IEEE P802.11
Wireless LANs

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| Comment resolutions for 9.4.2.200 |
| Date: 2018-09-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D3.0 with the following CIDs (17 CIDs):

* 15025, 15026, 15027, 15030, 15031, 15032, 15242, 15243, 15880, 15881,
* 15882, 15883, 16436, 16445, 16459, 16460, 16461

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 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** |
| 15025 | Abhishek Patil | 139.44 | Reference to Broadcast field is made before the field is actual defined (which happens on pg 140 on line 47). Also the description of TWT Parameters occurs before description of fields in Control field. | Move the paragraph on pg 139 and Figures 9-589av1 and 9-589av2 after Table 9-262j1 (i.e., after all the fields of Control field have been described which includes Negotiation Type field). | Revised –Agree in principle with the comment. Moved as suggested.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15025. |
| 15026 | Abhishek Patil | 141.56 | Since the TWT Parameter set for Broadcast TWT and Individual TWT are now defined to be independent, the subfields in the Request Type field need not be overload. | Define a variant of Request Type field for Broadcast TWT (i.e., when Negotiation Type = 2 or 3) with the field names and feature descriptions that only apply to B-TWT (e.g., see Fig 9-740b and Fig 9-52h). Also, remove the overloaded spec text - e.g., Implicit field and its description doesn't apply to B-TWT (see pg 144 line 30). Update other sections accordingly. | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested changes.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15025. |
| 15027 | Abhishek Patil | 141.60 | RAW mechanism doesn't apply to HE STAs. TWT Schedule STA sets the TWT Protection field to 0. A TWT Scheduling AP sets the field to 1 if it enables NAV protection. Is there a need to have such explicit signaling? AP can enable NAV protection anytime it wants. | TWT Protection field doesn't apply to broadcast TWT and can be set to reserved for broadcast TWT. | Revised –Agree in principle with the comment. Clarified as suggested.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15025. |
| 15030 | Abhishek Patil | 146.44 | The Broadcast TWT Persistence Exponent (Ex) and Broadcast TWT Persistence Mantissa (Mn) together signal the number of beacons after which this schedule may change (see pg 146 of D3.0) = (Mn+1) x 2^Ex. However, this combination is not suitable to represent all possible values. For example, if Mn = all 1s (i.e., 255) and Ex=011 (i.e., 2), the current value = (255+1)x2^2 = 1024 TBTTs. The value after the next TBTT would be 1023 which cannot be represented. | Instead of representing the value in terms of an exponent, redefine the field such that the interval is represented in a linear scale in terms of BIs or DTIMs (e.g., 8 bits represents 255 DTIMs). 8-bits may be sufficient for this purpose and the remaining bits should be marked as reserved. | Revised –Agree in principle with the comment. Fixed the issue as suggested.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15030. |
| 15031 | Abhishek Patil | 147.23 | TWT Channel field is not present in Broadcast TWT Parameter Set field (Fig 9-589av2). Hence the last sentence of the paragraph doesn't apply. | Delete the sentence: "The TWT Channel field is not present when the Broadcast field has the value 1." | Revised –Agree in principle with the comment. Not certain what the technical motivation is to not have it in the broadcast TWT case but it indeed does not show in the broadcast case. TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15031. |
| 15032 | Abhishek Patil | 147.62 | An S1G STA is not a TWT scheduling STA | Delete scheduling STA from the first bullet | Revised –Agree in principle with the comment. Accounted for the suggestion.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15032. |
| 15242 | Amelia Andersdotter | 147.02 | This is a conditional statement, but also the verb "contains" is ambiguous: shall TWT Channel field contain a bitmap such as the one described? Or may it? What happens if it doesn't? | "When transmitted by a TWT requesting STA that is either an S1G STA or an HE STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true, the TWT Channel field contains a bitmap indicating which channel the STA requests to use as a temporary primary channel during a TWT SP." should be "If transmitted by a TWT requesting STA that is either an S1G STA or an HE STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true, then the TWT Channel field shall contain a bitmap indicating which channel the STA requests to use as a temporary primary channel during a TWT SP. " | Revised –Agree in principle with the comment. The sentence has become too long due to the many conditions added to it. Proposed resolution is to simply indicate what the field is used for and provide references to the respective subclauses where the field is being used in the protocols, for both HE and S1G STAs.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15042. |
