 | 49 | “One EOF-MPDU that is either a QoS Data frame with the Ack Policy field set to Normal Ack orHTP Ack each” – it is not clear what “each” refers to here | Delete “each” in the cited text at the referenced location | **Revised.****The cited centense is moved to *Table 9-532b* A-MPDU contents in the** ack-enabled A-MPDU **(data enabled immediate response) in HE PPDU context. No further change is needed.** |
| 16284 | 351 | 34 | The term "non-ack-enabled A-MPDU" appears in two locations (T9-425 and 27.10.4.2) but is not defined | Add a suitable definition in 27.10.4.2. Make it clear whether a "legacy" A-MPDU is a non-ack-enabled A-MPDU or whether this is an HE-only class of A-MPDUs | **Revised****Discussion: the revised Subcaluse 9.7 includes the definition of non-ack-enabled multi-TID A-MPDU context.** **See 11-18/1858** |
| 16289 | 349 | 47 | T9-425 says an ack-enabled A-MPDU contains “One frame with a single TID value with the Ack Policy fieldequal to Normal Ack or HTP Ack, or one Management framethat solicits an Ack frame, at least one QoS Null frame with AckPolicy set to No Ack and and zero or more Trigger frames.” But 27.10.4.1 says it contains “One EOF-MPDU that is either a QoS Data frame with the Ack Policy field set to Normal Ack orHTP Ack each, or a Management frame that solicits acknowledgmentOne or more non-EOF MPDUs that are not under the block ack agreements”. These do not coincide | Put all the format rules in T9-425. In 27.10.4.1 state that an ack-enabled A-MPDU is an A-MPDU that solicits the HE acknowledgment context as opposed to the legacy acknowledgment mechanisms | **Revised.****Generally agree with the commenter.** **TGax editor: please make changes in 11-18/1859r4 under CID 16289** |
| 16295 | 349 | 26 | The underlying intent of the zoo of A-MPDU variants (traditional, ack-enabled, non-ack-enabled, ack-enabled multi-TID, non-ack-enabled multi-TID) is not clear | In 27.10.4 add a para “A multi-TID A-MPDU allows multiple TIDs, all corresponding to a block ack agreement, to be present in an A-MPDU. An ack-enabled multi-TID A-MPDU additionally allows one or more frames not sent under a block ack agreement to be included. An ack-enabled A-MPDU allows one or more frames not sent under a block ack agreement to be included, but does not allow multiple TIDs to be present.” Etc. to outline in broad terms the intent of each flavour of A-MPDU | **Revised****Generally agree with the commenter.****TGax editor to make changes in 11-18/1859r4 under CID 16295** |
| 16355 | 349 | 47 | The definition of an ack-enabled A-MPDU should be in the subclause about this | Pull the material in 27.10.4.1 that is about ack-enabled A-MPDUs into its own subclause, to match 27.10.4.2 for non-ack-enabled multi-TID A-MPDUs and 27.10.4.3 for ack-enabled multi-TID A-MPDUs | **Revised****Generally agree with the commenter.****TGax editor to make changes in 11-18/1859r4 under CID 16355** |
| 16356 |  |  | An A-MPDU with two EOF=1 MPDUs is also an ack-enabled multi-TID A-MPDU, even if there are no EOF=0 MPDUs | As it says in the comment | **Revised****Generally agree with the commenter. Table 9-aaa4 already cover this case. No further change is needed.** |
| 16413 | 349 | 37 | "An HE STA shall set the Ack-Enabled Aggregation Support subfield to 1 in the HE MAC Capabilities Information field in the HE Capabilities element it transmits. An HE STA with dot11AckEnabledAMPDUOptionImplementedequal to false shall set the Ack-Enabled Aggregation Support subfield to 0."The first sentence seems to imply that Ack-Enabled Aggregation Support subfield equal to 1 for all HE STA, while the second one seems to link this subfiled to dot11AckEnabledAMPDUOptionImplemented.Consider revision of the first sentence, e.g.:"An HE STA with dot11AckEnabledAMPDUOptionImplementedequal to true shall set the Ack-Enabled Aggregation Support subfield to 1 in the HE MAC Capabilities Information field in the HE Capabilities element it transmits." | As in comment. | **Revised****Generally agree with the commenter.****TGax editor to make changes in 11-18/1859r4 under CID 16413** |
| 16492 | 349 | 52 | Clarify the text " One or more non-EOF MPDUs that are not under the block ack agreements ".Intent seems to allow for non-EoF MPDUs that are carrying TIDs, which do not have Block ACK session established. | Change text to: One or more non-EOF MPDUs, with ACK Policy field set to No-ACK.Delete the Note as well. | **Rejected.****Discussion: non-EoF MPDU could be Control frame which has no Ack Policy field.**  |
| 16493 | 350 |  | Section 9.3.1.23.1 Page 105, Lines 6 to 10 requires te TID Aggregation Limit to be > 0 and signal the actual number of TIDs that are allowed in HE TB PPDU. However, in Section 27.10.4.1, Page 350, line 12-13 allows Multi TID MPDUs in HE TB PPDU if the “TID Aggregation Limit field of the User Info field addressed to the STA is nonzero.” Clarify | Change text from “TID Aggregation Limit field of the User Info field addressed to the STA is nonzero. “ to “TID Aggregation Limit field of the User Info field addressed to the STA is greater than one.” | **Revised.****Generally agree with the commenter. The TID Aggregation Limit in 9.3.1.23.1 is updated. However the cited text in 27.10.4.1 is based on the original definition of the TID Aggregation Limit field.****TGax editor to make changes in 11-18/1859r4 under CID 16493** |
