IEEE P802.11
Wireless LANs

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| 11ax D4.0 comment-resolution 26.5.3.4 |
| Date: 2019-05-08 |
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Abstract

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

* 20186, 20640, 20650, 20651, 20655, 20659, 20660, 20764, 20816, 21597,
* 21082

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** |
|  |  |  |  |  |  |
| 20186 | 336 | 6 | An unassociated non-AP STA shall not include more than one Management frame in the HE TB PPDU thatis sent on an RA-RU allocated for unassociated STAs. | Nothing wrong with this paragraph, but it would be best to add a second paragraph stating rules for associated non-AP STA's behavior -- can include one or more Management frames but only one of them requires acknolwedgement. | RevisedDiscussion: The cited sentence is removed for unassociated STA to transmit management frame with the resolution to 20052. The behavior for associated STA to transmit management frame with other frames is defined in 7th paragraph of 26.5.3.4 (refer to Table 9-532b and 9-532d). The text about soliciting single management frame can be further calrified.TGax editor to make changes in 11-19/0750r3 under CID 20186 |
| ~~20187~~ | ~~337~~ | ~~24~~ | ~~In the scenario described in "If the associated non-AP STA has no frames pending or is unable to include pending frames in response to aBasic Trigger frame because the allocated resource is insufficient, then the associated non-AP STA shallinclude in the A-MPDU at least one QoS Null frame.", AP is lack of information to figure out minimum resource. AP can guess or allocate maximum resource but it incurrs overhead/delay to do it heuristically.~~ | ~~Introduce an explicit signaling mechanism to tell AP minimum resource, e.g. add an A-control field to specify current minimum buffer size. The non-AP STA can respond with this info in the QoS-null frame. AP would adjust resource allocation in next trigger frame immediately.~~ |  |
| ~~20500~~ | ~~338~~ | ~~12~~ | ~~As CID 16448 pointed out, the UPH is not well-defined. If a value of 3 is given for UPH at HE-MCS 7, does this mean that the tx power is 3 dB from the maximum that the PA can output for this HE-MCS, or does it mean that the power is 3 dB from where the transmitter thinks that EVM will be exceeded for this HE-MCS?~~ | ~~As it says in the comment; CID 16448 suggested to refine the meaning of "available power headroom" - with reference to what? To max PA power? To the point when TX EVM is expected to be exceeded? Or to what?~~ |  |
| 20640 | 337 | 28 | "A non-AP STA that responds to a BFRP Trigger frame addressed to it shall construct the A-MPDU carriedin the HE TB PPDU as defined in Table 9-531 (A-MPDU contents MPDUs in the control response context),except that only HE Compressed Beamforming/CQI frames shall be allowed in the A-MPDU; other framesshall not be allowed in the A-MPDU." -- so it's not really the control response context rules at all | Change the cited text at the referenced location to "A non-AP STA that responds to a BFRP Trigger frame addressed to it shall not transmit frames other than HE Compressed Beamforming/CQI frames in its response." | RevisedDiscussion: the commenter is right that the sounding feedback is not control response context. The group agreed that it is not necessary to put sounding feedback under the A-MPDU context.TGax editor to make changes in 11-19/0750r3 under CID 20640  |
| 20650 | 338 | 42 | "A non-AP STA shall not include a Control subfield with a Control ID subfield set to 15 in the HE variant HTControl field of the MPDUs carried in an HE TB PPDU." -- no justification for this | Delete the cited text at the referenced location | RevisedDiscussion: in HE TB PPDU, at least UPH Contrl field will be included if there is enough room. Then the Control subfield with a Control ID equal to 15 is not allowed in the HE virant HT Control field since the length of the related Control Information subfield is 26 bits. The clarification text is added.TGax editor to make changes shown in 11-19/750r3 under CID 20650 |
