IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | CR TWT IE | | | | | | Date: 2017-08-17 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Matthew Fischer | Broadcom |  |  | [Matthew.fischer@broadcom.com](mailto:Matthew.fischer@broadcom.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

Comment resolution with proposed changes to TGax D1.4 for CIDs from the WG LB for TGax related to 9.4.2.200 which is the TWT Information Element.

The CID list is (CIDs in GRAY were in the list previously, but have been deleted):

3031 3123 4765 4766 5034 5673 5759 5765 5766 5767 5768 5769

5832 5833 5834 5835 5836 5892 5959

6049 6051 6089 6350 6351 6352 6353 6354 6355 6363

7170 7184 7208 7358 7359 7360 7361 7362 7551 7598 7599 7600

7922 7923 7924 7925 7926 7927 7928 7929 7930

8123 8124 8127 8131 8144 8196 8197

8200 8591 9843 9971

The proposed changes on this document are based on TGax Draft 1.4.

**REVISION NOTES:**

**R0**:

initial

**R1**:

**Figure 9-589ava – TWT element format when the Broadcast subfield equals 1** – remove TWT Grouping Assignment subfield as it does not apply to the Broadcast case

**R2**:

Update to D1.3 – this changes a few paragraphs within 9.4.2.200 TWT Element – mostly modifying the language regarding the Wake TBTT Negotiation subfield and its effect on the interpretation of the Wake Interval and Target Wake Time subfields

**R3**:

Fixed abstract which still referred to D1.2

Added green numbers for CID 3123, 5034 in one more place

Replace references to 777r2 with 777r3

**R4**:

Split the 8 bit Broadcast TWT ID field into 5 bits for Broadcast TWT ID and 3 bits for Persistence field, change the original field name to Broadcast TWT Info, as it contains two subfields now, persistence field is to allow a specific number of BI to be specified as active for the broadcast TWT, so that if a STA fails to receive a beacon, it knows that the bTWT is still active. Latest received persistence value for a particular bTWT ID replaces any earlier value to allow the AP to continue to push the expiration of the bTWT forward.

Add NDP Report Poll frame requirement for Broadcast TWT with TWT Flow ID field set to 4. – TWT Flow ID field table of settings is modified to include this.

No longer addressing a group of CIDs that the editor took it upon himself to deal with already.

Those CIDs are deleted from the grayed out in the listing above and their table entries below are similarly grayed out.

They will all be removed if there is a subsequent revision.

Replace references to 777r3 with 777r4

**R5**:

Delete GRAY CIDs

Replace references to 777r4 with 777r5

**R6**:

Modify the table entry for TWT Grouping – it was incorrect

Replace the use of the word “active” in reference to a TWT with different verbs and adjectives, since there is no concept of “active” defined

Minor editorial change remove redundant AP reference

Replace references to 777r5 with 777r6

**R7**:

Eliminate the Broadcast Parameter Count field and instead create a Last Broadcast Parameter Set indicator which sits in the position of the Implicit bit which is never used for Broadcast.

Various other minor editorial modifications, including the insertion of a new table to more concisely replace a paragraph that describes the meaning of the Target Wake Time and TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields

Replace references to 777r6 with 777r7

**R8**:

Remove the FLOW ID code 4 for broadcast TWT – the NDP short feedback CID that generates this change and other associated changes are in a separate document

Changed 7362 proposed resolution from revise to reject and removed addition of an S1G MIB variable as this should be done within TGmd

CID 7930 – changed the outcome by deleting the qualifying phrase regarding “control feedback” within the table for Flow ID value meanings in the context of broadcast TWT SPs

CID 7600 – changed from revise to reject – note that when it was revise, the proposed commenter change was not actually implemented, nor was any subdued generally agreed version of it implemented, so only the resolution is changed, i.e. no change to the proposed text changes is necessary to accompany the change of the resolution

CID 8196 – changed from reject to revise and piggybacked other CID resolutions regarding the splitting of the format diagram

TWT Flow ID code 2 – removed HE TB NDP PPDU from the list of acceptable frames because code 2 requires at least one random RU within every trigger and this is not compatible with the NDP FB Poll trigger type that is needed to generate the HE TB NDP PPDU