| 16494 | 351 |  | Note on Page 270 Line 42-44 (NOTE--The maximum number of Per AID TID Info fields that the STA is capable of including in the Multi-STA BlockAck frame for the same value of the AID field is indicated in the Multi-TID Aggregation Rx Support field of HECapabilities element it transmits.).A STA that is advertising Multi-TID Aggregation Rx Support subfield to "Zero" in the HE MAC Capabilities Information field, is not allowed to include more than one TID AID Info in Multi-STA Block ACK frame for the same value of the AID field.Note on Page 351 Lines 23-27 allows for aggregation of Management frame irrespective of the Multi-TID Aggregation Rx Support."NOTE--A multi-TID A-MPDU allows the aggregation of an Action frame regardless of the value indicated in the Multi-TID Aggregation Rx Support subfield in the HE MAC Capabilities Information field of the HE Capabilities element as long as the indicated in the value of the TID Aggregation Limit subfield in the Trigger Dependent User Info field of a the Basic Trigger frame is nonzero. " If the TID Aggregation Limit Subfield = 1, and the HE TB PPDU has both QoD Data of a TID, and also an Action Frame then the response i.e., Multi-STA Block ACK has two PER AID TID Info fields. This seems to be contradicting Note on Page 270. Clarify and change Note in Page 270 to be aligned with Table 27-2. | If the Action Frame is included even when Multi-TID Aggregation RX support being 0, remove the restriction on the number of PER AID TID Info fields to not count the PER AID TID info that has TID=15 as part of the limit (Multi-TID Agrgegation Rx Support field). | **Revised****Generally agree with the commenter****TGax editor to change the note in P270 L42-44 in ax D3.0 to “**NOTE--The maximum number of Per AID TID Info fields with TID field not equal to 15 that the STA is capable of including in the Multi-STA BlockAck frame for the same value of the AID field is indicated in the Multi-TID Aggregation Rx Support field of HECapabilities element it transmits**”** |
| 16684 | 351 | 63 | Including management frames in an ack-enabled multi-TID A-MPDU does not make sense. Management frames are sent very infrequently and performance beneift from this type of aggregation is negligable. Supporting management frames complicates the receiver: 1. requires special ack handling. 2. it requires special handling for decryption. | Remove the first and third bullet items so that the definition of an ack-enabled multi-TID A-MPDU does not include the presence of a Management frame. Update table in 9.7. Update ack response text since this combination will no longer be possible. | **Rejected****Discussion: an AP anyway needs to receive management frames and QoS Data frams in HE TB PPDU. Receiving management frame in an** ack-enabled multi-TID A-MPDU add no additional requirement. |
| 17041 | 351 | 23 | “NOTE—A multi-TID A-MPDU allows the aggregation of an Action frame regardless of the value indicated in the…”Based on the 27.10.4.3, “Action frame” shall be changed to “Management frame that solicits an Ack frame”. | As in comment. | **Revised.****Generally agree with the commenter.** **TGax editor to make changes in 11-18/1859r4 under CID 17041** |
| 17042 | 350 | 19 | "The multi-TID A-MPDU may contain an Action frame if the TID Aggregation Limit is nonzero and the AP supports reception of ack-enabled multi-TID A-MPDUs."Based on the 27.10.4.3, "Action frame" shall be chagned to "Management frame that solicits an Ack frame". | As in comment. | **Revised.****The A-MPDU contents are referred to the related tables in 9.7.3 where Action frame is changed to “Management frame that is bot Action No Ack frame”****TGax editor to make changes in 11-18/1859r4 under CID 17042.** |
| 17066 | 350 | 62 | "higher AC" is not clear. | Replace with "higher priority AC". | **Revised****the text is already changed in D3.2 as what the commenter proposed. No further change is needed.** |
| 17067 | 351 | 1 | "the AC that is same or higher" is not clear. | Replace with "the AC that has the same or higher priority". | **Revised****See CID 17066** |
| 17068 | 351 | 2 | "an AC lower than" is not clear. | Replace with "an AC that has a lower priority". | **Revised****Generally agree with the commenter.****TGax editor to make changes in 11-18/1859r4 under CID 17068** |
| 17147 | 349 |  | "One or more non-EOF MPDUs that are not under the block ack agreements", shouldn't the setence be "One or more non-EOF MPDUs that are under the block ack agreements"? Please clarify | as in the comment | **Rejected.****Discussion: non-EoF MPDUs are correct since the ack-enabled A-MPDU doesn’t allow non-EoF MPDUs under the block ack agreements.** |

