### IEEE P802.11Wireless LANs

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| 11ax D2.0 MAC Comment Resolution for NAV Part 1 |
| Date: 2017-12-14 |
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Abstract

This submission proposes resolutions for comments of TGax Draft 2.0 with the following CIDs:

12357, 12358, 12359, 12360, 12361, 11134, 11787, 12434, 13056, 12736, 12782, 12783, 13297, 13043, 13149, 13299, 13298

Revisions:

* Rev 0: Initial version of the document.

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 D2.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D2.0 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** |
| 12357 | Liwen Chu | 72.59 | 9.2.5.2 | HE NDPA and BRP Trigger can't be treated as VHT NDPA and Beamforming Report Poll frame since HE sounding protocol is different from VHT sounding protocol. | Change to "HE NDP Announcement frame or HE NDP Announcement frame and BRP Trigger frame" | Revised –The description does not imply any specific sounding procedure. It simply says that a STA always uses multiple protection in a TXOP that includes HE NDP Announcement or HE BRP Trigger frame. Also note that HE NDPA and VHT NDPA are the same frame type. We revise the description by combining it with the bullet of VHT description.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 12357. |
| 12358 | Liwen Chu | 73.06 | 9.2.5.2 | DL MU case is missing, also UL MU frame exchange is not correctly defined | Change the bullet per the comment. | Rejected –The commenter refers to the description for the single protection setting of MU-RTS. We note that DL MU case is covered by the estimated time to transmit pending frame, which includes all the pending frames in DL HE MU PPDU, plus the time to transmit the solicited HE TB PPDU if required, plus applicable SIFS.UL MU case is covered by the estimated time to transmit the pending frame, including the Basic Trigger frame, plus the time to transmit the solicited HE TB PPDU if required, pluse the time to transmit the acknowledgement for the solicited HE TB PPDU if required, plus applicable SIFS.  |
| 12359 | Liwen Chu | 73.59 | 9.2.5.2 | PPDUs should not appear here. Another observation is that these PPDUs include pending MPDUs of the AC. | Change the bullet per the comment. | Revised –Agree in principle with the commenter. In 11ax, other ACs are allowed to be transmitted together with primary AC due to multi-TID A-MPDU, and HE MU PPDU. Without elaborating all the cases, which are already defined in other clauses of the spec, we simply remove the “of the same AC” from the first bullet. As a result, we remove the bullet for DL MU PPDU because it is covered by the first bullet. We remove the bullet for Trigger frame because Trigger frame is a MPDU, and the case is covered by the first bullet. We also remove HE TB PPDU because it is an associated immediate response, and the case is covered in the second bullet.Also add a note to have the referene of multi-TID A-MPDU and shared EDCA.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 12359. |
| 12360 | Liwen Chu | 73.50 | 9.2.5.2 | BRP Trigger is missing. | Add it. | Revised – Agree in principle with the commenter. In 11ax, other ACs are allowed to be transmitted together with primary AC due to multi-TID A-MPDU, and HE MU PPDU. Without elaborating all the cases, which are already defined in other clauses of the spec, we simply remove the “of the same AC” from the first bullet. Since BRP Trigger is a variant of Trigger, which is a MPDU, the case is covered in the first bullet.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 12359. |
| 12361 | Liwen Chu | 74.48 | 9.2.5.7 | BA solicited by HE TN PPDU in single protection is missing | Add it. | Revised –Agree in principle with the commenter. We add description for the BA solicited by the HE TB PPDU in single protection setting.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 12361. |
| 11134 | Adrian Stephens | 181.41 | 10.3.2.3 | "The exact time of updating the NAV is described as follows. " -- this is unnecessary. Also, "as follows" is usually followed by a list. | Delete cited text. | Accepted – |
| 11787 | Graham Smith | 181.42 | 10.2.3.4 | "The exact time of updating the NAV is described as follows." I can't see the point of this sentence. One would expect a colon and a definintion but the next sentence starts with "This NAV update operation....". Delete | Delete "The exact time of updating the NAV is described as follows." | Accepted – |
| 12434 | Liwen Chu | 181.61 | 10.3.2.4 | "used for the most recent NAV update was received." in L61 and L62 should not be removed. | Change the sentence per the comment. | Accepted –  |
| 13056 | Osama Aboulmagd | 185.39 | 10.3.5 | "a STA using the DCF or EDCA shall use an RTS/CTSexchange for individually addressed frames when the length of the PSDU is greater than the length thresholdindicated by dot11RTSThreshold" what does it mean "shall use RTS/CTS exchange for individually addressed frames? | suggest to replace with; "shall use an RTS/CTS exchange to protect the transmission of individually addressed frame" | Revised–Agree in principle with the commenter. We change the referred sententece as suggested and the similar sentence at the end of the paragraph.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 13056. |