| 20651 | 335 | 57 | It is not clear what the UPH is reporting if there is also a OMI that is changing the NSTS/BW capabilities | At the end of the referenced paragraph add "If an MPDU includes both a UPH Control subfield and an OM Control subfield, the power headroom is determined based on the capabilities indicated in the OM Control subfield." | RevisedDiscussion: the UPH Control field provides uplink power headroom for the current MCS (See **9.2.4.6a.5 UPH Control**). It is not related to the operation mode change that will take effect after the TXOP. Some clarification is needed which is provided in the form of a note.TGax editor to make changes shown in 11-19/750r3 under CID 20651 |
| 20655 | 338 | 28 | "A non-AP STA shall include an HE variant HT Control field containing the UPH Control subfield in the MPDUs carried in the A-MPDU of the HE TB PPDU unless one of the following apply:" is not clear as to whether it should be included in all MPDUs (except for the exceptions) or just some. The wording/grammar is also odd: "in the MPDUs unless [...] The MPDU si" | Change the para and bullets at the referenced location to "A non-AP STA shall include an HE variant HT Control field containing the UPH Control subfield in eachMPDU carried in the A-MPDU of the HE TB PPDU except that:--- No UPH Control subfields are included when the remaining space in the A-MPDU, after inclusion of solicited MPDUs that cannot contain an HE variant HT Control field, is not sufficient to contain MPDU(s) that contain an HE variant HT Control field.--- No UPH Control subfield is included in an MPDU when other Control subfields are included in the HE variant HT Control field of that MPDU and the available space is not sufficient to contain a UPH Control subfield too.--- No UPH Control subfield is included in an MPDU that cannot contain an HE variant HT Control field." | RevisedAgree with the commenter that the grammar should be fixed. TGax editor to make changes in 11-19/0750r3 under CID 20655 |
| 20659 | 335 | 65 | "Otherwise, the non-AP STA is not required to include MPDUs in the A-MPDU." -- this is confusing | Add " (it includes only padding in the A-MPDU)" at the end of the sentence | Accepted |
| 20660 | 336 | 1 | "NOTE---The MU-RTS Trigger frame and the NFRP Trigger frame are exempt from these construction rules since theMU-RTS Trigger frame does not solicit an HE TB PPDU and the NFRP Trigger frame solicits an HE TB PPDU thatdoes not carry an A-MPDU." -- it's not the TFs that are exempt, it's the response | Change the cited text to "NOTE---The responses to a MU-RTS Trigger frame and a NFRP Trigger frame are exempt from these construction rules since the MU-RTS Trigger frame does not solicit an HE TB PPDU and the NFRP Trigger frame solicits an HE TB PPDU thatdoes not carry an A-MPDU." At the start of the subclause change "A non-AP STA that receives a Trigger frame or a frame" to "A non-AP STA that receives a Trigger frame other than an MU-RTS Trigger frame or an NFRP Trigger frame or receives a frame" | Accepted |
| 20764 | 336 | 48 | Re CID 16211: even though the resolution is shown as REJECTED, as far as I can tell it was basically accepted. Only one instance of "nonzero length" is now left | At 336.48 change "nonzero length MPDU delimiter" to "an MPDU delimiter" | RevisedDiscussion: Instead of using MPDU delimiter non-EOF MPDU is used.TGax editor to make changes in 11-19/0750r3 under CID 20764 |