| 15243 | Amelia Andersdotter | 147.07 | This is a conditional statement, but also the verb "contains" is ambiguous: shall TWT Channel field contain a bitmap such as the one described? Or may it? What happens if it doesn't? | "When transmitted by a TWT responding STA that is either an S1G STA or an HE STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true, 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. " should be "If transmitted by a TWT responding STA that is either an S1G STA or an HE STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true, the TWT Channel field shall contain a bitmap indicating which channel the TWT requesting STA is allowed to use as a temporary channel during the TWT SP. " | Revised –Duplicate of CID 15042. Same resolution.Agree in principle with the comment. The sentence has become too long due to the many conditions added to it. Proposed resolution is to simply indicate what the field is used for and provide references to the respective subclauses where the field is being used in the protocols, for both HE and S1G STAs.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15043. |
| 15880 | Liwen Chu | 144.16 | It is not clear what is TWT parameter of "TWT". | Change it to the parameters in TWT element. | Revised –Agree with comment. Accounted for the suggested change.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15880. |
| 15881 | Liwen Chu | 144.09 | A TWT scheduling AP can also use it to reject the membership request.Add "This command is valid if the TWT Request field is 0; otherwise not applicable." | As in the comment | Revised –Agree with comment that TWT scheduling AP can use it. Clarification is added that the TWT scheduling STA is the TWT scheduling AP. Please note that this command is also used in a request (refer to table 27-6), as such it is applicable when the TWT request is 0 as well. TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15881. |
| 15882 | Liwen Chu | 144.06 | It seems that a TWT scheduling AP can use it.Add "This command is valid if the TWT Request field is 0; otherwise not applicable." | Change the description accoridng to the comment | Revised –Agree with comment that TWT scheduling AP can use it. Clarification is added that the TWT scheduling AP can use it. And clarified that the command is not valid in the condition suggested. TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15882. |
| 15883 | Liwen Chu | 144.27 | Change to "...indicate that at least one Trigger frame or a frame carrying TRS Control subfield is transmitted during..." | As in the comment | Revised –Agree with the comment. Incorporated the suggestion.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 15883. |
| 16436 | Matthew Fischer | 145.23 | The BSR is not mentioned in the table. It should be included. | Add BSR to the table at rows for values 1 and 2 | Revised –Agree with the comment. Incorporated the suggestion.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 16436. |
| 16445 | Matthew Fischer | 146.44 | The Broadcast TWT Persistence fields are not compatible with the behavioral specification for using these fields in 27.7.3.2 where it says that there is a Broadcast TWT Persistence subfield, but there is not such a field, and that that field can only decrement by one, but the combined mantissa and exponent cannot accommodate this rule because if the exponent is roughly greater than 1, then the expressible broadcast persistence count values are frequently separated by more than one. | Fix either the field definitions to allow expression of a set of persistence values that are separated by a count of 1 so that at each beacon, the field value can be included with a value of 1 less than the previous beacon. Or change the behavioral rules to ensure that the element is not present except for every n beacons, where n is equal to the value of the Broadcast TWT Persistence Exponent field. | Revised –Agree with the comment. Proposed resolution is the same as that for CID 15030. Provided a linear enumeration of the persistence value, and due to the reduction of the available numbers (to 255) provide a mandatory behavior rather than recommendation for an AP to indicate future parameters when being modified.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 16436. |
| 16459 | Ming Gan | 144.04 | Does Dictate TWT work for TWT scheduling STA and Scheduled STA? | If it does, please add them for Dictate TWT | Revised –Agree with the comment. It does. Added.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 16459. |
| 16460 | Ming Gan | 140.35 | The description for Negotiation Type is obscure. Separate Negoation Type field into Broadcast TWT subfield and Service Type subfield | as in comment | Rejected –In the previous draft the two bits were separate, and it received many comments to be merged into one single table for ease of interpretation. In order to keep the encoding consistent suggestion is to keep the description and encoding as is. |
| 16461 | Ming Gan | 147.45 | Is there any condition for a TWT scheduled STA to set the TWT Protection subfield to 0? i.e., "if TWT protection is not requested for thecorresponding TWT(s)." as a TWT requesting STA. Otherwise, the TWT Protection subfield is reserved for a TWT scheduled STA. | As in comment | Revised –The TWT protection field is expected to be reserved for TWT scheduled STAs and TWT scheduling APs. Proposed resolution aligns with that of CID 15027, for which it is proposed to specify that the TWT Protection field be reserved when the Negotiation Type subfield is nonzero.TGax editor to make the changes shown in 11-18/1465r0 under all headings that include CID 16459. |