| 12736 | Mark RISON | 221.04 | 27 | The protection rules for HE ER PPDUs are not specified | Add a subclause "Protection" stating "A TXOP holder that transmits an HE ER PPDU in a TXOP shall transmit an RTS frame or MU-RTS Trigger frame at the start of the TXOP." | Rejected –It is generally up to the TXOP holder to decide if RTS frame or MU-RTS Trigger frame will be used for protection at the start of the TXOP. Hence, the spec does not need to mandate the protection operation when an HE ER SU PPDU is transmitted. |
| 12782 | Mark RISON | 306.41 | 27.11.5 | "A STA that is not a TXOP responder and the transmits an HE SU PPDU, HE ER SU PPDU, or HE MU PPDU that carries a PS-Poll frame shall set the TXVECTOR parameter TXOP\_DURATION to UNPSPECIFIED." -- the precedence is not clear (and the first "the" should be "that") | Change to "... and that transmits a PS-Poll frame in an HE SU PPDU, HE ER PPDU or HE MU PPDU shall..." | Accepted - |
| 12783 | Mark RISON | 306.41 | 27.11.5 | "A STA that is not a TXOP responder and the transmits an HE SU PPDU, HE ER SU PPDU, or HE MU PPDU that carries a PS-Poll frame shall set the TXVECTOR parameter TXOP\_DURATION to UNPSPECIFIED." -- a TXOP responder can't send a PS-Poll | Delete "that is not a TXOP responder and" | Revised – Agree in principle with the commenter. Note that a TXOP responder can send a PS-Poll in HE TB PPDU. However, it is true that a TXOP responder can not send a PS-Poll in HE SU PPDU, HE ER SU PPDU, or HE MU PPDU. Also we note that if a STA sends HE TB PPDU, then the STA is a TXOP responder. Hence, we remove the redundant phrase.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 12783. |
| 13297 | Robert Stacey | 306.33 | 27.11.5 | The TXVECTOR parameter TXOP\_DURATION does not carry something called TXOP Duration field. It is a parameter and it caries a duration value that presumably goes in the "TXOP" field in HE-SIG-A. | Remove statement. | Revised –Agree in principle with the commenter. We revise the description accordingly. We also remove the reference HE in HE AP, HE non-AP STA, or HE STA because by default clause 27 is for HE STA.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 13297. |
| 13149 | Po-Kai Huang | 307.14 | 27.11.5 | Add a note saying that the exact indicaiton will be modified based on the coding rule in table-28-18, table 28-19, and table 28-20. As a result, the reader will know that the exact indication may not be the value in TXVECTOR parameter TXOP\_DURATION. | As in comment. | Revised –Agree in principle with the commenter. We add a note to cite the reference.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 13149. |
| 13043 | Michael Montemurro | 179.59 | 10.3.2.1 | What does "information might also be available" | Clarify the behavior here. What does the receiving(?) STA need to do. Presumably the duration is set to "UNSPECIFIED"? | Revised –Agree in principle with the commenter. We add a reference to 27.11.5 (TXOP\_DURATION).TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 13043. |
| 13299 | Robert Stacey | 306.61 | 27.11.5 | It is not clear how all STAs receiving a Trigger frame in a non-HE PPDU set the TXOP field in HE-SIG-A to the same value. There is a statement at P306L65 that tells you what not to set it to, but nothing an the value. | Remove the statement at P306L61. Add a statement "An HE TB PPDU sent in response to a Trigger frame or frame carrying a UMRS Control frame shall set the TXVECTOR parameter TXOP\_DURATION to the value carried in the Duration field of the soliciting frame less SIFS less HE TB PPDU duration". We already have a statement about ignoring the RXVECTOR parameter TXOP\_DURATION of an HE PPDU if a (MAC) frame is received. So the response to a Trigger frame or frame carrying UMRS Control field is one calculation based on the Duration field of the MAC frame doing the soliciting. | Revised – Agree in principle with the commenter. The STA that responds to Trigger frame will set the TXOP field in HE-SIG-A based on the duration field in the MAC header. Since every STA that responds to the Trigger frame will have the same value in the Duration field of the responding frame calculated based on the value of the Duration field in the Trigger frame, the value of the TXOP field in HE-SIG-A will then be the same for all responding STAs. Notice that the rule in P307 L1 is supposed to work for a STA that is TXOP responder. Remove the phrase “that is not a TXOP responder”.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 13299. |
| 13298 | Robert Stacey | 306.56 | 27.11.5 | It is important that all STAs responding with an HE TB PPDU set all HE-SIG-A fields to the same value. There is a race condition with the statement at P306L56. The last HE Operations element received by a STA may be different for different STAs due to scanning, power save and other conditions. A change in the BSS Color Disable field could result in different settings for the TXOP field. | Remove the dependency on HE Operation field settings. Set TXOP\_DURATION based on Duration field of Trigger frame or frame carrying UMRS and nothing else. | Revised – Agree in principle with the commenter. The description in R306L56 is a “should” statement, and the setting of TXOP duration field to UNSPECIFIED in HE TB PPDU is mandated by the paragrpahs of R306L46, P30132986L61, and R307L1.Hence, the description in R306L56 does not create any race condition.To avoid confusion, we add the HE TB PPDU as an exception for the description in R306L56.TGax editor to make the changes shown in 11-17/1874r0 under all headings that include CID 13298. |

