IEEE P802.11
Wireless LANs

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| Comment resolution for 27.7.3.3 |
| Date: 2017-05-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (26):

* 5670, 5852, 6751, 7633, 7634, 7822, 8086, 8089, 8090, 8229, 8286, 8287, 9314, 9744, 9745, 9746, 9935, 9936, 9980, 5666, 5667, 5669, 6749, 6750, 6752, 7114

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: some minor editorial changes incorporated (changes highlighted in green).

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** | **Commenter** | **P** | **L** | **Comment** | **Proposed Change** | **Resolution** |
| 5670 | Guoqing Li | 186 |  | As I understand, a STA need to send PS-Poll or APSD trigger during a TWT SP to fetch DL BU if the TWT SP is announced. The STA does not send PS-Poll or APSD trigger if the SP is unannounced. This paragraph only applies to announced SP which need to be clarifeid | Line 21, change to "...frame within that TWT SP if the TWT SP is announced" | Revised –Agree in principle. Proposed resolution clarifies as suggested, plus additionally adding to the exception the unannounced case that needs no PS-Poll or QoS Null. TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 5670. |
| 5852 | Hyunhee Park | 185 | 39 | P185L39 says "A TWT scheduled STA should not initiate trandsmission of frames to the TWT scheduling STA outside of broadcast TWT SPs and within trigger-enabled TWT SPs".In this case, the EDCA backoff procedure is unclear when the backoff count is finished outside of broadcast TWT SP and within trigger-enabled TWT SP. Therefore, the EDCA backoff procedure of tirgger-enabled TWT should be clarified. | Add below sentence in P185L41 for clarification of EDCA backoff procedure."The backoff for the associated EDCAF should not countdown outside trigger-enable TWT SPs." | Rejected –The cited statement indicates a recommendation for the STA to not initiate transmissions on it own so that to avoid disrupting the WM access performed by the AP or other STAs that have been allocated resources in those time periods. However this is not a mandatory requirement and has no impact in the EDCA backoff procedure per se.  |
| 6751 | John Coffey | 186 | 17 | Inconsistent terminology: here we have "the trigger-based PPDU", whereas almost everywhere else in the draft we have "the HE trigger-based PPDU". If the same thing is intended, the same term should be used. | Change to "the HE trigger-based PPDU". | Revised –Agree in principle. Proposed resolution is to replace with HE TB PPDU.TGax Editor: Replace “trigger-based PPDU” with “HE TB PPDU” throughout the draft.  |
| 7633 | Liwen Chu | 185 | 38 | Whether a scheduled STA can do transmission is decided by the MU EDCA parameters. No additional rules are needed. | Change the text per the comment. | Rejected –MU EDCA operation and TWT operation are independent of each other, although they can jointly be used by an AP in which case the mandatory rules defined by MU EDCA enhance the recommended behavior that is defined for TWT operation. On the other side if the AP only uses TWT then the STAs are only recommended to not access the medium outside of TWT SPs or within trigger-enabled TWT SPs to help in scheduling.  |
| 7634 | Liwen Chu | 185 | 42 | "A TWT scheduled STA that is in PS mode may go to doze state after receiving the Beacon frame and shallbe in the awake state at a broadcast TWT start time during which the STA intends to exchange frames withthe TWT scheduling STA."This is not harmonized with AP's trigger rules: in a btoadcast TWT SP, AP should schedule the STAs that negotiate the TWT SP with it. | Harmonize them. | Revised –Agree in principle. Proposed resolution clarifies this case and the other one where the STA negotiates the wake interval.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 8086. |
| 7822 | Mark Hamilton | 186 | 8 | AID12 is equal to the least significant 12 bits of the AID | Change "AID" to "12 least significant bits of the AID". Same thing at P186L22, P189L51, P189L55. | Revised –Already taken care of in D1.2.TGax editor: Replace “STA’s AID” with “the 12 LSBs of the STA’s AID” throughout. |
| 8086 | Matthew Fischer | 185 | 42 | The language here is a bit unclear - in particular, pay attention to the "shall" clause and the associated modifier "which the STA intends": A TWT scheduled STA that is in PS mode may go to doze state after receiving the Beacon frame and shall be in the awake state at a broadcast TWT start time during which the STA intends to exchange frames with the TWT scheduling STA. - the problem here is that the AP cannot predict whether a STA is going to be awake or not, because the AP does not know of the STA's intentions. So this is not helpful language. Either change the shall to a should, or remove the qualifier and require the STA to be awake for all TWT SP associated with a Broadcast TWT that it has joined. | Remove the qualifier or modify it so that the STA is required to be awake for all TWT SP associated with a Broadcast TWT that it has joined. If a STA has not joined the Broadcast TWT with this TWTID, then it does not have to be awake. Also, there will remain the option for a STA to be able to sleep through some BTWT SPs because it can always signal suspend and resume with the TWT Info frames. | Revised –Agree in principle. Proposed resolution clarifies this case and the other one where the STA negotiates the wake interval.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 8086. |