**END OF REVISION NOTES**

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.***

**CIDs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3031 | Abhishek Patil | 70.04 | 9.4.2.200 | A TWT Scheduling STA that is responding to a TWT request to setup a wake TBTT will see the TBTT Negotiation subfield value to 1. Also see section 27.7.3.4 (pg 186, line 48) | Change the sentence to say that a TWT scheduling STA that is responding to a TWT request to setup a wake TBTT shall set the value of TBTT Negotiated subfield to 1. | Revise – deleting the sentence is logically equivalent, simpler and easier to understand, as the fields have the same meaning when the Wake TBTT Negotiation bit is set to 1, regardless of whether requesting, responding, scheduled or scheduling STA sets the bit. TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 3031. |
| 3123 | Adrian Stephens | 69.28 | 9.4.2.200 | 802.11ah defines the TWT element as extensible. .11ax indicates that the body of the element can be repeated for Broadcast, and presumably relies on the Length field to determine the number of such repeats. These are incompatible. | Change the element ID definition to indicate it is not extensible, or add a count subfield in the Control field. | Revise – TGax editor to make changes as shown in 11-17/0777r8 that are marked with CID 3123 |
| 4765 | Alfred Asterjadhi | 69.32 | 9.4.2.200 | There are some issues in this Figure. First some parts are missing (TWR field is 8, 2, or 0 in length, Broadcast TWT ID needs to be underlined). Also in order to avoid confusion between a normal TWT element and a broadcast TWT element I suggest having two Figures, one for TWT element (with one TWT parameter set, as in baseline), and another one for broadcast TWT element (with one or more TWT parameter sets, this to be tied to the value broadcast = 1 and wake TBTT interval value 0). | As in comment. | Revise – TGax editor to make changes as shown in 11-17/0777r8 that are marked with CID 4765 |
| 4766 | Alfred Asterjadhi | 69.55 | 9.4.2.200 | The Broadcast TWT ID is present when the Broadcast field is 1, however the functionality of the Broadcast TWT ID depends on the value of the Wake TBTT interval value. If the value is 0 then this is a broadcast TWT element. If the value is 1 then this is a TWT request/response that is negotiating the broadcast TWT IDs of that (those) particular value(s). | As in comment. Impacts also the paragraph that describes the definition of Wake TBTT Negotiation in the next paragraph (which as is refers only to when the Broacast is 0 and need to add the case when broadcast is 1). Also to generalize call this field something else (as Wake TBTT is restrictive now). Also please make these changes to all those fields that depend on these settings in the remaining paragraphs of this subclause. | Revise – TGax editor to make changes as shown in 11-17/0777r8 that are marked with CID 4766 |
| 5034 | Chittabrata Ghosh | 69.51 | 9.4.2.200 | It is mentioned that there are one or multiple TWT Parameter sets within a TWT element when Broadcast field is 1; for efficient parsing, it is beneficial to add an indication of the number of the TWT Parameter sets included within the TWT element | Please include signaling of the number of TWT Parameter sets in a TWT element | Revise – TGax editor to make changes as shown in 11-17/0777r8 that are marked with CID 5034 |
| 5673 | Guoqing Li | 72.35 | 9.4.2.200 | This paragraph says how to set Broadast ID for broadcast TWT. However, in secton 27.7.3.4, line 46 and 58, it indicates that broadcast ID is reserved. | clarify so that it is consistent with section 27.7.3.4 | Revise – add text in the field description that the field is reserved when transmitted by a scheduled STA. TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5673. |
| 5759 | Guoqing Li | 70.50 | 9.4.2.00 | "as other TWT paramters are sugested by TWT scheduled STAs", does scheduled STA also suggest flow identifier? It seems to me that flow identifier is determined by the AP's scheduling algorithm and scheduled STA doesn't suggest this parameter. | Clarify | Revise – TWT Flow ID field is reserved when transmitted by a scheduled STA - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5759. |
| 5765 | Hanseul Hong | 69.36 | 9.4.2.200 | The length of TargetWakeTime subfield is 2 in case of broadcast TWT | Change '8 or 0' to '8 or 2 or 0' for the length of TargetWakeTime subfield | Revise – other changes have caused a separate diagram to be created, so the change is effected in spirit, but differently than suggested - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5765. |
| 5766 | Hanseul Hong | 69.36 | 9.4.2.200 | In broacast TWT, TWT channel subfield is not present | Change '1' to '1 or 0' for the length of TWT channel subfield | Revise – other changes have caused a separate diagram to be created, so the change is effected in spirit, but differently than suggested - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5766. |
| 5767 | Hanseul Hong | 70.04 | 9.4.2.200 | In table 9-262k, TWT scheduling STAs may set TBTT negotiation subfield to 1 in case of accept/reject TWT | Delete 'scheduling STA' | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5767. |
| 5768 | Hanseul Hong | 74.52 | 9.4.2.200 | According to the description, the TWT Channel field in TWT element sent by an HE TWT requesting STA indicates temporary primary channel during TWT SP. | Change 'a TWT requesting STA' to 'a S1G TWT requesting STA' and 'a TWT responding STA' to 'a S1G TWT responding STA', or give some description of using temporary channel in an HE STA | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5768. |
| 5769 | Hanseul Hong | 75.24 | 9.4.2.200 | It says "A TWT requesting STA sets the TWT Protection subfield to 0 if TWT protection by RAW allocation is not requested for the corresponding TWT(s)". However, an HE STA, TWT Protection subfield may be set to 1 to enable the NAV protection given by 802.11ax. | Delete the sentence or change 'A TWT requesting STA' to 'A S1G TWT requesting STA' | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5769. |
| 5832 | Huizhao Wang | 69.64 | 9.4.2.200 | Paragraph starting from line 64 is completely incomprehencable. It seems trying to describe the TWT element with broadcast = 1, how to determine the wake TBTT and listen interval, but it has failed to describe it clearly | Add graphs, and equations to show how to calculate the next wake TBTT and listen intervals between beacons | Reject – the information here is complete and concise as a description of the field. It is not intended to provide the commenter’s requested behavioral descsription, the exact use of these fields is found in 27.7.3.4, which is already referenced here. |
| 5833 | Huizhao Wang | 69.31 | 9.4.2.200 | Target Wake Time field size should be either 8 or 2 octects | Change "8 or 0" to "8 or 2" | Revise – other changes have caused a separate diagram to be created, so the change is effected in spirit, but differently than suggested - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5833. |
| 5834 | Huizhao Wang | 70.34 | 9.4.2.200 | The description for TWT Setup command of Request TWT is not clear. It should just simply say that for Request TWT command, the Target Wake Time field should be set to zero. | Replace the text: "The Target Wake Time field of the TWT element contains 0s as the TWT responding STA specifies the target wake time value for this case,". With following simple text: "Target Wake Time field shall set to zero." | Reject – the group has this language in place because when the language was not present, there were questions about how there could be a request without providing a non-zero TWT Time value in the request and the language certainly does not make things more difficult to understand, but rather, provides an explanation that clears up the question of why 0s is appropriate. |
| 5835 | Huizhao Wang | 73.16 | 9.4.2.200 | Deliver sounding feedback in TWT SP time may impact the performance of HE TxBF. The sounding feedback carries the channel matrix information of the moment of sounding NDP is received, need to timely delivered to the beamformer without delay, so using TWT SP time to deliver it will likely cause extra delays. | Remove: "Frames that are sent as part of a sounding feedback exchange (see 27.6 (HE sounding protocol))" | Reject – nothing in the statements here suggest that the sounding frames were sent at any significant time preceding the delivery of the feedback. It is much more probable that the TWT is for PS STA which are only waking at the TWT SP and therefore, the sounding PPDUs are transmitted in the same TWT SP as the feedback. Even if sounding were in one SP and FB in a later one, that is an implementation choice. |
| 5836 | Huizhao Wang | 73.42 | 9.4.2.200 | Deliver sounding feedback in TWT SP time may impact the performance of HE TxBF. The sounding feedback carries the channel matrix information of the moment of sounding NDP is received, need to timely delivered to the beamformer without delay, so using TWT | remove: "Frames that are sent as part of a sounding feedback exchange (see 27.6 (HE sounding protocol))" | Reject – nothing in the statements here suggest that the sounding frames were sent at any significant time preceding the delivery of the feedback. It is much more probable that the TWT is for PS STA which are only waking at the TWT SP and therefore, the sounding PPDUs are transmitted in the same TWT SP as the feedback. Even if sounding were in one SP and FB in a later one, that is an implementation choice. |
| 5892 | James Yee | 69.69 | 9.4.2.200 | Here and elsewhere, "field is 1" should be "field is set to 1" | As suggested. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 5892. |