**Discussion: *None.***

* TWT element

Replace Figure 9-589av (TWT element format) with the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | Element ID | Length | Control | TWT Parameter Information |
| Octets:  | 1 | 1 | 1 | variable |
| * TWT element format
 |

**TGax Editor: *Remove the paragraphs below of this subclause as follows (added lateron again) (#CID15025):***

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(#15025)

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ~~B1~~B0 | ~~B2~~B1 | B2              B3 | ~~B3~~B4 ~~B8~~B7 |
|  | NDP Paging Indicator | Responder PM Mode | Negotiation Type | Reserved |
| Bits: | 1 | 1 | 2 | ~~6~~4 |
| * Control field format
 |

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

The Negotiation Type subfield indicates whether the information included in the TWT element is for the negotiation of parameters of broadcast or individual TWT(s) or a Wake TBTT interval.(#11006, #11007) The MSB of the Negotiation Type subfield is the Broadcast field.(#11835)

If the Broadcast field of the Negotiation Type subfield is 1, then one or more broadcast TWT parameter sets are contained in the TWT element (see Figure 9-589av2 (Broadcast TWT Parameter Set field format)). (#12230)If the Broadcast field of the Negotiation Type subfield is 0, then only one Individual TWT parameter set is contained in the TWT element (see Figure 9-589av1 (Individual TWT Parameter Set field format)). An S1G STA sets the Negotiation Type subfield to 0.(#11007)(#11835)

The Negotiation Type subfield determines 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 9-262j1 (Interpretation of Negotiation Type subfield, Target Wake Time, TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields).

|  |
| --- |
| * Interpretation of Negotiation Type subfield, Target Wake Time, TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields(#11007)
 |
| Negotiation Type subfield | Target Wake Time field | TWT Wake Interval Mantissa and TWT Wake Interval Exponent fields | Description |
| 0 | A future Individual TWT SP start time | Interval between individual TWT SPs | Individual TWT negotiation between TWT requesting STA and TWT responding STA or individual TWT announcement by TWT responder. See 10.43 (Target wake time (TWT)), and 27.7.2 (Individual TWT agreements).(#12394)The TWT element contains one individual TWT parameter set.(#11835) |
| 1 | Next Wake TBTT time | Interval between wake TBTTs | Wake TBTT and wake interval negotiation between TWT scheduled STA and TWT scheduling AP. See 27.7.4 (Use of TWT Information frames).The TWT element contains one individual TWT parameter set.(#11835) |
| 2 | A future Broadcast TWT SP start time | 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).The TWT element contains one or more broadcast TWT parameter sets.(#11835) |
| 3 | A future Broadcast TWT SP start time | 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).The TWT element contains one or more broadcast TWT parameter sets.(#11835) |

