### IEEE P802.11Wireless LANs

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| 11ax D3.0 MAC Comment Resolution for NAV – Part I |
| Date: 2018-09-04 |
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Abstract

This submission proposes resolutions for comments of TGax Draft D3.0 with the following CIDs:

15868, 16048, 15869, 16438, 16437, 16027, 16029, 16030, 16215, 16938, 16422

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on the comment received in offline discussion.
* Rev 2: Revision based on the feedback from Alfred

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 D3.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D3.0 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.***

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 15868 | Liwen Chu | 82.6 | 9.2.5.2 | Trigger to solicit HE TB PPDU after MU-RTS/CTS is missing. Another observation is that MU-RTS/CTS may be followed by DL MU PPDU + UL acknowledgement. | Change the text according to the comment. | Rejected – We note that we use a general description for any frame that may be transmited by the iniatior of TXOP as shown below.*1a) In an MU-RTS Trigger frame, the Duration/ID field is set to the estimated time, in microseconds,* ***required to transmit the pending frame****, plus one CTS frame, plus the time to transmit thesolicited HE TB PPDU if required, plus the time to transmit the acknowledgment for the solicited HE TB PPDU if required, plus applicable IFSs.*The pending frame includes the Trigger frame and the DL MU PPDU. |
| 16048 | Mark RISON |  | 9.2.5.2 | It is not clear how a TXOP holder computes the estimated duration, when an exchange involves or might involve an M-BA that might in turn contain an "all-ack" rather than a bitmap. It's probably safest to assume the bitmap | At the end of NOTE 2 at the referenced location add "The duration of a Multi-STA BlockAck frame ought to be estimated on the assumption it will not contain an all-ack indicator." | Revised – We note that the problem of inexact estimation exists in the current spec as shown below. Similar to the existing spec, we add a note for the situation. *NOTE 1—Estimated times might prove to be inexact, if the TXOP responder has a choice of PHY options (e.g., BCC v.LDPC, use of STBC, use of short GI, PHY header/preamble format options) or MAC options (e.g., use of HT Control).Heuristics such as the TXOP responder’s previous choices and channel conditions might be used to minimize theinexactitude.* TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16048. |
| 15869 | Liwen Chu | 83.38 | 9.2.5.7 | This contradicts with the rule in 9.2.5.2: Basic Trigger can use single protection and the acknowledgement in frame exchange with Basic Trigger uses multiple protection always. | Change the text according to the comment. | Revised –Agree in principle with the commenter. TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 15869. |
| 16438 | Matthew Fischer | 225.48 | 10.22.2.9 | There are contradictions to the baseline text that are introduced by the changes in this subclause. There are a couple of locations in the baseline text in this same subclause that mention that receipt of a CF-End causes NAV reset. Either this new text needs to be merged and modified with the existing text, or qualifiers need to be added to both sets of text. | Resolve the inconsistencies between the proposed changes to the subclause and the existing baseline text of the subclause. | Revised – Agree in principle with the commenter. We have merge the sentence with the baseline to resolve inconsistency. TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16438. |
| 16437 | Matthew Fischer | 225.54 | 10.22.2.9 | Several cases missing here. | Add the case of when the CF-End is not identified as either intra or inter-BSS for both lines 54 and 61Add a sentence to say what happens if none of the conditions described in the subclause are met - e.g. if none of these conditions is met, then no NAV is reset, being careful to not contradict the baseline text in the same subclause. | Revised – Based on 9.3.1.6 CF-End frame format, a CF-End frame contains BSSID. Further, based on the description in 27.2.2, a frame with BSSID field can always be identified as intra-BSS or inter-BSS by an associated HE STA. Hence, we only add description for an unassociated HE STA, which basically follows the legacy rule to reset NAV in every condition. TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16437. |
| 16027 | Mark RISON | 356.04 | 27.11.5 | "Otherwise, the TXVECTOR parameter TXOP\_DURATION is set to 8448" -- should be a shall | Change "is" to "shall be" in the cited text at the referenced location | Accepted – TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16027. |
| 16029 | Mark RISON | 356.06 | 27.11.5 | "NOTE 1---Except for a PS-Poll frame, the Duration/ID field in a Data frame, Management frame and Control frameindicates duration information." -- this is both commonly known and liable to spec rot | Delete this NOTE | Accepted – TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16029. |