| 5959 | Jarkko Kneckt | 72.26 | 9.4.2.200 | The Triggered TWT SP should define that AP shall transmit a Trigger frame or a frame with Reverse Direction Grant indication in the Triggered TWT SP. In both cases the AP schdules UL transmission resources for the STA. The transmission of the frame with Reverse Direction Grant is useful when data transmission is random or the AP does not have precise knowledge of the amount of UL data that a STA has or when few STAs wake up for the TWT SP. The Trigger frame and frame with RDG enables the AP to allocate transmission resource for the non-AP STA . When frame with RDG is transmitted, the transmission resources are not wasted, if the non-AP STA does not have traffic to transmit for the whole allocated resource. | Please change the text p.72, l.26 to read:" includes Trigger frames or farmes with reverse direction grant. The Trigger field is set to 1 to indicate that at least one Trigger frame or a frame with reverse direction grant is transmitted during the TWT SP." | Reject – reverse direction does not promote efficient use of the medium that using a feature that is a fundamental enhancement offered by the TGax amendment. |
| 6049 | Jarkko Kneckt | 73.03 | 9.4.2.200 | How STAs that have established TWT Flow ID 1 or 2 transmit UL DATA? The recommendations do not allow UL data transmission. | Please allow UL and DL data frames transmission at the end of the TWT SP. Thus, the first part of the TWT may be used to exchange short signaling packets and the last part could be used for the data transmissions. Transmitting data in the same TWT SP simplifies the TWT handling. | Reject – see ID value 3, which already has no restrictions on what may be transmitted during the SP – this is all within the control of the AP and is therefore an implementation decision with all options available as per the current encodings in the draft specification. |
| 6051 | Jarkko Kneckt | 69.17 | 9.4.2.200 | The Trigger field in the TWT currently controls whether the AP shall send a Trigger to a STA in TWT SP. The TWT should not force AP to send Trigger frames, the Triggering should be taken into use when EDCA is not performing well and AP should have flexibility to control this transition. | Delete the Trigger field in the Request Type field of the TWT element. | Reject – while there could be an alternative to the current description of triggered TWT behavior, the one that exists is the one that was agreed upon, and other variations of TWT SP operation also exist within the draft. The current triggered TWT rules do not allow the operation suggested by the commenter because the current rules also recommend that the requesting STA does not send frames outside of the SP. What is being suggested is really, a proposal for a new mode of operation and would need a more complete description to be considered. |
| 6089 | Jian Yu | 74.52 |  | The ax draft contains description for 11ah draft without an clarification. For example, there is description for channel width of 1MHz and 2MHz for a BSS, whch seems very strange | Refine the whole paragraph and clarify which part is for ax and which part is for ah. Maybe should also add ah spec as a reference | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 6089. |
| 6350 | John Coffey | 71.04 | 9.4.2.200 | Unclear wording: "... contains 0s as the TWT ..." looks at first sight as if the TWT whatever contains 0s. In context it seems that the "as" means "because" here. The stray clause tacked on at the end by a comma doesn't help. | Change "as" to "because". | Revise – generally agree with comment but language is changed significantly - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 6350. |
| 6351 | John Coffey | 71.04 | 9.4.2.200 | The sentence in the fifth column has independent clasues linked by a comma without a coordinating conjunction. This is ungrammatical usage and it hurts clarity. | Change the comma to a semicolon. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 6351. |
| 6352 | John Coffey | 73.09 | 9.4.2.200 | Garbled text: "Feedback can be contained is the QoS Control field". | Change "is" to "in". | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 6352. |
| 6353 | John Coffey | 73.34 | 9.4.2.200 | Garbled text: "Feedback can be contained is the QoS Control field". | Change "is" to "in". | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 6353. |
| 6354 | John Coffey | 74.04 | 9.4.2.200 | Anthropomorphism: "the TWT requesting STA expects". The STA is an object and does not "expect" anything. | Reword to remove the anthoropomorphism. | Reject – if corporations are people, then it follows that STAs are people, see USA supreme court cases which established these facts almost 200 years ago: <https://en.wikipedia.org/wiki/Trustees_of_Dartmouth_College_v._Woodward> – 17 U.S. 518 (1819) and <https://en.wikipedia.org/w/index.php?title=Pembina_Consolidated_Silver_Mining_Co._v._Pennsylvania&action=edit&redlink=1> – 125 U.S. 181 (1888) – also note that neither the 802.11 style guide 11-09-1034-11-0000-802-11-editorial-style-guide, nor the IEEE SA style guide 2014\_IEEE\_SA\_stylemanual mentions “anthropormorhpism”, whatever that means… and furthermore, the entity in question, perhaps best described as an algorithm, has definite expectations of future events and as evidenced by the commenter’s lack of a decent alternative, there seems to be no word in the English language that would make a decent substitute for “expects” in this case |
| 6355 | John Coffey | 74.07 | 9.4.2.200 | Anthropomorphism: "the TWT requesting STA expects". The STA is an object and does not "expect" anything. | Reword to remove the anthoropomorphism. | Reject – as corporations are people, then it follows that STAs are people, see USA supreme court cases which established these facts almost 200 years ago: <https://en.wikipedia.org/wiki/Trustees_of_Dartmouth_College_v._Woodward> – 17 U.S. 518 (1819) and <https://en.wikipedia.org/w/index.php?title=Pembina_Consolidated_Silver_Mining_Co._v._Pennsylvania&action=edit&redlink=1> – 125 U.S. 181 (1888) – also note that neither the 802.11 style guide 11-09-1034-11-0000-802-11-editorial-style-guide, nor the IEEE SA style guide 2014\_IEEE\_SA\_stylemanual mentions “anthropormorhpism”, whatever that means… and furthermore, the entity in question, perhaps best described as an algorithm, has definite expectations of future events and as evidenced by the commenter’s lack of an alternative suggestion, there seems to be no word in the English language that would make a decent substitute for “expects” in this case |
| 6363 | John Coffey | 75.50 | 9.4.2.200 | The second case here is when the relevant STA is not an S1G STA, whereas earlier in the same section (P75 L20) the condition is "within an HE BSS". Is there some distinction intended? Can TWT be used in non-S1G, non-HE BSSs? | Change "is not an S1G STA" to "is an HE STA". | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 6363. |
| 7170 | kaiying Lv | 70.27 | 9.4.2.200 | The Wake TBTT Negotiation subfield is set to 0 in TWT elements transmitted by a responding STA and by a scheduling STA. In table 9-262k,"Description when transmitted by a TWT scheduling STA, Wake TBTT Negotiation subfield = 1", which is conflicted with the above statement. | Please change to "Description when transmitted by a TWT scheduling STA, Wake TBTT Negotiation subfield =0." | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7170. |
| 7184 | kaiying Lv | 75.02 | 9.4.2.200 | change"TWT broadcast field"to"broadcast field" | As in comment | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7184. |
| 7208 | kaiying Lv | 71.04 | 9.4.2.200 | the description about " Demand TWT" is incorrect. | please clarify it | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0296r2 that are marked with CID 8125. |
| 7358 | Kwok Shum Au | 70.27 | 9.4.2.200 | In 70.2-70.4, it says that "The Wake TBTT Negotiation subfield is set to 0 in the TWT elements transmitted by a responding STA and a scheduling STA". In Table 9-262k, however, there is a entry titled "Descripton when transmitted by a TWT scheduling STA, Wake TBTT Negotiation subfield = 1", which means that the Wake TBTT Negotiation subfield is allowed to set to 1 in the TWT elements transmitted by a scheduling STA. It is a contradictation. | Please clarify whether the Wake TBTT Negotiation subfield is allowed to set to 1 in the TWT elements transmitted by a scheduling STA. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7358. |
| 7359 | Kwok Shum Au | 73.10 | 9.4.2.200 | Missing proposition for the sentence "Feedback can be contained is the QoS Control field ...". | In 73.10 and 73.35, replace "Feedback can be contained is the QoS Control field ..." with "Feedback can be contained in the QoS Control field ..." | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7359. |
| 7360 | Kwok Shum Au | 73.14 | 9.4.2.200 | There is no subclause 25.14 for link adaptation using the HE variant HT Control field. | In 73.14 and 73.39, replace "25.14" with "27.13". | Revise – proposed change from commenter is misleading, but the spirit of the comment is understood and accepted, TGax editor to note that no change is necessary at this point in time as D1.2 already has the problem fixed per CID 4727. |
| 7361 | Kwok Shum Au | 74.20 | 9.4.2.200 | In 74.20-74.25, it says that the Target Wake Up Time field can be set to 0, 8 octets or 2 octets. In Figure 9-589av, however, it indicated that the Target Wake Up Time field can be set to either 0 or 8 octets only. | In 69-36, replace "8 or 0" with "8, 2 or 0". | Revise – other changes have caused a separate diagram to be created, so the change is effected in spirit, but differently than suggested - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7361. |
| 7362 | Kwok Shum Au | 74.25 | 9.4.2.200 | For the sentence "When a TWT responding STA or a TWT scheduling STA with dot11TWTGroupingSupport equal to 0 transmits a TWT element to the TWT requesting STA ...", it means dot11TWTGroupingSupport is required. However, dot11TWTGroupingSupport cannot be found in this amendment (11ax D1.0), 11mc Draft 8.0 or 11ah Draft 10.0. | Add dot11TWTGroupingSupport in subclause C.3. | Reject –while the group does generally agree with the comment, the problem cited is one that is part of the baseline (TGah amendment) and is therefore under the scope of TGmd - TGax requests that the commenter resubmit the comment to TGmd and can refer to 11-17-0777r7 to see a good example of a proposed MIB variable update. |