**TGax Editor: *Insert the paragraphs below and figures after the table as follows (#CID15025):***

The TWT Parameter Information field contains a single Individual TWT Parameter Set field with format defined in Figure 9-589av1 (Individual TWT Parameter Set field format) when the Broadcast subfield in the Control field is 0 and contains one or more Broadcast TWT Parameter Set fields with format defined in Figure 9-589av2 (Broadcast TWT Parameter Set field format) when the Broadcast subfield of the Control field is 1. The number of Broadcast TWT Parameter Set fields present is determined by the values of Last Broadcast Parameter Set subfields of the Request Type fields.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  | Request Type | Target Wake Time | TWT Group Assignment | Nominal Minimum TWT Wake Duration | TWT Wake Interval Mantissa | TWT Channel | NDP Paging (optional) |
| Octets:  | 2 | 0 or 8 | 0, 3 or 9 | 1 | 2 | 1 | 0 or 4 |
| * Individual TWT Parameter Set field format
 |
|  |  |  |  |  |  |
|  | Request Type | Target Wake Time | Nominal MinimumTWT Wake Duration | TWT Wake Interval Mantissa | Broadcast TWT Info |
| Octets: | 2 | 2 | 1 | 2 | 2 |
| * Broadcast TWT Parameter Set field format
 |

(#15025)

**TGax Editor: *Change the paragraph and Figure, and insert new Figure as follows (#CID15880, 15881, 15882, 16459):***

The format of the Request Type field of an Individual TWT Parameter Set is shown in Figure 9-669 (Request Type field format(11ah)) and of a Broadcast TWT Parameter Set is shown in Figure 9-669ax1 (Request Type field format in a Broadcast TWT Parameter Set) (#15026).

Change Figure 9-589ax (Request Type field format) as follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 B3 | B4 | B5 | B6 | B7 B9 | B10 B14 | B15 |
|  | TWT Request | TWT Setup Command | ~~Reserved~~Trigger | Implicit | Flow Type | TWT Flow Identifier (#12405) | TWT Wake Interval Exponent | TWT Protection |
| Bits:  | 1 | 3 | 1 | 1 | 1 | 3 | 5 | 1 |
| * Request Type field format in an Individual TWT Parameter Set *(#15026)*
 |
|  | B0 | B1 B3 | B4 | B5 | B6 | B7 B9 | B10 B14 | B15 |
|  | TWT Request | TWT Setup Command | Trigger | Last Broadcast Parameter Set | Flow Type | Broadcast TWT Recommendation(#12405) | TWT Wake Interval Exponent | Reserved |
| Bits:  | 1 | 3 | 1 | 1 | 1 | 3 | 5 | 1 |
| * Request Type field format in a Broadcast TWT Parameter Set*(#15026)*
 |

Change the 6th and 7th paragraphs as follows:

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.

The TWT Setup Command subfield values indicate the type of TWT command ~~as shown in Table 9-262k~~. The use of the TWT Setup Command field for the negotiation of individual and broadcast TWT is described in Table 9-262k (TWT Setup Command field values). The entries in the table apply to cases where the Negotiation Type subfield is not 1(#11835). For TWT Setup Command field use when the Negotiation Type subfield is 1(#11835), see 27.7.4 (Use of TWT Information frames).(#12397, #12398)