**Discussion:** *None.*

**Propose:** Revised for CID 12357, 12361 per discussion and editing instructions in 11-17/1874r0.

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

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

Change the 2nd paragraph as follows:

The STA selects between single and multiple protection when it transmits the first frame of a TXOP. All subsequent frames transmitted by the STA in the same TXOP use the same class of duration settings. A STA always uses multiple protection in a TXOP that includes:

* Frames that have the RDG/More PPDU subfield equal to 1
* PSMP frames
* VHT/HE(#12357) NDP Announcement frames, or Beamforming Report Poll frames, or BRP Trigger frames (#12357)

***Change item a) of the 3rd paragraph as follows:***

The Duration/ID field is determined as follows:

* Single protection settings.
* For an RTS frame that is not part of a dual clear-to-send (CTS) exchange and is not part of a BDT exchange, the Duration/ID field is set to the estimated time, in microseconds, required to transmit the pending frame, plus one CTS frame, plus one Ack or BlockAck frame if required, plus any NDPs required, plus explicit feedback if required, plus applicable IFSs.
* In an MU-RTS Trigger(#5448) frame, the Duration/ID field is set to the estimated time, in microseconds, required to transmit(#5448) the pending frame, plus one CTS frame, plus the time to transmit(#5448) the solicited HE TB PPDU if required, plus the time to transmit the acknowledgement for the solicited HE TB PPDU(#9813) if required, plus applicable IFSs.
* In a BlockAckReq frame, the Duration/ID field is set to the estimated time required to transmit one Ack or BlockAck frame, as applicable, plus one SIFS.
* In an MU-BAR Trigger frame, BSRP Trigger frame, GCR MU-BAR Trigger frame and BQRP Trigger frame,(#8251) the Duration/ID field is set to the time required to transmit(#5449) the solicited HE TB PPDU plus one SIFS.

4) In a BlockAck frame that is not sent in response to a BlockAckReq frame or an implicit blockack request or a frame carried in an HE TB PPDU(#12361) , the Duration/ID field is set to the estimated time required to transmit an Ack frame plus a SIFS.

4a In an Ack or BlockAck frame that is sent in response to a frame carried in HE TB PPDU, the Duration/ID field is set to 0. (#12361)

* In individually addressed QoS Data frames with the Ack Policy subfield equal to No Ack or Block Ack, for Action No Ack frames, and for group addressed frames, the Duration/ID field is set to one of the following:
* i) If the frame is the final fragment of the TXOP, 0
* ii) Otherwise, the estimated time required for the transmission of the following frame and its response frame, if required (including appropriate IFSs)
* In a Basic Trigger frame, the Duration/ID field is set to the estimated time required to transmit the solicited HE TB PPDU, plus the estimated time required to transmit the acknowledgement for the solicited HE TB PPDU(#7724), plus applicable SIFSs.