| 7551 | Liwen Chu | 74.04 | 9.4.2.200 | Change to "In a TWT element transmitted by a TWT requesting or scheduled STA, the TWT wake interval is equal to the average time that the TWT requesting STA or TWT scheduled STA expects to elapse between successive TWT SPs." | As in comment | Revise –generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7551. |
| 7598 | Liwen Chu | 73.04 | 9.4.2.200 | Add Ack/BA as the responding frame from scheduled STA. It makes no sense to only do sounding without data frame transmission. | As in comment | Revise –generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7598. |
| 7599 | Liwen Chu | 73.30 | 9.4.2.200 | Add Ack/BA as the responding frame from scheduled STA. It makes no sense to only do sounding without data frame transmission. | As in comment | Revise –generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7599. |
| 7600 | Liwen Chu | 72.53 | 9.4.2.200 | Add the following restriction "The AP doesn't transmit a TIM frame or a FILS discovery frame including a TIM element at the beginning of the TWT SP." | As in comment | Reject – There is no discernible justifcation for the proposed change. |
| 7922 | Mark RISON | 69.63 | 9.4.2.200 | "The Wake TBTT Negotiation subfield indicates" -- how exactly does it indicate this? | Add similar sentences to the "The Broadcast field is 1 to indicate that the TWT SP(s) defined by the TWT element are associated with broadcast TWT(s). The Broadcast field is 0, otherwise." above | Revise –generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7922. |
| 7923 | Mark RISON | 72.37 | 9.4.2.200 | " the TWT Flow Identifier subfield contains a value that indicates recommendations on the types of frames that are transmitted by scheduled STAs during the broadcast TWT SP, encoded according to Table 9- 262k1" -- but that table discusses both the scheduling STA and scheduled STA | Delete "scheduled" | Revise –generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7923. |
| 7924 | Mark RISON | 70.27 | 9.4.2.200 | "Description when transmitted by a TWT scheduling STA, Wake TBTT Negotiation subfield = 1" is incompatible with " The Wake TBTT Negotiation subfield is set to 0 in TWT elements transmitted by a responding STA and by a scheduling STA." at line 2 above | Change "1" to "0" | Revise – deleting the earlier sentence is logically equivalent, simpler and easier to understand, as the fields have the same meaning when the Wake TBTT Negotiation bit is set to 1, regardless of whether requesting, responding, scheduled or scheduling STA sets the bit. TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7924. |
| 7925 | Mark RISON | 70.27 | 9.4.2.200 | Descriptions of the other four cases (requesting/responding when Wake TBTT Negotiation Subfield = 1 and scheduling/scheduled when = 0) are missing | Delete ", Wake TBTT Negotiation subfield = [0/1]" in each cell (4 deletions) | Revise –generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7925. |
| 7926 | Mark RISON | 70.43 | 9.4.2.200 | Spurious asterisk | Delete the asterisk | Revise –generally agree with comment but other instances changed the asterisk to the words “see NOTE”, so that is what is proposed here - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7926. |
| 7927 | Mark RISON | 71.30 | 9.4.2.200 | There can be no TWT request to accept since a scheduled STA cannot make a request (see 70.35) | Change the cell to "N/A" | Reject – the accept outcome is also used to accept a suggest or demand. |
| 7928 | Mark RISON | 71.33 | 9.4.2.200 | It says "(See" in the 4th column | Change to "(see" | Accept – TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7928. |
| 7929 | Mark RISON | 73.22 | 9.4.2.200 | "There are no restrictions on the frames transmitted by the schedul- ing STA of the broadcast TWT SP." -- but the scheduling STA is the AP, so the next para does introduce restrictions | Delete the cited text; also at line 49. Also fix at line 56 to only refer to the scheduled STA | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7929. |
| 7930 | Mark RISON | 73.09 | 9.4.2.200 | "Feedback can be contained is the QoS Control field or in the HE variant HT Control field of the frame, " -- a PS-Poll cannot carry either | At line 8 and line 33 change "PS-Poll and QoS Null frames" to "QoS Null frames and PS-Poll frames contained in Control Wrapper frames" | Revise – generally agree with comment , but changing the text in a different way by eliminating the qualifying phrase - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 7930. |
| 8123 | Matthew Fischer | 70.03 | 9.4.2.200 | The following text was not updated when the table of TWT commands and responses was updated for broadcast TWT negotiation: "The Wake TBTT Negotiation subfield is set to 0 in TWT elements transmitted by a responding STA and by a scheduling STA." Missing definition for requesting and responding STA cases. | Delete the cited line and change "The Wake TBTT Negotiation subfield indicates that the scheduled STA transmitting the TWT element is indicating a value for the next wake TBTT for a broadcast TWT" to "The Wake TBTT Negotiation subfield indicates that a scheduled STA transmitting the TWT element is indicating a requested value for the next wake TBTT for a broadcast TWT and a scheduling STA transmitting the element is indicating the next wake TBTT for the broadcast TWT. The Wake TBTT Negotiation subfield is set to 0 by TWT Requesting and TWT Responding STAs." | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8123. |
| 8124 | Matthew Fischer | 69.36 | 9.4.2.200 | figure 9-589av was not correctly updated to reflect changes made during CR that created D1.0 - Broadcast TWT changes allow a value of 2 octets for the Target Wake Time field, and this is not reflected in the TWT element diagram (9-589av) octet count label for the field | Change the number of octets in the figure for the Target Wake Time field to be 8 or 2 or 0. | Revise – other changes have caused a separate diagram to be created, so the change is effected in spirit, but differently than suggested - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8124. |
| 8127 | Matthew Fischer | 70.34 | 9.4.2.200 | The table entry for the first row for column wake tbtt negotiation is NA, but at P139 the text says that this box should not have NA value - also see P186L40 which does not mention REQUEST | Make a decision - either do or do not allow request command by scheduled STA for Broadcast TWT - fix the different references so that they do not conflict. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8127. |
| 8131 | Matthew Fischer | 70.34 | 9.4.2.200 | Too many of the entries for column "Description when transmitted by a TWT scheduling STA, Wake TBTT Negotiation subfield = 1" have "NA" - according to Table 10-19a--TWT setup exchange command interpretation, there should be more entries with something other than NA here. | Reconcile the table in 9.4.2.200 TWT element with Table 10-19a--TWT setup exchange command interpretation - noting that Table 10-19a is the more correct one. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8131. |
| 8144 | Matthew Fischer | 69.36 | 9.42.200 | The TWT Channel should be 0 or 1 because for bTWT, the TWT channel is not present | Change the TWT Channel octet count in figure 9-589av TWT element format to read "0 or 1" instead of "1" | Revise – other changes have caused a separate diagram to be created, so the change is effected in spirit, but differently than suggested - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8144. |
| 8196 | Osama Aboulmagd | 69.30 | 9.4.2.200 | Comparing the IE in Figure 9-589av to the one in 11ah draft, it seems that this TWT element is a new element by adding Broadcast TWT ID. The question is; is this a new IE? If not then I don't understand what format is now used for ah | clarify | Revise – the text explains the difference, in that the Broadcast bit is reserved for S1G, and it explains how the format changes dependent on the value of the Broadcast subfield. As part of the changes proposed here, an additional clarification is provided, which is to split the element format diagram into one that applies when Broadcast == 1 and one for the case of Broadcast == 0. With all of this, clarify should exist. TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8196 |
| 8197 | Osama Aboulmagd | 69.30 | 9.4.2.200 | There are sub-fields in the TWT IE having variable length. When repeating for each TWT parameter, how the information can be decoded given the variabe length of some of the sub-fields? | Clarify | Reject – the subfields are of different length for each field depends on the settings of other subfields, so that the size, format, length, etc of each repeated set of subfields is fully described by the bits within that set of subfields. |
| 8200 | Osama Aboulmagd | 72.47 | 9.4.2.200 | Table 9-262k1 seems to be totally arbitrary and is not based on any rationale. Perhaps some explanation is in order. | either provide a rationale for the different restrictions or simply delete the table. My preference is to delete the table. | Revise – generally agree with comment, table modified significantly to simplify - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 8200. |
| 8591 | Sheng Sun | 70.50 | 9.4.2.200 | The terms Scheduling STA and Scheduled STA need to be defined | as in comment | Reject – definitions exist in 27.7.3.1 |
| 9843 | Young Hoon Kwon | 69.63 | 9.4.2.200 | It is not clear the meaning when the Wake TBTT Negotiation subfield is set to 0 or 1. Need further clarification. | As in the comment. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 9843. |
| 9971 | Yuchen Guo | 70.04 | 9.4.2.200 | The expression "The Wake TBTT Negotiation subfield is set to 0 in TWT elements transmitted by a responding STA and by a scheduling STA." is not correct. When the TWT scheduling STA transmits a TWT response frame as a response to a TWT request frame in the negotiation procedure of wake TBTT and listen interval, The value of the Wake TBTT Negotiation subfield should be equal to 1. | The Wake TBTT Negotiation subfield is set to 1 in TWT elements transmitted by a responding STA and by a scheduling STA in the negotiation procedure of wake TBTT and listen interval, and set to 0 otherwise. | Revise – generally agree with comment - TGax editor shall make the changes shown in 11-17/0777r8 that are marked with CID 9971. |