| 20816 | 337 | 52 | 26.5.2 says " If a STA receives a BQRP Trigger frame aggregated with Control,Data and Management frames that solicits an acknowledgment, the response A-MPDU shall containMPDUs in the order described in Table 9-531 (A-MPDU contents MPDUs in the control response context).", 26.5.3.6 says " If a non-AP STA receives a BSRP Trigger frame aggregatedwith Control, Data and Management frames that solicits an acknowledgment, the response A-MPDU shallcontain MPDUs in the order described in Table 9-531 (A-MPDU contents MPDUs in the control responsecontext).". However 26.5.3.4 says "A non-AP STA that responds to a BSRP or BQRP Trigger frame addressed to it shall construct the A-MPDUcarried in the HE TB PPDU as defined in Table 9-529 (A-MPDU contents in the data enabled no immediateresponse context) with the exception that the A-MPDU does not contain QoS Data frames. The non-AP STAshall include in the A-MPDU at least one QoS Null frame." This is inconsistent (different tables) | Delete "shall construct the A-MPDUcarried in the HE TB PPDU as defined in Table 9-529 (A-MPDU contents in the data enabled no immediateresponse context) with the exception that the A-MPDU does not contain QoS Data frames. The non-AP STA" in the cited text in 26.5.3.4. Also delete "non-AP" in the cited text in 26.5.3.6 | RevisedDiscussion: the text related to Table 9-529 is required since it covers the case that the soliciting PPDU only carries a BSRP or BQRP Trigger. The text related to Table 9.531 is related to the case that the soliciting PPDU includes Control, Data and Management frame. The text in 26.5.2 (related to BQRP Trigger) and the text in 26.5.3.6 (related to BSRP Trigger) say different things. The normative behavior will be moved to A-MPDU construction subclause (26.5.3.4), and the text in 26.5.2 and 26.5.3.6 will be changed to just referring to 26.5.3.4.TGax editor to make changes in 11-19/0750r3 under CID20816 |
| 21597 | 336 | 6 | An unassociated non-AP STA shall not include more than one Management frame in the HE TB PPDU thatis sent on an RA-RU allocated for unassociated STAs. | Nothing wrong with this paragraph, but it would be best to add a second paragraph stating rules for associated non-AP STA's behavior -- can include one or more Management frames but only one of them requires acknolwedgement. | RevisedDiscussion: The cited sentence is removed for unassociated STA to transmit management frame with the resolution to 20052. The behavior for associated STA to transmit management frame with other frames is defined in 7th paragraph of 26.5.3.4 (refer to Table 9-532b and 9-532d). The text about soliciting single management frame can be further calrified.RevisedTGax editor to make changes in 11-19/0750r3 under CID21597 |
| ~~21598~~ | ~~337~~ | ~~24~~ | ~~In the scenario described in "If the associated non-AP STA has no frames pending or is unable to include pending frames in response to aBasic Trigger frame because the allocated resource is insufficient, then the associated non-AP STA shallinclude in the A-MPDU at least one QoS Null frame.", AP is lack of information to figure out minimum resource. AP can guess or allocate maximum resource but it incurrs overhead/delay to do it heuristically.~~ | ~~Introduce an explicit signaling mechanism to tell AP minimum resource, e.g. add an A-control field to specify current minimum buffer size. The non-AP STA can respond with this info in the QoS-null frame. AP would adjust resource allocation in next trigger frame immediately.~~ |  |
| 21082 | 337 | 24 | Where is this allowed in the AMPDU context, except for the NO ACK case? | Clarify in the AMPDU context tables when an SMPDU can be transmitted that is other than the SMPDU context, or clarify that an HE TB PPDU can contain an SMPDU. | RevisedDiscussion: S-MPDU can’t be tranmistted that is other than SMPDU context. in this case, the STA can transmit a QoS Null, multiple QoS Null. The A-MPDU context is defined in other places, i.e. P337L9 mention that HE TB PPDU can carry S-MPDU and P336L38 in 11ax D4.0.TGax editor to make changes as shown in 11-19/750r1 under CID 21082.  |