***Change item b) of the 3rd paragraph as follows:***

* Multiple protection settings. The Duration/ID field is set to a value D as follows:
* Else 

 where

*TSINGLE-MSDU* is the estimated time required for the transmission of the allowed frame exchange sequence defined in 10.22.2.8 (TXOP limits) (for a TXOP limit of 0), including applicable IFS durations

*TPENDING* is the estimated time required for the transmission of

* Pending MPDUs (#12359)
* Any associated immediate response frames
* Any HT NDP, VHT NDP, HE NDP(#7905) or Beamforming Report Poll frame transmissions and explicit feedback response frames
* Applicable IFSs
* Any RDG
* Any pending QoS Null frame exchanges by paged STAs
* Any pending PS-Poll or NDP PS-Poll frame exchanges by paged STAs

(#12359)(#12359)(#12359)*TTXOP* is the duration given by dot11EDCATableTXOPLimit (dot11QAPEDCATableTXOPLimit for the AP) for that AC

*TTXOP-REMAINING* is *TTXOP* less the time already used time within the TXOP

*TEND-NAV* is the remaining duration of any NAV set by the TXOP holder, or 0 if no NAV has been established

*TPPDU* is the time required for transmission of the current PPDU

NOTE 1 – The detailed rule of allowing or disallowing transmission of MPDUs with different ACs is 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)

**Propose:** Revised for CID 13043 per discussion and editing instructions in 11-17/1874r0.

***TGax editor: Change 10.3.2 Procedures common to the DCF and EDCAF as the following: (Track change on)***

* Procedures common to the DCF and EDCAF
* CS mechanism

***Change the 3rd and 4th paragraph of the subclause as follows:***

A first virtual CS mechanism shall be provided by all MAC entities, and an additional second virtual CS mechanism shall be provided by an S1G MAC entity. The first mechanism is referred to as the NAV. The NAV maintains a prediction of future traffic on the medium based on duration information that is announced in RTS/CTS frames by non-DMG STAs, MU-RTS/CTS by HE STAs as defined in 27.2.5 (MU-RTS/CTS procedure)(#3137), and RTS/DMG CTS frames by DMG STAs prior to the actual exchange of data. The duration information is also available in the MAC headers of all frames sent during the CP other than PV1 MAC frames and PS-Poll frames and during the BTI, the A-BFT, the ATI, the CBAP, and the SP. The duration information might(#3148) also be available in the RXVECTOR parameter TXOP\_DURATION when an HE PPDU is received (see 27.11.5 (TXOP\_DURATION))(#13043).

**Propose:** Revised for CID 11134, 12434 per discussion and editing instructions in 11-17/1874r0.

***TGax editor: Change 10.3.2.4 Setting and resetting the NAV as the following: (Track change on)***

**10.3.2.4 Setting and resetting the NAV**

**(…existing texts …)**

Various additional conditions may set or reset the NAV for a STA that is not an HE STA(#8269), as described in 10.4.3.3 (NAV operation during the CFP). When the NAV is reset, a PHY-CCARESET.request primitive shall be issued. (#11134) This NAV update operation is performed when the PHY-RXEND.indication primitive is received, except when the PHYRXEND.indication primitive is received before the end of the PPDU, in which case the NAV update (#6495)is performed at the expected end of the PPDU.

**(…existing texts …)**

In non-DMG BSS, NAVTimeout period is equal to (2 x aSIFSTime) + (CTS\_Time) + aRxPHYStartDelay + (2 x aSlotTime). When an RTS frame is used for the most recent NAV update, t~~T~~he "CTS\_Time" shall be calculated using the length of the CTS frame and the data rate at which the RTS frame used for the most recent NAV update was received.(#12434) When an MU-RTS Trigger frame was used for the most recent NAV update, the "CTS\_Time" shall be calculated using the length of the CTS frame and the 6 Mb/s data rate (see 27.2.5 (MU-RTS/CTS procedure)).(#5931, #7528, #9748)(#4773)

**Propose:** Revised for CID 13056 per discussion and editing instructions in 11-17/1874r0.

***TGax editor: Change 10.3.5 Individually addressed MPDU transfer procedure as the following: (Track change on)***

Change 10.3.5 as follows:

~~A~~ When TXOP duration-based RTS is disabled, a STA using the DCF or EDCA(#7873) shall use an RTS/CTS exchange to protect the transmission of(#13056) individually addressed frames when the length of the PSDU is greater than the length threshold indicated by dot11RTSThreshold. When TXOP duration-based RTS is enabled, a non-AP HE STA using EDCA shall use an RTS/CTS exchange as defined in 27.2.1 (TXOP duration-based RTS/CTS)(#4773, #5556). A STA may also use an RTS/CTS exchange to protect the transmission of(#13056) individually addressed frames when it is necessary to distribute the NAV or when it is necessary to establish protection (see 10.26 (Protection mechanisms)). Otherwise a STA using the DCF shall not use the RTS/CTS exchange.