**Discussion:**

TWT IE changes based on CIDs as shown above.

**Proposed Changes to Draft Text of TGax D1.3:**

***TGax editor: modify subclause 9.4.2.200 TWT element as follows:***

* TWT element

Change the text of the first paragraph as follows:

The TWT element format when the Broadcast subfield of the Control field is 0 is shown in Figure 9-589av (TWT element format when the Broadcast subfield equals 0).

TGax editor: please note that the change to the Broadcast TWT ID subfield in figure 9-589av (TWT element format) is that the text should be underlined to indicate that the presence of this subfield is an insertion to the the baseline.

Change Figure 9-589av (TWT element format when the Broadcast subfield equals 0) as follows (add arrow and associated text, modify lengths and change the caption): (#5833)(#7361)(#8124)(#8196)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Element  ID | Length | Control | Request  Type | Target  Wake  Time | TWT  Group  Assignment | Nominal  Minimum TWT  Wake  Duration | TWT Wake  Interval  Mantissa | TWT  Channel | NDP  Paging  (optional) |
| Octets: | 1 | 1 | 1 | 2 | 8 or 0 | 9 or 3 or 0 | 1 | 2 | 1 | 0 or 4 |

Figure 9-589av – TWT element format when the Broadcast subfield equals 0

Insert a new paragraph after Figure 9-589av – TWT element format when the Broadcast subfield equals 0, as follows:

The TWT element format when the Broadcast subfield of the Control field is 1 is shown in Figure 9-589ava (TWT element format when the Broadcast subfield equals 1). (#4765)(#5765)(#5766)(#5833)(#8144)

Insert Figure 9-589ava (TWT element format when the Broadcast subfield equals 1) as follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Repeat for each Broadcast TWT parameter set | | | | | |
|  | Element  ID | Length | Control | Request  Type | Target  Wake  Time | Nominal  Minimum TWT  Wake  Duration | TWT Wake  Interval  Mantissa | Broadcast TWT Info |
| Octets: | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |

Figure 9-589ava – TWT element format when the Broadcast subfield equals 1

Change Figure 9-589aw (Control field format) as follows.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B1 | | B2 | B3 | B4 | ~~B3~~B5 B8 |
|  | NDP Paging Indicator | | Responder PM Mode | Broadcast | Wake TBTT Negotiation | Reserved |
| Bits: | 1 | | 1 | 1 | 1 | ~~6~~4 |
|  | |

Change the following paragraph:

A STA that transmits a TWT element with the TWT Request subfield equal to 1 is a TWT requesting STA or TWT scheduled STA. Otherwise, it is a TWT responding STA or TWT scheduling AP.