**26.5.2.4 A-MPDU contents in an HE TB PPDU**

***TGax editor: change subclause 26.5.2.4 as follows:***

A non-AP STA that receives a Trigger frame or a frame that carries a TRS Control subfield and that transmits an HE TB PPDU response shall follow the A-MPDU padding procedure described in 26.6.3 (A-MPDU padding in an HE TB PPDU) and construct the A-MPDU carried in the HE TB PPDU as described below provided the AP allocates sufficient resources for the non-AP STA to include MPDU(s) in the A-MPDU. Otherwise, the non-AP STA is not required to include MPDUs in the A-MPDU.

NOTE—The MU-RTS Trigger frame and the NFRP Trigger frame are exempt from these construction rules since the MU-RTS Trigger frame does not solicit an HE TB PPDU and the NFRP Trigger frame solicits an HE TB PPDU that does not carry an A-MPDU.

An unassociated non-AP STA shall not include more than one Management frame in the HE TB PPDU that is sent on an RA-RU allocated for unassociated STAs.A non-AP STA that responds to a DL MU PPDU containing MPDU(s) addressed to it that include TRS Control subfield(s) follows the rules defined in 10.3.2.9 (Ack procedure) for generating the Ack frame, 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 defined in 26.4 (HE acknowledgment procedure) for generating the Multi-STA BlockAck frame if at least one of the received MPDUs solicits an immediate acknowledgment. The contents of the A-MPDU carried in the HE TB PPDU shall be as defined in:

* Table 9-531 (A-MPDU contents MPDUs in the control response context) if at least one of the received MPDUs solicits an immediate acknowledgment.
* Table 9-529 (A-MPDU contents in the data enabled no immediate response context) with the exception that the A-MPDU does not contain QoS Data frames, if none of the received MPDUs solicit an immediate acknowledgment.

NOTE 1—The non-AP STA additionally follows the rules in 26.3.2 (Dynamic fragmentation) if fragments are present in the soliciting A-MPDU.

NOTE 2—An AP might transmit an HE MU PPDU with an RU allocated to STA-ID 2045 with an A-MPDU that includes a Management frame addressed to an unassociated non-AP STA, that solicits an acknowledgment and that carries a TRS Control subfield. The TRS Control subfield allocates resources for the unassociated non-AP STA to respond with an HE TB PPDU that carries the acknowledgment.

An associated non-AP STA that responds to a Basic Trigger frame addressed to it shall construct the A-MPDU carried in the HE TB PPDU as defined in the following:

* Table 9-531 (A-MPDU contents MPDUs in the control response context), if the Trigger frame is contained in an A-MPDU and the non-AP STA receives at least one other MPDU that solicits an immediate acknowledgment. The TID Aggregation Limit field of the User Info field addressed to the non-AP STA may have any value.
* Table 9-529 (A-MPDU contents in the data enabled no immediate response context) with the exception that the A-MPDU does not contain QoS Data frames, if the Trigger frame is either not carried in an A-MPDU or is carried in an A-MPDU but the non-AP STA receives no other MPDUs that solicit an immediate acknowledgment. The TID Aggregation Limit field of the User Info field addressed to the non-AP STA may have any value.
* Table 9-429 (A-MPDU contents in the S-MPDU context) with the following restrictions:
* The S-MPDU shall be a control response frame if the non-AP STA received in the same A-MPDU at least one other MPDU that solicits an immediate acknowledgment. The TID Aggregation Limit field of the User Info field addressed to the non-AP STA may have any value.
* The S-MPDU may be a Multi-TID BlockAckReq frame provided that the number of TIDs present in the Multi-TID BlockAckReq frame does not exceed the TID aggregation limit indicated by the TID Aggregation Limit field of the User Info field addressed to the non-AP STA.
* The S-MPDU may be one of a QoS Data, QoS Null, Management or PS-Poll frame if the TID Aggregation Limit field of the User Info field addressed to the non-AP STA is greater than 0
* Otherwise the S-MPDU shall be one of a QoS Data, QoS Null, Management frame that does not solicit an immediate acknowledgment.(#20186, 21597)
* Table 9-532a (A-MPDU contents in the HE non-ack-enabled single TID immediate response context) or Table 9-532c (A-MPDU contents in the HE non-ack-enabled multi-TID immediate response context) if the TID Aggregation Limit field of the User Info field addressed to the non-AP STA in the Trigger frame is greater than 0 and the non-AP STA intends to carry one or more non-EOF MPDUs (see 10.13 (A-MPDU operation) and 26.6.4.3 (Non-ack-enabled multi-TID A-MPDU operation)(#21543)). The A-MPDU is subject to the following restrictions: (#20764)
* It shall contain a control response frame if the non-AP STA received at least one other MPDU that solicits an immediate acknowledgment.
* The number of TIDs present in the A-MPDU shall count towards reaching the TID aggregation limit indicated by the TID Aggregation Limit field of the User Info field addressed to the non-AP STA in the Trigger frame.
* Table 9-532b (A-MPDU contents in the HE ack-enabled single TID immediate response context) or Table 9-532d (A-MPDU contents in the HE ack-enabled multi-TID immediate response context) if the TID Aggregation Limit field of the User Info field addressed to the non-AP STA in the Trigger frame is greater than 0 and the non-AP STA intends to carry an ack-enabled A-MPDU (see 26.6.4.1 (General) and 26.6.4.4 (Ack-enabled multi-TID A-MPDU operation). The A-MPDU is subject to the following restrictions:
* It shall contain a control response frame if the non-AP STA receives at least another MPDU that solicits an immediate acknowledgment.
* The number of TIDs present in the A-MPDU, in either QoS Data or BlockAckReq frames, shall count towards reaching the TID aggregation limit that is obtained from the TID Aggregation Limit field of the User Info field addressed to the non-AP STA in the Trigger frame.

