IEEE P802.11
Wireless LANs

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| 11ax D4.0 Comment Resolution 21.6.4.1 |
| Date: 2019-06-19 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D4.0 with the following CIDs:

* 20193, 21199, 21604, 20136, 20137, 20194, 20195, 20391, 20417, 20418,
* 20983, 21069, 21200, 21202, 21203, 21336, 21337, 21606

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** |
| 20193 | 352 | 19 | Paragraph in the "NOTE" seems to disallow a qos-null requiring ACK to be transmitted as a S-MPDU. It conflicts with Table 9-532 (A-MPDU contents in the S-MPDU context) where "Any MPDU" is allowed. | Add to the end of the sentence: except that the A-MPDU is an S-MPDU as defined in Table 9-532 (A-MPDU contents in the S-MPDU context). | RevisedGenerally agree with the commenter.TGax editor to make changes as shown in 11-19/1023r4 under CID 20193. |
| 21199 | 353 | 17 | The < should be <= | Replace the comparison operator | Accepted |
| 21604 | 352 | 19 | Paragraph in the "NOTE" seems to disallow a qos-null requiring ACK to be transmitted as a S-MPDU. It conflicts with Table 9-532 (A-MPDU contents in the S-MPDU context) where "Any MPDU" is allowed. | Add to the end of the sentence: except that the A-MPDU is an S-MPDU as defined in Table 9-532 (A-MPDU contents in the S-MPDU context). | RevisedGenerally agree with the commenter.TGax editor to make changes as shown in 11-19/1023r4 under CID 21064. |

**26.6 A-MPDU operation**

**26.6.1 General**

***TGax editor: change the last paragraph in 26.6.1 to the following:***

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, except for a QoS Null frame with Normal Ack ack policy in an S-MPDU (as defined in Table 9-532a (A-MPDU contents in the HE non-ack-enabled single TID immediate response context) in HE PPDU context), Table 9-532b (A-MPDU contents in the HE ack-enabled single TID immediate response context), Table 9-532c (A-MPDU contents in the HE non-ack-enabled multi-TID immediate response context), Table 9-532d (A-MPDU contents in the HE ack-enabled multi-TID immediate response 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)). (#20193, 21604)