| 16030 | Mark RISON | 356.14 | 27.11.5 | The concept of a "potential duration" is nebulous | Delete "potential" throughout the referenced paragraph | Rejected –The reason for having the potential duration is the following. First, there is a concensus from the group that every STA shall calculate the same value in the TXOP duration field of HE-SIG-A.Second, the procedure to calculate the TXOP duration shall guarantee that each STA calculates the same value. There are two cases here. If the STA has duration field in the responding frame, then STA can use the value in the duration field to calculate the value of TXOP duration field. If the STA does not have duration field in the responding frame, then we still let the STA calculate the “potential duration” by following the same procedure to calculate the duration field, and the potential duration can then be used to calculate the value of TXOP duration field. Now, since the procedure of calculating duration field makes sure that every STA has the same value for duration field, and the procedure to calculate the value of TXOP duration from the value in the duration field is defined, we then guarantee that the every STA will calculate the same value in the TXOP duration field.  |
| 16215 | Mark RISON | 256.36 | 27.2.4 | PPDUs do not solicit anything, only the MPDUs in it do so | Change "the PPDU carrying the frame doesnot solicit an immediate response from the STA" to "the PPDU carrying the frame doesnot contain a frame that solicits an immediate response from the STA" | Accepted – TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16215. |
| 16938 | Xiaofei Wang | 255.53 | 27.2.4 | This paragraph is not very clear. It starts by stating that two NAVs are beneficial when a STA requires protection from intra-BSS PPDU, and avoids interference caused by inter-BSS PPDU. But the example given is a STA in UL MU transmissions will not transmit if basic NAV is set. Not sure where the protection from intra-BSS PPDU is. In addition, there is no normative behavior and only discuss benefit. Maybe it is better to either clarify the intent or remove it. | clarify the intent of the paragraph or remove the paragraph. | Rejected – We note that since the basic NAV is set and not overridden by the intra-BSS frame, the interface to inter-BSS can be avoided as described in the description. We also note that if we only keep inter-BSS NAV, and the Trigger frame does not set NAV, then when the inter-BSS NAV expires, the intra-BSS STA will contend and interfere with the UL transmission. As a result, the protection from intra-BSS PPDU can be maintained with two NAVs.Finally, we note that having description for the benefits of the feature is a general practice. Please see the examples below. ***27.7 TWT operation27.7.1 General****Target wake time (TWT) allows an AP to manage activity in the BSS in order to minimize contentionbetween STAs and to reduce the required amount of time that a STA in PS mode needs to be awake. This is achieved by allocating STAs to operate at non-overlapping times and/or frequencies, and concentrate the frame exchanges in predefined service periods****27.5.1 HE DL MU operation27.5.1.1 General****HE DL MU operation allows an AP to transmit simultaneously to one or more non-AP STAs in DL OFDMA, DL MU-MIMO or both.* |
| 16422 | Matthew Fischer | 292.33 | 27.5.3.5 | The draft introduces a split NAV and provides lots of information regarding how to set each of the intra-BSS NAV and the basic NAVHowever, there is no language that indicates what a STA is supposed to do with each of these NAVsExcept within 27.2.4, "if the basic NAV of the STA is nonzero" includes a reference to:27.5.3.5 UL MU CS mechanismThe language on NAV use here is extremely confusing, in particular, because there are no adjectives for NAVSo which NAV is being referred to at any instance? | Modify the language in 27.5.3.5 to clearly identify which of two NAVs must be considered for each of the cases described.Modify the language of 10.3.2.1 CS mechanism to identify the behavior that is specific to the two NAV case | Revised – Agree in principle with the commenter. We have revised the texts in 27.5.3.5.Note that in 10.3.2.1, we have added the reference to 27.2.4 for virtual CS indication, and in 27.2.4, we already have the following sentence. *The requirements in 10.3.2.1 (CS mechanism) apply to an HE STA maintaining two NAVs with the exception of the virtual CS indication of medium. For an HE STA maintaining two NAVs, if both the NAV timers are 0, the virtual CS indication is that the medium is idle; if at least one of the two NAV timers is nonzero,the virtual CS indication is that the medium is busy.*TGax editor to make the changes shown in 11-18/1189r1 under all headings that include CID 16422. |

**Discussion:** *None.*

**Propose:** Revised for CID 15869, 16048, 16438, 16437, 16027, 16029, 16215, 16422 per discussion and editing instructions in 11-18/1189r1.