Change the following paragraph:

When transmitted by a TWT requesting STA or a TWT scheduled STA, the Target Wake Time field contains a positive integer, which corresponds to a TSF time at which the STA requests to wake, or a value of zero when the TWT Setup Command subfield contains the value corresponding to the command “Request TWT”. When a TWT responding STA or TWT scheduling AP with dot11TWTGroupingSupport equal to 0 transmits a TWT element to a TWT requesting STA or TWT scheduled STA, the TWT element contains a value in the Target Wake Time field which corresponds to a TSF time at which the TWT responding STA requests the TWT requesting STA to wake and it does not contain the TWT Group Assignment field.

Insert the following three paragraphs and table after the 5th paragraph (“The Responder PM Mode subfield...”):

The Broadcast field indicates if the TWT SP(s) indicated by the TWT element are for broadcast or individual TWT(s). The Broadcast field is set to**(#5892)** 1 to indicate that the TWT SP(s) defined by the TWT element are associated with broadcast TWT(s). The Broadcast field is 0, otherwise.When the Broadcast field is 1 then one or more broadcast TWT parameter sets are contained in the TWT element where each TWT parameter set is contains the subfields Request Type, Target Wake Time, Nominal Minimum TWT Wake Duration, TWT Wake Interval Mantissa and Broadcast TWT Info fields. The Last Broadcast Parameter Set subfield is set to 1 in the last broadcast TWT parameter set of the element and is set to 0 in all other broadcast TWT parameter sets. When the Broadcast field is equal to 0, only one TWT parameter set is contained in the TWT element. An S1G STA sets the Broadcast field to 0.

The Wake TBTT Negotiation field and the Broadcast field determine the interpretation of the Target Wake Time, TWT Wake Interval Mantissa and TWT Wake Interval Exponent subfields of the TWT element as defined in Table 9-262kx. **(#8125, #8130) (#3031) (#4766)(#7170) (#7358)(#7924) (#8123)(#9843)(#9971)**

|  |  |  |  |
| --- | --- | --- | --- |
| Table 9-262kx – Interpretation of Target Wake Time and TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields | | | |
| Wake TBTT Negotiation and Broadcast subfields | Target Wake Time field | TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields | Description |
| Wake TBTT Negotiation = 0  Broadcast = 0 | Individual TWT | Interval between individual TWT SPs | Individual TWT negotiation between TWT requesting STA and TWT responding STA.  See 10.43 (Target wake time(TWT)), and 27.7.2 (Individual TWT agreements). |
| Wake TBTT Negotiation = 1  Broadcast = 0 | Next wake TBTT | Interval between wake TBTTs | Wake TBTT and wake interval negotiation between TWT scheduled STA and TWT scheduling AP.  See 27.7.3.4 (Negotiation of wake TBTT and listen interval). |
| Wake TBTT Negotiation = 0  Broadcast = 1 | Broadcast TWT | Interval between broadcast TWT SPs | Provide broadcast TWT schedules to TWT scheduled STAs by including the TWT element in broadcast MGMT frames sent by TWT scheduling AP.  See 27.7.3.2 (Rules for TWT scheduling AP). |
| Wake TBTT Negotiation = 1  Broadcast = 1 | Broadcast TWT | Interval between broadcast TWT SPs | Manage memberships in broadcast TWT schedules by including the TWT element in individually addressed MGMT frames sent by either a TWT scheduled STA or a TWT scheduling AP.  See 27.7.3 (Broadcast TWT operation). |

Change Figure 9-589ax (Request Type field format) as follows (B4 from "Reserved" to "Trigger").

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 B3 | B4 | B5 | B6 | B7 B9 | B10 B14 | B15 |
|  | TWT  Request | TWT Setup Command | ~~Reserved~~  Trigger | Implicit and Last Broadcast Parameter Set **(#3123) (#5034)** | Flow  Type | TWT Flow  Identifier | TWT Wake Interval Exponent | TWT Protection |
| Bits: | 1 | 3 | 1 | 1 | 1 | 3 | 5 | 1 |
| * Request Type field format | | | | | | | | |

Change Table 9-262k (TWT Setup Command field values) as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| * TWT Setup Command field values | | | | | |
| TWT Setup Command field value | Command name | (#5767)(#7925)(#8200)(#8131)Notes |  |  |  |
| 0 | Request TWT | ATWT requesting or TWT scheduled STA requests to join a TWT without specifying a target wake time.  This command is valid if the TWT Request field is equal to 1; otherwise the command is not applicable. |  |  |  |
| 1 | Suggest TWT | A TWT requesting or TWT scheduled STA requests to join a TWT and specifies a suggested set of TWT parameters with the possibility that if the requested target wake time and/or other TWT parameters cannot be accommodated, then the TWT setup might still be accepted by the TWT requesting or TWT scheduled STA.  This command is valid if the TWT Request field is equal to 1; otherwise it is not applicable. |  |  |  |
| 2 | Demand TWT | A TWT requesting or TWT scheduled STA requests to join a TWT and specifies a demanded set of TWT parameters which, if not accommodated by the responding STA or TWT scheduling AP will cause the TWT requesting STA or TWT scheduled STA to reject the TWT setup.  This command is valid if the TWT Request field is equal to 1; otherwise it is not applicable. |  |  |  |
| 3 | TWT Grouping | The TWT responding STA suggests TWT group parameters that are different from the suggested or demanded TWT parameters of the TWT requesting STA  This command is valid if the TWT Request field is 0 and Wake TBTT Negotiation field is 0 and is sent by an S1G STA; otherwise not applicable. |  |  |  |
| 4 | Accept TWT | A TWT responding STA or TWT scheduling AP accepts the TWT request with the TWT parameters (see NOTE (#7928)) indicated in the TWT element transmitted by the TWT responding STA or TWT scheduling AP.  This command is valid if the TWT Request field is 0; otherwise not applicable. |  |  |  |
| 5 | Alternate TWT | A TWT responding STA suggests TWT parameters that are different from those suggested or demanded by the TWT requesting STA.  This command is valid if the TWT Request field is 0; otherwise not applicable. |  |  |  |
| 6 | Dictate TWT | A TWT responding STA demands TWT prameters that are different from those suggested by a TWT requesting STA  This command is valid if the TWT Request field is 0; otherwise not applicable. |  |  |  |
| 7 | Reject TWT | A TWT responding STA or TWT scheduling AP rejects a TWT setup.  This command is valid if the TWT Request field is 0; otherwise not applicable. |  |  |  |
| NOTE—TWT Parameters are: TWT, Nominal Minimum Wake Duration, TWT Wake Interval and TWT Channel subfield values indicated in the element. The Trigger subfield value indicated in the element is also a TWT parameter for an HE STA. | | | | | |