**27.6A-MPDU operation**

**27.6.1 General**

***TGax editor: add the following paragraph at the end of 27.10.1:***

An HE STA may transmit HE SU PPDU or HE MU PPDU that carries an A-MPDU with contents defined in Table 9-529 (A-MPDU contents in the data enabled no immediate response context) or Table 9-532a (A-MPDU contents in the HE non-ack-enabled single TID immediate response context).

An A-MPDU with any number of QoS Null frames with any TID and with the Ack Policy field set to No Ack and aggregated with or without other frames may be transmitted to a recipient STA in an HE PPDU that is not an HE TB PPDU regardless of the value of the Multi-TID Aggregation Rx/Tx Support subfield in the HE MAC Capabilites Information field in the HE Capabilities element received from the recipient STA.

An A-MPDU with any number of QoS Null frames with any TID and with Ack Policy field set to No Ack and aggregated with or without other frames in an A-MPDU may be transmitted in the HE TB PPDU regardless of the value of the TID Aggregation Limit subfield and the value of the Preferred AC subfield in the Basic Trigger frame, and the value of the Multi-TID Aggregation Rx Support of the AP that solicits the A-MPDU.

NOTE—A QoS Null frame with the Ack Policy field set to Normal Ack or Implicit Block Ack Request is not allowed to be sent in an A-MPDU (as defined in Table 9-532a (A-MPDU contents in the non-ack-enabled single TID A-MPDU (data enabled immediate response) in HE PPDU context), , Table 9-532b (A-MPDU contents in the ack-enabled A-MPDU (data enabled immediate response) in HE PPDU context), Table 9-532c (A-MPDU contents in the non-ack-enabled multi-TID A-MPDU (data enabled immediate response) in HE PPDU context), Table 9-532d (A-MPDU contents in the ack-enabled multi-TID A-MPDU (data enabled immediate response) in HE PPDU context), Table 9-426 (A-MPDU contents in the data enabled no immediate response context) and Table 9-428 (A-MPDU contents MPDUs in the control response context)).