***TGax editor: Change 9.2.5.2 Setting for single and multiple protection under enhanced distributed channel access (EDCA) as follows: (Track change on)***

* Setting for single and multiple protection under enhanced distributed channel access (EDCA)

(…existing texts….)

NOTE—The rules allowing or disallowing the transmission of MPDUs with different ACs are described in 10.22.2.6 (Sharing an EDCA TXOP), 10.22.2.7 (Multiple frame transmission in an EDCA TXOP), and 27.10.4 (Multi-TID A-MPDU and ack-enabled A-MPDU).(#12359)NOTE- The estimated time to transmit acknowledgment in response to the solicited HE TB PPDU might be inexact. The TXOP holder might use the maximum time required to transmit acknowledgement as the extimated time. (#16048)

***TGax editor: Change 9.2.5.7 Setting for control response frames as follows: (Track change on)***

* Setting for control response frames

***Change as follows:***

(…existing texts….)

In a BlockAck frame transmitted in response to a BlockAckReq or MU-BAR Trigger frame or transmitted in response to a frame containing an implicit block ack request or transmitted in response to a frame carried in HE\_TB\_PPDU under single protection settings,(#15869) the Duration/ID field is set to the value obtained from the Duration/ID field of the frame that elicited the response minus the time, in microseconds between the end of the PPDU carrying the frame that elicited the response and the end of the PPDU carrying the BlockAck frame.

Under multiple protection settings, the(#15869) Duration/ID field in a BlockAck frame transmitted in response to a frame carried in HE TB PPDU is set according to the multiple protection settings defined in 9.2.5.2 (Setting for single and multiple protection under enhanced distributed channel access (EDCA)). (#12361)

***TGax editor: Change 10.22.2.9 Truncation of TXOP as follows: (Track change on)***

10.22.2.9 Truncation of TXOP

(…existing texts….)

In a non-DMG BSS, a (11ah)non-S1G and non-HE(#16438) STA shall interpret the reception of a CF-End frame as a NAV reset, i.e., it resets its NAV to 0 at the end of the PPDU containing this frame. After receiving a CF-End frame with a matching BSSID(TA) without comparing Individual/Group bit, an AP may respond by transmitting a CF-End frame after SIFS.

HE STAs shall interpret the reception of a CF-End frame according to the procedures described in 27.2.4a (Truncation of TXOP). (#16438)

 (…existing texts….)

Non-DMG STAs (11ah)that are not S1G STAs and are not HE STAs(#16438) that receive a CF-End frame reset their NAV and can start contending for the medium without further delay. A DMG STA that receives a CF-End frame can start contending for the medium at the end of the time interval equal to the value in Duration/ID field of the frame if none of its NAVs has a nonzero value (10.40.10 (Updating multiple NAVs)).

HE STAs that receive a CF-End frame may start contending for the medium without further delay according to the procedures described in 27.2.4a (Truncation of TXOP). (#16438)

 (…existing texts….)

(#16438)

***TGax editor: Add 27.2.4a Truncation of TXOP as follows:***

An unassociated HE STA shall interpret the reception of a CF-End frame as a NAV reset, i.e., it reset its maintained NAV to 0 at the end of the PPDU containing this frame. (#16437)

An HE STA that maintains one NAV (see 10.3.2.1 (CS mechanism)) and receives a CF-End frame should not reset the NAV if either of following conditions are met: .

* The received CF-End frame is an inter-BSS frame and the most recent NAV update was due to an intra-BSS frame (see 27.2.2 (Intra-BSS and inter-BSS frame determination)).
* The received CF-End frame is an intra-BSS frame and the most recently updated NAV was due to an inter-BSS frame (see 27.2.2 (Intra-BSS and inter-BSS frame determination)).(#12450, #12086)(#16438)

Otherwise, an HE STA that maintains one NAV (see 10.3.2.1 (CS mechanism)) and receives a CF-End frame shall reset the NAV. (#16438)