(#20186)

An unassociated non-AP STA may transmit an S-MPDU in the HE TB PPDU that is Management frame belonged to Class 1 and Class 2 using the UORA procedure.

If the associated non-AP STA has no frames pending or is unable to include pending frames in response to a Basic Trigger frame because the allocated resource is insufficient, then the associated non-AP STA shall include in the A-MPDU at least one QoS Null frame if the allocated resource is sufficient for containing a QoS Null frame.

NOTE----The non-AP STA can transmit one QoS Null frame as defined in Table 9-429 (A-MPDU contents in the S-MPDU context) or one or more QoS Null frames as defined in Table 9-529 (A-MPDU contents in the data enabled no immediate response context). (#21082)

A non-AP STA that responds to a BFRP Trigger frame addressed to it shall construct an A-MPDU carried in the HE TB PPDU with one or more HE Compressed Beamforming/CQI frames (see 26.7 (HE sounding protocol)) ; other frames shall not be allowed in the A-MPDU. (#20640)

NOTE—It is not always possible to fragment an HE compressed beamforming/CQI report (see 26.7.4 (Rules for generating segmented feedback)). If the length is insufficient to contain the HE compressed beamforming/CQI report requested by a BFRP Trigger frame, no feedback is sent.

A non-AP STA that responds to an MU-BAR Trigger frame addressed to it shall construct the A-MPDU carried in the HE TB PPDU as defined in Table 9-531 (A-MPDU contents MPDUs in the control response context). The non-AP STA includes either a BlockAck frame or a Multi-STA BlockAck frame in the A-MPDU as defined in 26.4 (HE acknowledgment procedure).

A non-AP STA that responds to a GCR MU-BAR Trigger frame addressed to it shall construct the A-MPDU carried in the HE TB PPDU as defined in Table 9-531 (A-MPDU contents MPDUs in the control response context). The non-AP STA includes a GCR BlockAck frame in the A-MPDU as defined in 10.24.10 (GCR and GLK-GCR block ack).

A non-AP STA that responds to a BSRP or BQRP Trigger frame addressed to it, which is not aggregated with any MPDUs that solicit an immediate acknowledgment. shall construct the A-MPDU carried in the HE TB PPDU as defined in Table 9-529 (A-MPDU contents in the data enabled no immediate response context) with the exception that the A-MPDU does not contain QoS Data frames. The non-AP STA shall include in the A-MPDU at least one QoS Null frame. A non-AP STA that responds to a BSRP or BQRP Trigger frame addressed to it, which is aggregated with at least one MPDU that solicits an immediate acknowledgment, shall construct the A-MPDUcarried in the HE TB PPDU as described in Table 9-531 (A-MPDU contents MPDUs in the control response context). (#20816)

NOTE 1—The frame type of MPDUs may be different across A-MPDUs within the same HE TB PPDU provided that the MPDUs are selected from the above tables of A-MPDU context, which depend on the variant of the Trigger frame and other parameters. (#20816)

NOTE 2—A non-AP STA follows the rules in 26.6.4 (Multi-TID A-MPDU and ack-enabled A-MPDU) for aggregating the QoS Data frames with multiple TIDs in HE TB PPDUs.