***TGax editor: change subclause 27.6.4 as follows:***

* + 1. Multi-TID A-MPDU and ack-enabled A-MPDU
			1. General

A non-ack-enabled multi-TID A-MPDU is an A-MPDU that includes QoS Data frames with TIDs corresponding to more than one block ack agreement. An ack-enabled multi-TID A-MPDU is an A-MPDU that additionally includes one or more QoS Data frames with TIDs that do not correspond to a block ack agreement. An ack-enabled A-MPDU includes one or more QoS Data frames not sent under a block ack agreement, but only one of the frames solicitsacknowledgement.(#16295)

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

An HE STA with dot11AckEnabledAMPDUOptionImplemented equal to true shall set the Ack-Enabled Aggregation Support subfield to 1 in the HE MAC Capabilities Information field in the HE Capabilities element it transmits. (#15700, 16280) An HE STA with dot11AckEnabledAMPDUOptionImplemented equal to false shall set the Ack-Enabled Aggregation Support subfield to 0.

 (#16355)A multi-TID A-MPDU is either a non-ack-enabled multi-TID A-MPDU or an ack-enabled multi-TID A-MPDU.

An HE STA shall not transmit a multi-TID A-MPDU or ack-enabled A-MPDU in a VHT PPDU or a HT PPDU.

A non-AP STA shall not send a multi-TID A-MPDU in an HE TB PPDU unless it is in response to a Basic Trigger frame where the TID Aggregation Limit field of the User Info field addressed to the STA is more than 1. (# **16493**)

 (#16225)

A multi-TID A-MPDU shall not be transmitted in an HE SU PPDU, HE ER SU PPDU or HE MU PPDU, unless(#15390) the TXOP limit is greater than 0(#Ed) for the AC that is used to gain access to the medium. The AC used to gain access to the medium is the primary AC (see 10.22.2.8 (TXOP limits)). If(#15391) the TXOP limit is greater than 0,(#Ed) then the STA may aggregate QoS Data frames from one or more TIDs in the A-MPDU under the following conditions:

* The A-MPDU shall be carried in either an HE SU PPDU or an HE ER SU PPDU transmitted by STA within the obtained TXOP or an HE MU PPDU transmitted by a non-AP 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
* If(#15392) 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-STA BlockAck frame is used to acknowledge the MPDUs in a multi-TID A-MPDU as defined in 27.4 (HE acknowledgment procedure).

In a multi-TID A-MPDU, MPDUs with the same TID are not necessarily contiguous.

If(#15393) the AP specifies a value defined in Table 9-136 (ACI-to-AC encoding) in the Preferred AC subfield in the Trigger Dependent User Info field of a Basic Trigger frame, then an HE STA that transmits a multi-TID A-MPDU to the AP should aggregate QoS Data frames from any one of the TIDs from the same AC or higher priority AC(#17065) as indicated in the Preferred AC subfield of the Trigger Dependent User Info field that is addressed to the STA in the Trigger frame, up to the limit indicated in the TID Aggregation Limit subfield in Trigger Dependent User Info field of the Trigger frame.

NOTE—While it is recommended that the STA transmit QoS Data from the AC that is same or higher than the preferred AC, the STA is still permitted to aggregate QoS Data from an AC that has a lower priority than the preferred AC. (#17068)

The STA may aggregate MPDUs from TIDs in other ACs within the remaining time to the HE TB PPDU duration value indicated in the UL Length subfield in the Common Info field of the received Trigger frame, up to the limit indicated in the TID Aggregation Limit subfield in Trigger Dependent User Info field of the Trigger frame.

NOTE—If the AP indicates AC\_BK in the Preferred AC subfield in the Trigger Dependent User Info field of a Basic Trigger frame, then an HE STA that transmits a multi-TID A-MPDU to the AP might aggregate MPDUs from any AC/TID or combination of TIDs, up to the limit indicated in the TID Aggregation Limit subfield in Trigger Dependent User Info field of the Trigger frame.