**TGax Editor: *Change the table below as follows (#CID15880, 15881, 15882, 16459):***

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

|  |
| --- |
| * TWT Setup Command field values
 |
| TWT Setup Command field value | Command name | ~~Description when transmitted by a TWT requesting STA~~Description | ~~Description when transmitted by a TWT responding STA~~ |
| 0 | Request TWT | ~~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, other TWT parameters\* are suggested by the TWT requesting STA in the TWT request.~~A TWT 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. | ~~N/A~~ |
| 1 | Suggest TWT | ~~TWT requesting STA includes a set of TWT parameters such that if the requested target wake time value and/or other TWT parameters cannot be accommodated, then the TWT setup might still be accepted.~~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. | ~~N/A~~ |
| 2 | Demand TWT | ~~TWT requesting STA includes a set of TWT parameters such that if the requested target wake time value and/or other TWT parameters cannot be accommodated, then the TWT setup will be rejected.~~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. | ~~N/A~~ |
| 3 | TWT Grouping | ~~N/A~~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, the Negotiation Type subfield has the value b00 and is sent by an S1G STA; otherwise not applicable.(#11367) | ~~TWT responding STA suggests TWT group parameters that are different from the suggested or demanded TWT parameters of the TWT requesting STA~~ |
| 4 | Accept TWT | ~~N/A~~A TWT responding STA or TWT scheduling AP accepts the TWT request with the TWT parameters (see NOTE) 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. | ~~TWT responding STA accepts the TWT request with the TWT parameters (See NOTE) indicated in the TWT element transmitted by the responding STA~~ |
| 5 | Alternate TWT | ~~N/A~~A TWT responding STA or TWT scheduling AP(#11835) suggests TWT parameters that are different from those suggested by the TWT requesting STA or TWT scheduled STA.(#12402)This command is valid if the TWT Request field is 0; otherwise not applicable. | ~~TWT responding STA suggests TWT parameters that are different from TWT requesting STA suggested or demanded TWT parameters~~ |
| 6 | Dictate TWT | ~~N/A~~A TWT responding STA or TWT scheduling AP indicates TWT parameters that are different from those suggested by the TWT requesting STA or TWT scheduled STA. *(#15882, 16459)* (#12400)This command is valid if the TWT Request field is 0; otherwise not applicable.*(#15882, 16459)* | ~~TWT responding STA demands TWT parameters that are different from TWT requesting STA TWT suggested or demanded parameters~~ |
| 7 | Reject TWT | ~~N/A~~A TWT responding STA rejects setup or a TWT scheduling AP*(#15881)* terminates an existing broadcast TWT or a TWT scheduled STA terminates its membership in a broadcast TWT.(#11368, #12037, #12401) | ~~TWT responding STA rejects TWT setup~~ |
| NOTE—TWT Parameters are: TWT, Nominal Minimum Wake Duration, TWT Wake Interval and TWT Channel subfield values indicated in the TWT element. The Trigger subfield value indicated in the TWT element is also a TWT parameter for an HE STA.*(#15880)* |

Insert the following paragraph after the 7th paragraph (“The TWT Setup Command subfield...”):

The Trigger field indicates whether or not the TWT SP indicated by the TWT element includes Trigger frames or frames carrying a TRS Control subfield(#13136)(#12403) as defined in 27.7 (TWT operation)(#11987). The Trigger field is set to 1 to indicate that at least one Trigger frame or a frame carrying a TRS Control subfield is transmitted during the TWT SP. The Trigger field is set to 0 otherwise.*(#15883)*

**TGax Editor: *Change the paragraphs below as follows (#CID15026):***

Change the 8th and 9th paragraphs as follows:

When transmitted by a TWT requesting STA, the Implicit subfield is set to 1 to request an implicit TWT.*(#15026)*

When transmitted by a TWT requesting STA, the Implicit subfield is set to 0 to request an explicit TWT.*(#15026)*

 The Last Broadcast Parameter Set subfield is set to 0 to indicate that another broadcast TWT Parameter set follows this set. The Last Broadcast Parameter Set subfield is set to 1 to indicate that this is the last broadcast TWT Parameter set in the broadcast TWT element.*(#15026)*

Change the 11th paragraph as follows:

The TWT Flow Identifier subfield(#12405) 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. The Broadcast TWT Recommendation subfield(#12405) contains a value that indicates recommendations on the types of frames that are transmitted by TWT scheduled STAs and scheduling AP during the broadcast TWT SP, encoded according to Broadcast TWT Recommendation field for a broadcast TWT element. The Broadcast TWT Recommendation is reserved when transmitted by a TWT scheduled STA.*(#15026)* (#11369, #12404)