NOTE—Resetting the NAV is the default behavior after receiving a CF-End frame as described in 10.22.2.9 Truncation of TXOP. (#16438)An HE STA that maintains two NAVs (see 27.2.4 (Updating two NAVs)) and receives a CF-End frame should not reset the intra-BSS NAV if the received CF-End frame is an inter-BSS frame. Otherwise, the HE STA shall reset the intra-BSS NAV. An HE STA that maintains two NAVs (see 27.2.4 (Updating two NAVs)) and receives a CF-End frame should not reset the basic NAV if the received CF-End frame is an intra-BSS frame. Otherwise, the HE STA shall reset the basic NAV. (#16438)

NOTE—Resetting the NAV is the default behavior after receiving a CF-End frame as described in 10.22.2.9 Truncation of TXOP. (#16438)

For an HE STA that maintains two NAVs (see 27.2.4 (Updating two NAVs)) and receives a CF-End frame, the HE STA may reset the basic NAV if the received CF-End frame is an intra-BSS frame and the basic NAV was updated due to a frame that cannot be identified as either inter-BSS frame or intra-BSS frame. (#16438) (#12450, 12086)

NOTE – A CF-End frame contains BSSID field, and an HE STA that is associated to an AP can always identify the CF-End as intra-BSS frame or inter-BSS frame (see 27.2.2 (Intra-BSS and inter-BSS frame determination)). (#16438)

For a HE STA that receive a CF-End frame, if the STA resets all their maintained NAV(s), the STA can start contending for the medium without further delay. (#16438)

* ***TGax editor: Change 27.11.5 TXOP\_DURATION as follows: (Track change on)*** TXOP\_DURATION

(…existing texts….)

A STA(#13297, #13299) that transmits a frame with a Duration field in an HE PPDU with the TXVECTOR parameter TXOP DURATION not set to UNSPECIFIED(#13300) shall set the TXVECTOR parameter TXOP\_DURATION to the duration information indicated by the Duration field if the value of the Duration field is smaller than 8448 µs. Otherwise, the TXVECTOR parameter TXOP\_DURATION shall be set to 8448.(#16027)

(#16029)NOTE 1(#16029)—For a TXOP responder, the Duration field in the MAC header of the response PPDU is set based on the Duration field in the MAC header of the soliciting PPDU as described in 9.2.5.7 (Setting for control response frames) or 9.2.5.8 (Setting for other response frames).

(…existing texts….)

***TGax editor: Change 27.2.4 Updating two NAVs as follows: (Track change on)***

* Updating two NAVs

(…existing texts….)

A STA, that is not a TXOP holder, shall update the intra-BSS NAV with the duration information indicated by the received frame in a PSDU if and only if all the following conditions are met:

* The frame is identified as intra-BSS according to the rule described in 27.2.2 (Intra-BSS and inter-BSS frame determination).
* The indicated duration is greater than the current intra-BSS NAV value.
* The RA of the received frame is not the STA's MAC address or the PPDU carrying the frame does not contain a frame that solicits an immediate response from the STA(#12270) or the received frame is a Trigger frame.(#16215)

***TGax editor: Change 27.5.3.5 UL MU CS mechanism as follows: (Track change on)***

* UL MU CS mechanism

(…existing texts….)

 The intra-BSS NAV is not considered in virtual CS for a STA that responds to a Trigger frame.(#16422)

The basic NAV is considered in virtual CS for a STA that responds to a Trigger frame from an associated AP if the counter of the basic NAV is not 0. (#16422)

(#16422)A NAV is considered in virtual CS for a STA that responds to a Trigger frame from an unassociated AP through the UORA procedure (see 27.5.5 (UL OFDMA-based random access (UORA))) unless one of the following conditions is met:

* The NAV was set by a frame originating from the AP sending the Trigger frame
* The NAV counter is 0

NOTE 1—The details of how a STA is solicited by the Trigger frame for transmission are described in 27.5.3.2.3 (Allowed settings of the Trigger frame fields and TRS Control subfield).

NOTE 2—When a STA responds to a Trigger frame from an unassociated AP through the UORA procedure, the method to identify that a NAV was set by a frame originating from the STA sending the Trigger frame is implementation specific. For example, a STA can save the TXOP holder address and match the saved TXOP holder address with the TA field of the Trigger frame.

For a STA that is solicited by a Trigger frame for transmission, the indication of the virtual CS is described as follows. If no NAV is considered, then the virtual CS indicates idle. Otherwise, the virtual CS indicates busy.

(…existing texts….)