**(…existing texts …)**

**Propose:** Revised for CID 12782, 12783, 13149, 13297, 13298, 13299 per discussion and editing instructions in 11-17/1874r0.

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

**27.11.5 TXOP Duration**

The TXVECTOR parameter TXOP\_DURATION of an HE PPDU
indicates duration information for NAV setting and protection of the TXOP except that the TXVECTOR parameter TXOP\_DURATION is set to UNSPECIFIED to indicate no duration information. (#13297)

NOTE 1 – The value of TXVECTOR parameter TXOP\_DURATION is converted to an indication in the TXOP field of HE-SIG-A as described in Table 28-18 (HE-SIG-A field of an HE SU PPDU and HE ER SU PPDU), Table 28-19 (HE-SIG-A field of an HE MU PPDU), and Table 28-20 (HE-SIG-A field of an HE TB PPDU). The indication in the TXOP field of HE-SIG-A is converted to the RXVECTOR parameter TXOP\_DURATION as described in Table 28-1 (TXVECTOR and RXVECTOR parameters).(#13149)

A STA that is not a TXOP responder and that transmits an HE SU PPDU, HE ER SU PPDU, or HE MU PPDU may set (#13297)the TXVECTOR parameter TXOP\_DURATION to UNSPECIFIED(#8394).

A STA (#12783)that(#12782) transmits an HE SU PPDU, HE ER SU PPDU, or HE MU PPDU that carries a PS-Poll frame shall set the TXVECTOR parameter TXOP\_DURATION to UNSPECIFIED(#8394).(#12783)

A STA that is a TXOP responder that transmits an HE SU PPDU, HE ER SU PPDU, or HE TB PPDU shall set the TXVECTOR parameter TXOP\_DURATION to UNSPECIFIED if the RXVECTOR parameter TXOP\_DURATION of the soliciting PPDU is UNSPECIFIED(#8394).

An (#13297)AP that has set the BSS Color Disabled field in the HE Operation element to 1, shall set the TXVECTOR parameter TXOP\_DURATION to UNSPECIFIED for an HE PPDU that it transmits to non-AP STAs associated to it.

An non-AP (#13297)STA should set the TXVECTOR parameter TXOP\_DURATION to UNSPECIFIED for an HE PPDU, except for the HE TB PPDU,(#13298) that it transmits to an AP if the BSS Color Disabled field in the HE Operation element most recently received from the AP is 1.A STA (#12783)that transmits an HE TB PPDU shall not set the TXVECTOR parameter TXOP\_DURATION to UNSPECIFIED(#8394) if any one of the following condition is met:

* The RXVECTOR parameter TXOP\_DURATION of the soliciting PPDU is not UNSPECIFIED(#8394)
* The soliciting PPDU is not an HE PPDU(#5215)

When an (#13297)STA (#13299)transmits an HE PPDU with the TXVECTOR parameter TXOP DURATION not set to UNSPECIFIED and the MAC header of the HE PPDU contains a Duration field,(#13299) it 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 is set to 8448.(#9846)

NOTE 1—Except for a PS-Poll frame, the Duration/ID field in a Data frame, Management frame and Control frame indicates duration information.

NOTE 2—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).

When a STA(#12783) transmits (#12783) an HE TB PPDU carrying either(#12783) an NDP feedback or a PS-Poll frame with the TXVECTOR parameter TXOP DURATION not set to UNSPECIFIED, it shall calculate the potential duration information and set the TXVECTOR parameter TXOP\_DURATION in the HE TB PPDU carrying the NDP feedback or PS-Poll frame to the value of the computed potential duration. The TXOP responder shall calculate potential duration information equal to the duration information indicated by the Duration field of the frame that solicits the response minus the time, in microseconds, between the end of the PPDU carrying the frame that soliciting the HE TB PPDU and the end of the HE TB PPDU. If the calculated potential duration information includes a fractional microsecond, the potential duration information is rounded up to the next higher integer. If the calculated potential duration information is smaller than 8448 s, the TXVECTOR parameter TXOP\_DURATION shall be set to the calculated potential duration information. Otherwise, the TXVECTOR parameter TXOP\_DURATION shall be set to 8448.

(#9143)

NOTE 1(#13149)—The time is equal to SIFS plus the duration of the HE TB PPDU, where the duration of the HE TB PPDU which is defined in Equation (28-126).(#9846)