A non-AP STA may set the dot11HEUPHControlActivated to false if the most recent OM Control field sent (if any) to the AP had the UL MU Disable field equal to 1; otherwise, the non-AP STA shall set the dot11HEUPHControlActivated to true.

A non-AP STA with dot11HEUPHControlActivated equal to true that is scheduled in a Trigger frame or is the intended receiver of an TRS Control subfield transmits the dB value of its UL power headroom, *HRSTA*, in the UPH Control subfield of MPDUs carried in the HE TB PPDU sent in response to assist in the AP's MCS selection. The UL power headroom for the assigned MCS is defined in Equation (26-2).

*

where

 represents the maximum UL transmit power of an HE TB PPDU with the assigned MCS after considering hardware capability, regulatory requirements and local maximum transmit power levels (see 11.8.5 (Specification of regulatory and local maximum transmit power levels)), as well as non-802.11 in-device coexistence requirements

 represents the current UL transmit power of the HE TB PPDU for the assigned MCS, which is determined by power control and subject to the non-AP STA's capabilities and other requirements as defined in 27.3.14.2 (Power pre-correction)

*HRSTA* is the UL power headroom, in dB, of the HE TB PPDU, the encoding of which is specified in 9.2.4.6a.5 (UPH Control).

NOTE—If the Minimum Transmit Power Flag subfield in the UPH Control subfield is 1, then the non-AP STA is transmitting the HE TB PPDU at its minimum  for the assigned MCS. The UL power headroom is calculated for the current MCS and is independent of OM parameters provided in any OM Control field contained in the same A-Control field. (#20651)

(#20655, 20650) A non-AP STA shall include an HE variant HT Control field containing the UPH Control subfield in the MPDUs carried in the A-MPDU of the HE TB PPDU except that:

* No UPH Control subfield is included in any MPDU if the remaining space in the A-MPDU, after inclusion of solicited MPDUs that cannot contain an HE variant HT Control field, is not sufficient to contain MPDU(s) that contain an HE variant HT Control field.
* No UPH Control subfield is included in an MPDU if the other Control fields in the HE variant HT Control field, other than Control fields with a Control ID subfield equal to 15, are included are included in the HE variant HT Control field of the MPDUs, and the available space in the HE variant HT Control field is not sufficient to contain an additional UPH Control subfield as well.
* No UPH Control subfield is included in an MPDU that is a Control frame.

A non-AP STA shall not include a Control subfield with a Control ID subfield set to 15 in the HE variant HT Control field of the MPDUs carried in an HE TB PPDU.

**26.5.6 Bandwidth query report operation(#20053)**

***TGax editor: change the last paragraph in subclause 26.5.6 as follows:***

An AP may include a BQRP Trigger frame together with other Control, Data and Management frames in one A-MPDU to a STA if the HE Capabilities element received from the STA has the BSRP BQRP AMPDU Aggregation field equal to 1. A non-AP STA constructs A-MPDU in responding to a BQRP Trigger frame as described in **26.5.2.4 (A-MPDU contents in an HE TB PPDU)**. (#20816)

**26.5.5 Buffer status report operation(#20053)**

***TGax editor: change subclause 26.5.5 as follows:***

……

An AP may include a BSRP Trigger frame together with other Control, Data and Management frames in one A-MPDU to a non-AP STA if the HE Capabilities element received from the non-AP STA has the BSRP BQRP A-MPDU Aggregation field equal to 1. A non-AP STA constructs A-MPDU in responding to a BSRP Trigger frame as described in **26.5.2.4 (A-MPDU contents in an HE TB PPDU)**. (#20816)

……