Insert a new table as follows:

|  |
| --- |
| * Broadcast TWT Recommendation field(#12405) for a broadcast TWT element
 |
| Broadcast TWT Recommendation 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 and QoS Null frames(#12313)
* Feedback can be contained in the QoS Control field or in the HE variant HT Control field of the frame, if either is present (see (#12406)27.5.3 (UL MU operation), 27.8 (Operating mode indication), 27.13 (Link adaptation using the HLA Control subfield), etc.)
* Feedback in an HE TB NDP PPDU, if solicited by the AP (see 27.5.6 (NDP feedback report procedure))(#12313, #12409)
* BQRs (see 27.5.2 (HE bandwidth query report operation for MU))(#11008, #12407)
* BSRs (see 27.5.3.6 (HE buffer status feedback operation for UL MU)) *(#16436)*
* 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

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)), otherwise, there are no other restrictions on the frames transmitted by the TWT scheduling AP. |
| 2 | Frames transmitted during a broadcast TWT SP by a TWT scheduled STA are recommended to be limited to solicited status and feedback:* PS-Poll and QoS Null frames
* Feedback can be contained in the QoS Control field or in the HE variant HT Control field of the frame, if either is present (see (#12406)27.5.3 (UL MU operation), 27.8 (Operating mode indication), 27.13 (Link adaptation using the HLA Control subfield), etc.)
* BQRs (see 27.5.2 (HE bandwidth query report operation for MU))(#11008, #12407)
* BSRs (see 27.5.3.6 (HE buffer status feedback operation for UL MU)) *(#16436)*
* 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

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)), otherwise there are no restrictions on the frames transmitted by the TWT scheduling AP. |
| 3 | No constraints on the frames transmitted during a broadcast TWT SP except that the AP transmits 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 |

Change the 12th and 13th paragraphs as follows:

In a TWT element transmitted by a TWT requesting or TWT scheduled STA, the TWT wake interval is equal to the average time that the ~~TWT requesting~~ STA expects to elapse between successive TWT SPs start times (see Table 9-262j1 (Interpretation of Negotiation Type subfield, Target Wake Time, 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 ~~TWT responding~~ STA expects to elapse between successive TWT SPs start times(#12035). In a TWT element contained in a TWT request that is sent by the scheduled STA to negotiate its wake intervals, the TWT wake interval indicates the value of the wake interval (see 27.7.4 (Use of TWT Information frames)).(#12410) 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).

When transmitted by a TWT requesting STA or a TWT scheduled STA and the TWT Setup Command subfield contains a value corresponding to the command "Suggest TWT" or "Demand TWT", the Target Wake Time field contains ~~a positive~~ an unsigned integer ~~which~~ that 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 transmitted by a TWT requesting STA or a TWT scheduled STA and the TWT Setup Command subfield contains the value corresponding to the command "Request TWT", the Target Wake Time field contains the value 0. 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 10(18/664r1) of the relevant TSF value. When a TWT responding STA 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 ~~which~~ that corresponds to a TSF time at which the TWT responding STA requests the TWT requesting STA to wake for the corresponding TWT SP and it does not contain the TWT Group Assignment field.(#12412, #12413)

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

**TGax Editor: *Change the paragraphs below as follows (#CID15030, 16445):***

(#11123)The Broadcast TWT Info subfield is defined in Figure 9-589ay1 (Broadcast TWT Info subfield format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0                       B2 | B3                       B7 | B8                     B15 |
|  | Reserved(#11005) | Broadcast TWT ID | Broadcast TWT Persistence(#11005) |
| Bits:  | 3 | 5 | 8 |
| * Broadcast TWT Info subfield format
 |

 (#11005, #12036)

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~~,~~ is not present. The value 0 in the Broadcast TWT ID subfield indicates the (#12084)broadcast TWT whose membership corresponds to all STAs that are members of the BSS corresponding to the BSSID of the Management frame(#12597) carrying the TWT element.

 s*(#15030, 16445)*

Change the 22nd and subsequent two paragraphs as follows:

**TGax Editor: *Change the paragraphs below as follows (#CID15031, 15242, 15243):***

 The TWT Channel field includes a bitmap that provides the channel that is being negotiated by a STA as a temporary channel during a 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. In an S1G BSS, the ~~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. In an HE BSS, the minimum width channel is equal to 20 MHz. 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. In an HE BSS, only one bit of the bitmap can have a value of 1. The TWT Channel field is used by an S1G STA as defined in 10.48 (Subchannel Selective Transmission (SST) and is used by an HE STA as defined in 27.7.7 (HE subchannel selective transmission operation). *(#15031, 15242, 15243)*

~~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 the TWTs that are set up within an S1G BSS
* Enabling NAV protection during the TWT SP(s) for the TWTs 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).