| 8089 | Matthew Fischer | 185 | 57 | In a couple of places, the wrong term is used - where "responding STA" is mentioned | At L58, change "responding STA" to "scheduled STA" and at L62, change "responding STA" to "scheduling STA" - also the sentence on L62 that begins with "reception of a frame" is a separate paragraph, but it should probably be item 3) in the list of items just above itself | Revised –Agree in principle. Proposed resolution accoutns for the suggested changes.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 8089. |
| 8090 | Matthew Fischer | 185 | 45 | If a STA is awake for more than one TWT SP, because either at the start or in the middle of an initial TWT SP, an overlap occurs, then the STA should be required to be awake until all TWT SP in which it participates have terminated. Note the complication here of identifying the particular TWT SP to which a terminanation notice belongs - i.e. if a scheduled STA receives an EOSP, is that valid or all TWT SP in which it participates, or is it only valid for one of them and if so, which one of them? | As one option, add a new paragraph to follow the paragraph that begins at P185L42 and its associated bullet items as follows: A scheduled STA that participates in more than one Broadcast TWT SP shall remain in the wake state during any time that is part of any of the TWT SP in which it participates unless a termination has occured for each of the TWT SPs that is currently active. Or maybe: A scheduled STA that participates in more than one Broadcast TWT SP may switch to doze state only when a termination event has occured for all currently acitve TWT SPs in which it participates. | Revised –Agree in principle. Proposed resolution is to specify that the early SP termination event occurs for all b-TWTs. Note that this is added as a note since the normative behavior generally related ot one particular instance of B-TWT. TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 8090. |
| 8229 | Osama Aboulmagd | 185 | 35 | The term "broadcast TWT element" is used in many places but I wasn't able to find its format | clarify | Revised –Agree in principle. Proposed resolution specifies that a broadcast TWT element with the Broadcast field set to 1 is a broadcast TWT element.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 8229. |
| 8286 | Pascal VIGER | 185 | 40 | Second paragraph of 27.7.3.3: "A TWT scheduled STA should not initiate transmission of frames to the TWT scheduling STA outside of broadcast TWT SPs and within trigger-enabled TWT SPs."This sentence should be completed to which action the TWT scheduled STA should do. | I propose to clearly indicate after the sentence: "However, the TWT scheduled STA should wait for trigger frames sent by the TWT scheduling STA". | Rejected –The comment fails to identify a technical issue. Waiting is not an action, rather than a non-action.  |
| 8287 | Pascal VIGER | 184 | 17 | The TWT scheduling STA shall schedule for transmission a Trigger frame addressed to one or more TWT scheduled STAs during a trigger-enabled TWT SP.Due to density and other (legacy) STAs contending on the medium, there is good chance that the TWT SP start time is delayed.TWT STAs may miss the TWT SP for any of 2 reasons:- the TWT-TF is collided (worse case)- the TWT-TF is too much postponed : thus some TWT STAs will fallback from MU-EDCA to EDCA mode, or will transition to doze state | The Trigger Frames having a targeted wake time schedule (trigger-enabled SPs) shall be prioritized for being transmitted by HE AP.This will ensure the timing contract with TWT scheduled stations is respected for trigger-enabled TWT agreement, which is beneficial for medium usage efficiency. | Rejected –An AP is already allowed to send a Trigger frame using any AC, and depending on the priority that the AP deems reasonable for the particular scenario there is likelihood that the AP can decide using the highest priority AC\_VO. This is already there. The only thing that is not allowed as of today is the AP using PIFS to access the medium to transmit Trigger frames, and this would be a controversial topic at least since the use of PIFS would have adverse effects for fair access to the medium in a dense (even rarely dense, such as 2 BSS in the same area) environment as an AP using PIFS access to send trigger frames may cause starvation to STAs associated to other BSSs and are within its BSS range.  |
| 9314 | Tomoko Adachi | 185 | 62 | The sentence starting from line 62 seems to be one of the early TXT SP termination events. | Move the sentence from line 62 to be the 3rd item in the previous paragraph. | Accepted |