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| **CID** | **PP** | **LL** | **Comment** | **Proposed Change** | **Resolution** |
| 20136 | 354 | 12 | The two cases need to be called out explicitly:1) The non-AP STA shall not send a non-ack enabled multi-TID A-MPDU in an HE TB PPDU unless it is a response to a basic Trigger frame where the TID Aggregation limit is greater than 12) The non-AP STA shall not send a ack enabled multi-TID A-MPDU in an HE TB PPDU unless it is a response to a basic Trigger frame where the TID Aggregation limit is greater than 0" | As in comment. | RevisedDiscussion: the commenter is right that the following case should be added that ack-enabled multi-TID A-MPDU could include one Management frame and QoS Data frame from one TID which can be solicited by basic Trigger frame with TID Aggregation Limit 1.TGax editor to make changes in 11-19/1023r4 under CID 20136 |
| 20137 | 354 | 9 | This note was accompained with a normative sentence in D3.0 which was lost. Please add it back: "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." Similarly the rule that indicated that the number of TIDs will not exceed that declared by the recipient is also missing. Please check ensure that normative language is not missing due to re-org of subclauses. | As in comment. | RevisedDiscussion: agree with the commenter. A note is added.TGax editor to make changes in 11-19/1023r4 under CID 20137 |
| 20194 | 353 | 54 | In "An HE STA with dot11AMPDUwithMultipleTIDOptionImplemented equal to true shall set the Ack-Enabled Aggregation Support subfield to 1 ...", "dot11AMPDUwithMultipleTIDOptionImplemented" is a typo for "dot11AckEnabledAMPDUOptionImplemented." | Change "dot11AMPDUwithMultipleTIDOptionImplemented" to "dot11AckEnabledAMPDUOptionImplemented." | Accepted.Note to editor: the proposed change is already in 11ax D4.2. |
| 20195 | 354 | 22 | In the paragraph, it's stated "an HE MU PPDU transmitted by a non-AP STA". It should be a HE TB PPDU since a non-AP STA cannot transmit a HE MU PPDU. | Change "an HE MU PPDU" to "an HE TB PPDU". | RejectedIn 11ax, an HE non-AP STA can transmit HE MU PPDU, e.g. in **26.11.2 UPLINK\_FLAG**. An HE non-AP STA can transmit multi-TID A-MPDU in HE TB PPDU. However an HE non-AP STA will not check TXOP limit when transmitting multi-TID A-MPDU in HE TB PPDU since the HE TB PPDU is solicited by an AP. |
| 20391 | 353 | 43 | An ack-enabled A-MPDU includes one or MOREQoS Data frames not sent under a block ack agreement, but only one of the frames solicits acknowledgement.' seems contradicting with Table 9-532b conditions column | Change to be consistent with Table 9-532b | RevisedDsicussion: the description of ack-enabled multi-TID A-MPDU, non-ack-enabled multi-TID A-MPDU and ack-enabled single -TID A-MPDU are descriped per EoF MPDU, non-EoF MPDU.TGax editor to make changes in 11-19/1023r5 under CID 20391. |
| 20417 | 354 | 17 | change to "If the TXOP limit of the Primary AC is greater than 0,..." | As in comment | RevisedAgree with the commenter. TGax editor to change the sentence to “If the TXOP limit of the primary AC is greater than 0…” |
| 20418 | 354 | 14 | The HE MU PPDU from AP should be the exception. Otherwise the sentence in L35 should be changed. | As in comment | 1023r5RejectedDiscussion: with the current text, when the TXOP limit is not 0, the AP can transmit multi-TID A-MPDU |
| 20983 | 353 | 56 | "dot11AckEnabledAMPDUOptionImplemented" -- no such MIB variable | Change to "dot11AMPDUwithMultipleTIDOptionImplemented" | Revised.It should be dot11AckenabledAMPDUOptionImplemented. So it is not right to change to “dot11AMPDUwithMultipleTIDOptionImplemented”. The commenter is right that the MIB variable is missing. Propsoe to add the related MIB variable.TGax editor to make changes in 11-19/1023r4 under CID 20983 |
| 21069 | 354 | 22 | Should the non-AP STA case here be HE TB PPDU? | Change HE MU PPDU to HE TB PPDU | RejectedIn 11ax, an HE non-AP STA can transmit HE MU PPDU, e.g. in **26.11.2 UPLINK\_FLAG**. An HE non-AP STA can transmit multi-TID A-MPDU in HE TB PPDU. However an HE non-AP STA will not check TXOP limit when transmitting multi-TID A-MPDU in HE TB PPDU since the HE TB PPDU is solicited by an AP. |
| 21200 | 353 | 41 | This is a sentence fragment. Do we need an "and/or" between "one Management frame soliciting acknowledgment," and "one or more QoS Data frames"? | Correct the text | Revised.Discussion: the description of ack-enabled multi-TID A-MPDU, non-ack-enabled multi-TID A-MPDU and ack-enabled single -TID A-MPDU are descriped per EoF MPDU, non-EoF MPDU.TGax editor to make changes in 11-19/1023r5 under CID 21200.  |
| 21202 | 354 | 21 | When we say "transmitted by the non-AP STA or the AP within the obtained TXOP" vs is there some 3rd case that is neither a non-AP STA nor an AP? | Replace with "transmitted by the STA within the obtained TXOP". | Accepted |
| 21203 | 354 | 53 | I believe based on the paragraph before & after the Note, that the recommendation is incorrect. Provided the TID Aggregation Limit is not exceeded, it is preferable to include lower priority traffic then sending Zero Delimiters to pad the PSDU. The recommendation should be to allow lower priority, only when no others are available. | Replace the Note text with "While it is recommended that the non-AP STA aggregate QoS Data from an AC that has lower priority than the preferred AC, only when QoS Data from other AC have been exhausted, the STA is still permitted to aggregate QoS Data from an AC that has lower priority than the preferred AC when QoS Data from other AC are still available". | Revised.Discussion: the group believe that a STA can transmit frames from any TID after receiving a Basic Trigger frame. This can simplify the STA’s design since within SIFS the STA needs to prepare the PHY parameter setting for the HE TB transmission, select the frames to be transmitted in HE TB PPDU etc. One clarification can be added in the paragraph before the note about the TID Aggregation Limit.TGax editor to make changes in 11-19/1023r5 under CID 21203 |
| 21336 | 353 | 42 | "additionally includes" The ack-enabled multi-TID A-MPDU definition seems to build on the non-ack-enabled multi-TID A-MPDU definition, although it doesn't say that. It can't build on the non-ack-enabled multi-TID definition because it is a completely seperate beast. "one or more QoS Data frames with TIDs that do not correspond to a block ack agreement" is not accurate. It is still "ack-enabled" if the QoS Data frames do belong to a block ack agreement but are sent as EOF-MPDUs. | Accurately define "ack-enabled multi-TID A-MPDU" pssibly through reference to Table 9-532c. | Revised.Discussion: the description of ack-enabled multi-TID A-MPDU, non-ack-enabled multi-TID A-MPDU and ack-enabled single -TID A-MPDU are descriped per EoF MPDU, non-EoF MPDU.TGax editor to make changes in 11-19/1023r5 under CID 21336. |
| 21337 | 353 | 44 | "not send under a block ack agreement". This is not pertinent to the definition. A QoS Data frame that is under a block ack agreement but sent as an EOF-MPDU so that it solicits an Ack frame response should be part of the definition. The definition is also not complete. An A-MPDU that includes a Trigger frame and a Management frame that solicits acknowledgement is also an ack-enable A-MPDU. | Define an ack-enabled A-MPDU as an A-MPDU that includes a frame that solicits an Ack response and one or more additional frames, none of which solicit acknowledgment. | Revised.Discussion: the description of ack-enabled multi-TID A-MPDU, non-ack-enabled multi-TID A-MPDU and ack-enabled single -TID A-MPDU are descriped per EoF MPDU, non-EoF MPDU.TGax editor to make changes in 11-19/1023r5 under CID 21337. |
| 21606 | 354 | 22 | In the paragraph, it's stated "an HE MU PPDU transmitted by a non-AP STA". It should be a HE TB PPDU since a non-AP STA cannot transmit a HE MU PPDU. | Change "an HE MU PPDU" to "an HE TB PPDU". | RejectedIn 11ax, an HE non-AP STA can transmit HE MU PPDU, e.g. in **26.11.2 UPLINK\_FLAG**. An HE non-AP STA can transmit multi-TID A-MPDU in HE TB PPDU. However an HE non-AP STA will not check TXOP limit when transmitting multi-TID A-MPDU in HE TB PPDU since the HE TB PPDU is solicited by an AP. |