An HE STA that intends to send QoS Data frames from a single TID should select a TID from the same or higher priority AC indicated in the Preferred AC subfield in the Trigger Dependent User Info field of a Basic Trigger frame. If the HE STA has no buffered MPDU for TIDs belonging to the same or higher priority AC indicated in the Preferred AC subfield in the Trigger Dependent User Info field of a Basic Trigger frame, then the HE STA may include MPDUs for a TID belonging to any other AC in that A-MPDU carried in the HE TB PPDU.

NOTE—A multi-TID A-MPDU allows the aggregation of an Management frame that solicits Ack regardless of the value indicated in the Multi-TID Aggregation Rx Support subfield in the HE MAC Capabilities Information field of the HE Capabilities element as long as the indicated in the value of the TID Aggregation Limit subfield in the Trigger Dependent User Info field of a the Basic Trigger frame is nonzero.(#17041)

An HE AP may aggregate MPDUs from any TIDs in multi-TID A-MPDU for DL HE MU PPDU transmission and the number of TIDs in multi-TID A-MPDU shall not be more than the Multi-TID Aggregation Rx Support announced by the recipient.

**27.6.4.2 ack-enabled A-MPDU operation (#16355)**

An ack-enabled A-MPDU is an A-MPDU with contents defined in Table 9-532b (A-MPDU contents in the HE ack-enabled single TID immediate response context). (#16289, 16413, 17042)

NOTE—An ack-enabled A-MPDU does not contain(#16287) more than one of the following frames: QoS Data frames, Management frame that solicits acknowledgment.

An HE STA shall not transmit an ack-enabled A-MPDU to a peer HE STA unless it has received from the peer HE STA an HE Capabilities element where the Ack-Enabled Aggregation Support subfield is 1.

27.6.4.3 Non-ack-enabled multi-TID A-MPDU operation

A non-ack-enabled multi-TID A-MPDU is an A-MPDU with contents defined in Table 9-532c (A-MPDU contents in the HE non-ack-enabled multi-TID immediate response context).

* (#16289, 16413)

NOTE—A non-ack-enabled multi-TID A-MPDU might include other frames such as a Trigger frame, BlockAck frame, or QoS Null frame (see Table 9-529 (A-MPDU contents in the data enabled immediate response context))

An HE STA shall not transmit a non-ack-enabled multi-TID A-MPDU to a peer HE STA unless it has received from its peer HE STA an HE Capabilities element where the Multi-TID Aggregation Rx Support subfield is nonzero.

A STA that receives a non-ack-enabled multi-TID A-MPDU responds as defined in 27.4.4 (Per-PPDU acknowledgment selection rules).

27.6.4.4 Ack-enabled multi-TID A-MPDU operation

A non-ack-enabled multi-TID A-MPDU is an A-MPDU with contents defined in Table 9-953d (A-MPDU contents in the ack-enabled multi-TID A-MPDU (data enabled immediate response) in HE PPDU context) (#16289, 16413, 17042)

QoS Data frames with the same TID shall have the same Ack Policy field setting.

QoS Data frames with the same TID shall be carried in A-MPDU subframes with the same value in the EOF field setting.

In an ack-enabled multi-TID A-MPDU, the EOF field of each A-MPDU subframe carrying a frame that solicits an Ack frame acknowledgment shall be set to 1. The EOF field of all other A-MPDU subframes carrying frames shall be set to 0.

An HE STA shall not transmit an ack-enabled multi-TID A-MPDU to a peer HE STA unless it has received from the the peer HE STA an HE Capabilities element where the Multi-TID Aggregation Rx Support subfield is nonzero and the Ack-Enabled Aggregation Support subfield is 1.

A STA that receives an ack-enabled multi-TID A-MPDU responds as defined in 27.4.4 (Per-PPDU acknowledgment selection rules).

A STA that transmits an ack-enabled multi-TID A-MPDU that contains at least two MPDUs with different TIDs carried in A-MPDU subframes that have the EOF field equal to 1 shall ignore the immediate response if it is an Ack frame.