| 9744 | Yongho Seok | 185 | 51 | A TWT requesting STA in PS mode that is awake for a TWT SP may transition to the doze state after an early TWT SP termination event if there is at least one frame exchange with the STA during AdjustedMinimumTWTWakeDuration.But, I think that the below early TWT SP termination event requires no frame exchange."The reception from the TWT scheduling STA of a Trigger frame with a Cascade Indication field equal to 0 that is not intended to the STA and does not allocate any random RU."If a frame exchange like a PS-Poll frame or an APSD trigger frame was occured, the AP will attempt to transmit a DL BU frame to the TWT requesting STA. | Change as the following:"...or after an early TWT SP termination event 2) and 3) if there is at least one frame exchange with the STA during AdjustedMinimumTWTWakeDuration, or after an early TWT SP termination event 1) if there is no frame exchange with the STA from the TWT SP start time." | Revised –Agree with the comment. Proposed resolution incorporates the suggested change. TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 9744. |
| 9745 | Yongho Seok | 185 | 48 | Probably, "AdjustedMinimumWakeDuration" is a typo."AdjustedMinimumTWTWakeDuration" is right. | Change "AdjustedMinimumWakeDuration" to "AdjustedMinimumTWTWakeDuration". | Accepted |
| 9746 | Yongho Seok | 185 | 62 | "The reception of a frame sent by the TWT responding STA that has either the EOSP subfield equal to 1 or the More Data field equal to 0 when the frame does not contain an EOSP subfield."Because the above paragraph is one of the early TWT SP termination events, it shall be move to bullet 3). | As per comment. | Accepted |
| 9935 | Young Hoon Kwon | 185 | 55 | Event shown in 1) only implies that the AP will not schedule any UL MU transmission during remaining TWT SP, and it does not give any information on DL transmission. Therefore, the event 1) does not prohibit an AP from sending DL transmission during the TWT SP. Then, it is not sure how can a STA go to doze state with event 1)? Further clarification is needed. | As in the comment. | Revised –Agree in principle with the comment. Proposed resolution is inline with suggested change from CID 9743, and other CIDs, that proposes to clarify that item 1) or a) now is subject to no frame exchange has occurred with the STA from the start of the TWT.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 9935. |
| 9936 | Young Hoon Kwon | 185 | 62 | The last sentence should be written as the third event for termination. Therefore, it should be enumerated as 3). Also, "TWT responding STA" need to be changed to "TWT scheduling STA". | As in the comment. | Revised –Agree with the comment. Applied suggested changes and also applied the suggested change in the preceding item as well.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 9936. |
| 9980 | Yuchen Guo | 185 | 39 | Is the TWT scheduled STA in PS mode? If not, it seems not reasonable to suggest a TWT scheduled STA that is in the active mode not to transmit outside of broadcast TWT SP | Add "that is in PS mode" after "TWT scheduled STA" | Rejected –The broadcast TWT is used for both power save (for STAs in PS mode) and for scheduling purposes (for STAs in general, not only for those in PS mode). As such this sentence is correct as it refers to the scheduling part of the broadcast TWT. |
| 5666 | Guoqing Li | 185 | 47 | Regarding the first "TWT SP termination event" in this line, the terminlogy in other part of this section is "early TWT SP termination event", need to be consistent to avoid confusion. | change the first "TWT SP termination event" in this line to "Early TWT SP termination event", | Revised –Agree in principle. Proposed resolution is to use same terminology as the individual TWT counterpart.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 5666. |
| 5667 | Guoqing Li | 185 | 47 | Regarding the second "TWT SP ternination event" in this line, it is referring to the end of the this SP. To diferentiate it from the early SP termination event, it is better to use another terminology such as "normal TWT SP termination event". | changethe the second "TWT SP termination event" in this line to "normal TWT SP termination event" or define TWT SP Termination event such that it includes early terination event and the even that the adjustedMinimumTWTWakedudration has passed. | Revised –Agree in principle. Proposed resolution is to use same terminology as the individual TWT counterpart.TGax editor to make the changes shown in 11-17/0686r1 under all headings that include CID 5667. |
| 5669 | Guoqing Li | 185 | 62 | This pagraph should be a third bullitin following the previous two bullitins | edit accordingly | Accepted |
| 6749 | John Coffey | 185 | 47 | Wrong article: "The TWT SP termination event occurs". | Change to "A TWT SP termination event occurs". | Accepted |
| 6750 | John Coffey | 186 | 16 | Wrong article: "The TWT scheduled STA that is in PS mode". Is there just one? | Change "The" to "A". | Accepted |
| 6752 | John Coffey | 186 | 20 | Wrong article: "the PS-Poll or APSD trigger frame". | Change "the" to "a". | Accepted  |
| 7114 | Junichi Iwatani | 186 | 15 | "trigger-based PPDU" should be "HE trigger-based PPDU" | as in comment | Revised –Agree in principle. Proposed resolution is to use the “HE TB PPDU” that is already present in the draft. Note to TGax editor: Change is already incorporated in D1.2.TGax editor: Replace “trigger-based PPDU” with “HE TB PPDU” |