**26.6.4 Multi-TID A-MPDU and ack-enabled A-MPDU**

**26.6.4.1 General**

***TGax editor: change subclause 26.6.4.1 to the following:***

A non-ack-enabled multi-TID A-MPDU is an A-MPDU where no EOF MPDU is aggregated in the A-MPDU and non-EOF MPDUs from at least two TIDs solicit Block Ack acknowledgement are aggregated in the A-MPDU.. An ack-enabled multi-TID A-MPDU is an A-MPDU where at least one EOF MPDU that solicits Ack acknowledgement is aggregated in the A-MMPDU and MPDUs from more tha one TID that solicit Ack acknowledgement or Block Ack acknowledgement are aggregated in the A-MPDU. An ack-enabled A-MPDU is an A-MPDU that contains one EOF-MPDU that solicits an Ack acknowledgment and one or more non-EoF-MPDUs that don’t solicit acknowledgement (#20975). (#20391, 21200, 21336, 21337)

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(#20194) 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. An HE STA with dot11AckEnabledAMPDUOptionImplemented equal to false shall set the Ack-Enabled Aggregation Support subfield to 0.

A multi-TID A-MPDU is either a non-ack-enabled multi-TID A-MPDU or an ack-enabled multi-TID A-MPDU. A first HE STA may transmit a non-ack-enabled multi-TID A-MPDU to a second HE STA if the first HE STA has received from the second STA an HE Capabilities element where the Multi-TID Aggregation Rx Support subfield is nonzero. A first HE STA may transmit an ack-enabled multi-TID A-MPDU or a non-ack-enabled multi-TID A-MPDU to a second HE STA if the first HE STA has received from the second HE STA an HE Capabilities element where the Multi-TID Aggregation Rx Support subfield is nonzero and where the Ack-Enabled Aggregation Support subfield is 1. Otherwise the first HE STA shall not transmit a multi-TID A-MPDU to the second HE STA.

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 non-ack-enabled 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 greater than 1. A non-AP STA shall not send an ack-enabled 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 greater than 0. (#20136)

NOTE--An ack-enabled multi-TID A-MPDU solicited by a Basic Trigger frame with TID Aggregation Limit field equal to 1 can contain one Management frame that solicits acknowledgment and one or more QoS Data frames from the same TID if the AP supports reception of ack-enabled multi-TID A-MPDUs. (#20137)

A multi-TID A-MPDU shall not be transmitted in an HE SU PPDU, HE ER SU PPDU or HE MU PPDU unless the TXOP limit is greater than 0 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 the TXOP limit is greater than 0, 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 the non-AP STA or the AP 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 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

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.