Insert the following paragraph before the 9th paragraph (“When transmitted by a TWT requesting STA,...”):

The Trigger field indicates if the TWT SP indicated by the TWT element includes Trigger frames as defined in 10.43 (Target wake time (TWT)). The Trigger field is set to 1 to indicate that at least one Trigger frame is transmitted during the TWT SP. The Trigger field is set to 0 otherwise.

Change the 9th and 10th paragraphs as shown:

When transmitted by a TWT requesting STA, the Implicit and Last Broadcast Parameter Set subfield is set to 1 and the Broadcast subfield is set to 0 to request an implicit TWT.

When transmitted by a TWT requesting STA, the Implicit and Last Broadcast Parameter Set subfield is set to 0 and the Broadcast subfield is set to 0 to request an explicit TWT.

When the Broadcast subfield is equal to 1, the Implicit and Last Broadcast Parameter Set subfield is set to 0 to indicate that another broadcast TWT Parameter set follows this set. When the Broadcast subfield is equal to 1, the Implicit and Last Broadcast Parameter Set subfield is set to 1 to indicate that this is the last broadcast TWT Parameter set in the element. **(#3123) (#5034)**

Change the 12th paragraph as follows:

The TWT Flow Identifier subfield contains a 3-bit value which identifies the specific information for this TWT request uniquely from other requests made between the same TWT requesting STA and TWT responding STA pair. For a TWT SP that is indicated in a TWT response transmission that is a broadcast TWT SP, the TWT Flow Identifier subfield contains a value that indicates recommendations on the types of frames that are transmitted by TWT scheduled STAs and scheduling APs**(#7923)** during the broadcast TWT SP, encoded according to Table 9-262k1 (TWT Flow Identifier field for a broadcast TWT element). The TWT Flow Identifier is reserved when transmitted by a TWT scheduled STA except when used as defined in 27.7.3.4 (Negotiation of wake TBTT and wake interval). **(#5673)(#5759)**

TGax editor: please note that the change to the items in the table beginning with “Feedback can be contained” includes a change to the bullet/indentation of that item

Insert a new table as follows:

|  |  |
| --- | --- |
| * TWT Flow Identifier field for a broadcast TWT element | |
| TWT Flow Identifier field value | Description when transmitted in a broadcast TWT element |
| 0 | No constraints on the frames transmitted during a broadcast TWT SP. |
| 1 | Frames transmitted during a broadcast TWT SP by a TWT scheduled STA are recommended to be limited to solicited feedback and status:   * PS-Poll, QoS Null frames and HE TB NDP PPDUs * Feedback can be contained in**(#6352)(#7359)** the QoS Control field or in the HE variant HT Control field of the frame, if either is present (see 27.5.1 (HE DL MU operation), 27.5.2 (UL MU operation), 27.8 (Operating mode indication), 27.13 (Link adaptation using the HLA Control field(#4727)), etc.)**(#7930)** * Frames that are sent as part of a sounding feedback exchange (see 27.6 (HE sounding protocol)) * Management frames * Action, or Action No Ack frames * Control response frames**(#7598)**   **(#7929)**Trigger frames transmitted by the TWT scheduling AP during the broadcast TWT SP do not contain RUs for random access (see 27.7.3.2 (Rules for TWT scheduling AP(#6919))), otherwise, there are no other restrictions on the frames transmitted by the TWT scheduling AP. **(#7929)** |
| 2 | Frames transmitted during a broadcast TWT SP by a TWT scheduled STA**(#5856)(#9844)** are recommended to be limited to solicited status and feedback:   * PS-Poll and QoS Null frames * Feedback can be contained in**(#6353)** the QoS Control field or in the HE variant HT Control field of the frame, if either is present (see 27.5.1 (HE DL MU operation), 27.5.2 (UL MU operation), 27.8 (Operating mode indication), 27.13 (Link adaptation using the HLA Control field(#4727)), etc.) **(#7930)** * Frames that are sent as part of a sounding feedback exchange (see 27.6 (HE sounding protocol)) * Management frames * Action, Action No Ack frames or (Re)Association Request frames * Control Response frames**(#7599)**   **(#7929)**  Trigger frames transmitted by the TWT scheduling AP during the broadcast TWT SP contain at least one RU for random access (see 27.7.3.2 (Rules for TWT scheduling AP(#6919))), otherwise there are no restrictions on the frames transmitted by the TWT scheduling AP. **(#7929)** |
| 3 | No constraints on the frames transmitted during a broadcast TWT SP, except that the **(#7929)**AP **(#7600)** transmit a TIM frame or a FILS Discovery frame including a TIM element at the beginning of each TWT SP. (see 27.14.3.2 (AP operation for opportunistic power save) |
| 4-7 | Reserved |

TGax editor: please note that newly inserted text in the following paragraph will be underlined in the TGax draft as it indicates an insertion to the baseline and strikethrough text is to appear as strikethrough in the TGax draft because it indicates deletions from the baseline:

Change the 10th paragraph as follows:

In a TWT element transmitted by a TWT requesting or TWT scheduled STA**(#7922)**, the TWT wake interval is equal to the average time that the **(#7551)**STA expects to elapse between successive TWT SPs (see Table 9-262kx Interpretation of Target Wake Time and TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields). In a TWT element transmitted by a TWT responding STA or TWT scheduling AP, the TWT wake interval is equal to the average time that the **(#7551)**STA expects to elapse between successive TWT SPs. In a TWT element contained in a TWT request that is sent by the TWT scheduled STA to negotiate the wake intervals for Beacon frames that contain a TWT element that indicates a broadcast TWT, the TWT wake interval indicates the value of the wake interval (see 27.7.3.4 (Negotiation of Wake **(#8510)**TBTT and wake interval))(#8154). The TWT Wake Interval Exponent subfield is set to the value of the exponent of the TWT wake interval value in microseconds, base 2. The TWT wake interval of the requesting STA is equal to (TWT Wake Interval Mantissa) × 2(TWT Wake Interval Exponent).