**TGax Editor: *Change the paragraphs below as follows (#CID15027, 15032, 16461):***

~~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).~~

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 the TWTs where the TWT responding STA is an S1G STA.
* Enabling NAV protection during the TWT SP(s) for the TWTs where the TWT responding STA is an HE STA.

 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.

The is reserved when the Negotiation Type subfield is not 0 *(#15027, 15032, 16461)*

**27.7.3.2 Rules for TWT scheduling AP**

**TGax Editor: *Change the paragraphs below as follows (#CID15030, 16445):***

The TWT scheduling AP shall include a nonzero value in the Broadcast TWT Persistence subfield*(#15030, 16445)* for each Broadcast TWT to indicate the number of TBTTs for which the Broadcast TWT schedule will be in existence, counting forward from the current TBTT. The AP may change the value of the Broadcast TWT Persistence subfield for any Broadcast TWT within any transmitted TWT element. If the AP reduces the value of the subfield, it shall not reduce the value by more than one as compared to the value transmitted during the immediately preceding beacon interval. If the AP increases the value of the Broadcast TWT Persistence subfield, it may increase the value by any amount as compared to the value transmitted during the immediately preceding TBTT.

A TWT scheduling AP that sets the TWT Setup Command subfield to Reject TWT shall indicate the TBTT at which the periodic broadcast TWT will be terminated by setting the value of the Broadcast TWT Persistence subfield*(#15030, 16445)* to indicate the number of TBTTs that remain until the broadcast TWT schedule is terminated. The broadcast TWT schedule terminates at the next TBTT that follows the TBTT at which the TWT scheduling AP transmits the broadcast TWT element with Broadcast TWT Persistence subfield for that broadcast TWT schedule equal to 0.*(#15030, 16445)*

A TWT scheduling AP that sets the TWT Setup Command subfield to Alternate TWT shall indicate the TBTT at which the periodic broadcast TWT parameter set will be modified by setting the Broadcast TWT Persistence subfield*(#15030, 16445)* to indicate the number of TBTTs that remain until the broadcast TWT schedule is modified. The broadcast TWT schedule will be modified at the next TBTT, which follows the TBTT at which the TWT scheduling AP transmits the broadcast TWT element with Broadcast TWT Persistence *(#15030, 16445)* subfield for that broadcast TWT schedule equal to 0. The AP shall include in the broadcast TWT element the modified broadcast TWT parameter set that will take effect at that TBTT. The modified broadcast TWT parameter set shall have the same values in the TWT Setup Command and Broadcast TWT ID subfields as the broadcast TWT parameter set that is being modified and switch the TWT Setup Command subfield from Alternate TWT to Accept TWT at that TBTT.

**27.7.3.3 Rules for TWT scheduled STA**

**TGax Editor: *Change the paragraphs below as follows (#CID15030, 16445):***

A TWT scheduled STA that did not receive a Beacon frame at a TBTT shall act as if it had received the expected Beacon frame containing a TWT element for a broadcast TWT, if the missed beacon corresponds to a TBTT that is within the next *n* TBTTs beyond the most recently received Beacon frame that included a TWT element for that broadcast TWT, where *n* is equal to one plus the value obtained from the Broadcast TWT Persistence subfield of the corresponding Broadcast TWT, except that *n* is infinite when the Broadcast TWT Persistence *(#15030, 16445)* subfield is 255.

**TGax Editor: *Remove “Mantissa” from all Tables in clause 27.7 (TWT operation) (#CID15030, 16445)***