The Multi-STA BlockAck frame is used to acknowledge the MPDUs in a multi-TID A-MPDU as defined in 26.4 (HE acknowledgment procedure).

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

If 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 as indicated in the Preferred AC subfield of the Trigger Dependent User Info field that is addressed to the STA in the Trigger frame. The allowed number of TIDs from which QoS Data frames with an ack policy other than No Ack are aggregated in an HE TB PPDU by a STA shall follow the restriction defined in Table 26-2 (**Relation between TID Aggregation Limit field, Multi-TID Aggregation Tx Support field and solicited immediate response**). (#21203)

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 lower priority than the preferred AC.

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 a Management 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.

**26.5.2.2.4 Allowed settings of the Trigger frame fields and TRS Control subfield**

***TGax editor: change Table 26-2 as follows:***

|  |
| --- |
| * Relation between TID Aggregation Limit field, Multi-TID Aggregation Tx Support field and solicited immediate response
 |
| AP: TID Aggregation Limit field | Non-AP STA: Multi-TID Aggregation Tx Support field | Non-AP STA: Solicited immediate response? |
| 0 | Any value | No |
| 1 | Any value | Yes for at most 1 TID and/or 1 Management frame that solicits Ack acknowledgement (#21203) |
| *tal* (0 to *mta* + 1) | *mta* | Yes at most *tal* TIDs and/or at most one Management frame that solicits Ack acknowledgement (#21203) |
| where*tal* is the value in the TID Aggregation Limit field*mta* is the value in the Multi-TID Aggregation Tx Support field |

* MIB Detail

***TGax editor: change Dot11HEStationConfigEntry as follows:***

Dot11HEStationConfigEntry ::=

 SEQUENCE {

 dot11TRSOptionImplemented(#20043) TruthValue,

 dot11ULMUMIMOOptionImplemented TruthValue,

 dot11OFDMARandomAccessOptionImplemented TruthValue,

 dot11HEControlFieldOptionImplemented TruthValue,

 dot11OMIOptionImplemented TruthValue,

 dot11HEMCSFeedbackOptionImplemented INTEGER,

 dot11HEDynamicFragmentationLevel INTEGER,

 dot11AMPDUwithMultipleTIDOptionImplemented TruthValue,

 dot11MPDUAskedforAckInMultiTIDAMPDU TruthValue,

 dot11TXOPDurationRTSThreshold Unsigned32,

 dot11PPEThresholdsRequired TruthValue,

 dot11IntraPPDUPowerSaveOptionActivated TruthValue,

 dot11AMSDUFragmentationOptionImplemented TruthValue,

 dot11BSSColorCollisionAPPeriod Unsigned32,

 dot11BSSColorCollisionSTAPeriod Unsigned32,

 dot11AutonomousBSSColorCollisionReportingImplemented TruthValue,

 dot11HESRPOptionImplemented TruthValue,

 dot11HEBSRControlImplemented TruthValue,

 dot11HEUPHControlActivated TruthValue,

 dot11HEBQRControlImplemented TruthValue,

 dot11HECASControlImplemented TruthValue,

 dot11PartialBSSColorImplemented TruthValue,

 dot11ObssNbRuToleranceTime Unsigned32,

 dot11HESubchannelSelectiveTransmissionImplemented TruthValue,

 dot11SRResponderOptionImplemented TruthValue,

 dot11AutonomousBSSColorInUseReportingImplemented TruthValue,

 dot11ShortSSIDListImplemented TruthValue,

 dot11ColocatedRNRImplemented TruthValue,

 dot11SRGAPOBSSPDMinOffset Integer,

 dot11SRGAPOBSSPDMaxOffset Integer,

 dot11SRGAPBSSColorBitmap OCTET STRING (SIZE(8)),

 dot11SRGAPBSSIDBitmap OCTET STRING (SIZE(8)),

 dot11NonSRGAPOBSSPDMaxOffset Integer,(#20337)

 dot11HTVHTTriggerOptionImplemented TruthValue,

 dot11HEDynamicSMPowerSaveOptionImplemented TruthValue,(#21540)

 dot11AckEnabledAMPDUOptionImplemented TruthValue (#20983)

 }

dot11AckEnabledAMPDUOptionImplemented OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a capability variable.

 Its value is determined by device capabilities.

 This attribute, when true, indicates that the station implementation is capable of receiving ack-enabled A-MPDU. The capability is disabled otherwise."

 ::= { dot11HEStationConfigEntry ANA}(#20983)