Change the 11th paragraph as follows:

When transmitted by a TWT requesting STA or a TWT scheduled STA **(#7922)**, the Target Wake Time field contains a positive integer that**(#6356)** corresponds to a TSF time at which the STA requests to wake, or a value of zero when the TWT Setup Command subfield contains the value corresponding to the command "Request TWT". The Target Wake Time field is 8 octets when the Broadcast field is 0; otherwise it is 2 octets with the lowest bit of the 2 octets corresponding to bit 4 of the relevant TSF value. When a TWT responding STA or a TWT scheduling AP(#6919) with dot11TWTGroupingSupport equal to 0 transmits a TWT element to the TWT requesting STA, the TWT element contains a value in the Target Wake Time field that**(#6357)** corresponds to a TSF time at which the TWT responding STA requests the TWT requesting STA or TWT scheduled STA to wake for the corresponding TWT SP and it does not contain the TWT Group Assignment field.

Insert the following paragraphs and figure after paragraph 21 (“The TWT Wake Interval Mantissa...”):

The Broadcast TWT Info subfield is present if the Broadcast subfield in the Control subfield is 1; Otherwise, **(#6358)**the Broadcast TWT Info subfield is not present.The Broadcast TWT Info subfield contains the Broadcast TWT ID subfield and the Broadcast TWT Persistence subfield as shown in Figure 9-859yy – Broadcast TWT Info subfield format.

|  |  |  |
| --- | --- | --- |
|  | B0 B2 | B3 B7 |
|  | Broadcast TWT Persistence | Broadcast TWT ID |
| Bits: | 3 | 5 |

Figure 9-859yy – Broadcast TWT Info subfield format

The Broadcast TWT Persistence subfield indicates the number of beacon intervals during which the Broadcast TWT SPs corresponding to this broadcast TWT Parameter set are present. The number of beacon intervals during which the Broadcast TWT SPs are present is equal to the value in the Broadcast TWT Persistence subfield plus 1, except that the value of 7 indicates that the Broadcast TWT SPs are present for every beacon interval, until explicitly terminated.

Within a TWT element that includes a TWT setup command value of Request TWT, Suggest TWT or Demand TWT, the Broadcast TWT ID, if present, indicates a specific Broadcast TWT in which the transmitting STA is requesting to participate. Within a TWT element that includes a TWT setup command value of Accept TWT, Alternate TWT, Dictate TWT or Reject TWT, the Broadcast TWT ID, if present, indicates a specific Broadcast TWT for which the transmitting STA is providing TWT parameters. Within a TWT element that includes a TWT setup command value of TWT Grouping, the Broadcast subfield is 0 and the Broadcast TWT ID **(#6359)** is not present. The value 0 in the Broadcast TWT ID subfield indicates the special broadcast TWT whose membership corresponds to all STAs that are members of the BSS corresponding to the BSSID of the management frame carrying the TWT element.

Change the 22nd and subsequent two paragraphs as follows:

When transmitted by a TWT requesting STA that is not an S1G STA, the TWT Channel field is reserved.**(#5768)(#6089)** When transmitted by a TWT requesting STA that is an S1G STA,**(#5768)(#6089)** the TWT Channel field contains a bitmap indicating which channel the STA requests to use as a temporary primary channel during a TWT SP. When transmitted by a TWT responding STA that is an S1G STA,**(#5768)(#6089)** the TWT Channel field contains a bitmap indicating which channel the TWT requesting STA is allowed to use as a temporary channel during the TWT SP. Each bit in the bitmap corresponds to one minimum width channel for the band in which the TWT responding STA's associated BSS is currently operating, with the least significant bit corresponding to the lowest numbered channel of the operating channels of the BSS. **(#6360)**The minimum width channel is equal to the SST Channel Unit field of the SST Operation element if such an element has been previously received or is equal to 1 MHz for a BSS with a BSS primary channel width of 1 MHz and 2 MHz for a BSS with a BSS primary channel width of 2 MHz if no such element has been previously received from the AP to which the SST STA is associated. A value of 1 in a bit position in the bitmap transmitted by a TWT requesting STA means that operation with that channel as the primary channel is requested during a TWT SP. A value of 1 in a bit position in the bitmap transmitted by a TWT responding STA means that operation with that channel as the primary channel is allowed during the TWT SP. The TWT Channel field is not present when the **(#7184)**Broadcast field has the value 1.

~~A TWT requesting STA sets the TWT Protection subfield to 1 to request the TWT responding STA to provide protection of the set of TWT SPs corresponding to the requested TWT flow identifier by allocating RAW(s) that restrict access to the medium during the TWT SP(s) for that(those) TWTs. A TWT requesting STA sets the TWT Protection subfield to 0 if TWT protection by RAW allocation is not requested for the corresponding TWT(s).~~

A TWT requesting STA sets the TWT Protection subfield to 1 to request the TWT responding STA to provide protection of the set of TWT SPs corresponding to the requested TWT flow identifier by:

* Allocating RAW(s) that restrict access to the medium during the TWT SP(s) for that (those) TWT(s)**(#6361)** that are set up within an S1G BSS
* Enabling NAV protection during the TWT SP(s) for that (those) TWT(s)**(#6363)** that are set up within an HE BSS

A TWT requesting STA sets the TWT Protection subfield to 0 if TWT protection is not requested for the corresponding TWT(s). **(#5769)**

A TWT scheduled STA sets the TWT Protection subfield to 0.

~~When transmitted by a TWT responding STA that is an AP, the TWT Protection subfield indicates whether the TWT SP(s) identified in the TWT element will be protected. A TWT responding STA sets the TWT Protection subfield to 1 to indicate that the TWT SP(s) corresponding to the TWT flow identifier(s) of the TWT element will be protected by allocating RAW(s) that restrict access to the medium during the TWT SP(s) for that(those) TWT(s). A TWT responding STA sets the TWT Protection subfield to 0 to indicate that the TWT SP(s) identified in the TWT element might not be protected from TIM STAs by allocating RAW(s).~~

When transmitted by a TWT responding STA or TWT scheduling AP(#6919), the TWT Protection subfield indicates whether the TWT SP(s) identified in the TWT element will be protected. A TWT responding STA or TWT scheduling AP(#6919) sets the TWT Protection subfield to 1 to indicate that the TWT SP(s) corresponding to the TWT flow identifier(s) of the TWT element will be protected by:

* Allocating RAW(s) that restrict access to the medium during the TWT SP(s) for that (those) TWT(s) when the responding STA or scheduling AP is an S1G STA.
* Enabling NAV protection during the TWT(s) for that (those) TWT(s)**(#6362)** when the responding STA or scheduling AP is an HE**(#6363)** STA

A TWT responding STA or TWT scheduling AP(#6919) sets the TWT Protection subfield to 0 to indicate that the TWT SP(s) identified in the TWT element might not be protected.

**End of proposed changes.**