**Discussion: *None.***

* Rules for TWT scheduled STA

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 8229):***

A TWT scheduled STA that receives a TWT element with the Broadcast field equal to 1 in a Beacon frame shall follow the rules defined in this subclause to interact with the TWT scheduling AP. A TWT element with the Broadcast field equal to 1 is refered to as broadcast TWT element*(#8229)*.

A TWT scheduled STA should not initiate transmission of frames to the TWT scheduling AP outside of broadcast TWT SPs and within trigger-enabled TWT SPs.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 6749, 5669, 9936, 9746, 9935, 9745, 9744, 9314, 7634, 8089, 5666, 5667):***

A TWT scheduled STA that is in PS mode may go to doze state after receiving the Beacon frame and shall be in the awake state at a broadcast TWT start time for which the STA has indicated to be awake by either establishing a membership for the broadcast TWT with that Broadcast TWT ID, or by negotiating the wake TBTT and wake interval of Beacon frames that the STA receives, as defined in 27.7.3.4 (Negotiation of wake TBTT and wake interval), or has sent a PS-Poll or UPSD trigger frame during that beacon interval *(#7634, 8086)*.

A TWT scheduled STA in PS mode that is awake for a broadcast TWT SP may transition to the doze state after *(#5666, 5667)* AdjustedMinimumTWTWakeDuration*(#9745)* time has elapsed from the TWT SP start time as identified by the TWT scheduled STA, or after an early TWT SP termination event a) if there is no frame exchange with the STA from the TWT SP start time, or after an early TWT SP termination event b) or c)*(#9935, 9744)* if there is at least one frame exchange with the STA during AdjustedMinimumTWTWakeDuration, whichever occurs first*(#9935, 9744)*. The early TWT SP termination events are as defined below:

1. The reception from the TWT scheduling AP of a Trigger frame with a Cascade Indication field equal to 0 that is not intended to the STA and does not allocate any random RU.
2. The transmission of an acknowledgement in response to a soliciting frame sent by the TWT scheduling STA*(#9936, 8089)* that has either the EOSP subfield equal to 1 or the More Data field equal to 0 when the frame does not contain an EOSP subfield.
3. *(#9936, 9746, 9314, 5669)* The reception of a frame sent by the TWT scheduling STA*(#9936, 8089)* that has either the EOSP subfield equal to 1 or the More Data field equal to 0 when the frame does not contain an EOSP subfield.

The classification of a More Data field equal to 0 in an Ack, BlockAck and Multi-STA BlockAck frame as an early termination event can occur only when both STAs have indicated support of transmitting or receiving the frame with a nonzero More Data subfield, which is indicated in the More Data Ack subfield of the QoS Info field of frames they transmit (see 11.2.2 (Power management in a non-DMG infrastructure network)).

**TGax Editor: Add a note as follows *(#CID 8090):***

NOTE 1—A Trigger frame, sent by the TWT scheduling AP, is defined as intended for the TWT scheduled STA when the Trigger frame contains the AID of the STA in one of its Per User Info fields (see 27.5.2 (UL MU operation)). Otherwise, the Trigger frame is not intended for the STA. If the Trigger frame contains one or more random RU(s) for which the STA can gain access according to 27.5.2.6 (UL OFDMA-based random access (UORA)) then the STA can follow the rules defined in 27.14.2 (Power save with UORA) to determine an early TWT SP termination event.

NOTE 2— A TWT scheduled STA participating in more than one TWT SPs, which overlap in time, stays in awake state until the latest AdjustedMinimumTWTWakeDuration across those TWT SPs expires, and an early termination event enables all TWT SPs to terminate early.*(#8090)*.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 6752, 6750, 5670):***

A TWT scheduled STA transmits a HE TB PPDU as a response to a Trigger frame that is intended for it and is sent during a trigger-enabled TWT SP (see 27.5.2 (UL MU operation)). A TWT scheduled STA*(#6750)* that is in PS mode and is awake shall include a PS-Poll frame or an APSD trigger frame in the HE TB PPDU if it intends to solicit buffered BUs from the TWT scheduling AP (see 11.2.2.8 (Receive operation for STAs in PS mode during the CP)) unless the STA has already transmitted a PS-Poll*(#6752)* or APSD trigger frame within that announced TWT SP or the TWT SP is an unannounced TWT SP*(#5670)*. The STA may include other frames in the HE TB PPDU.

NOTE—A TWT scheduling AP sets the bit in the TIM element of the Beacon frame that corresponds to the AID of the TWT scheduled STA to 1 to indicate that it expects the TWT scheduled STA to solicit available buffered BUs (see 11.2.2.8 (Receive operation for STAs in PS mode during the CP)).

A TWT scheduled STA should only send frames that satisfy the TWT flow identifier recommendations defined in Table 9.248l1 (TWT Flow Identifier field for a broadcast TWT element) during the corresponding TWT SP(s). Frames sent as a response to a Trigger frame are subject to further restrictions as defined in 27.5.2 (UL MU operation).