IEEE P802.11
Wireless LANs

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| Comment resolutions for 27.7 and 27.7.1 |
| Date: 2018-03-01 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Alfred Asterjadhi | Qualcomm Inc. | 5775 Morehouse Dr, San Diego, CA 92109 | +1-858-658-5302 | aasterja@qti.qualcomm.com |
| George Cherian | Qualcomm Inc. |  |  |  |
| Abhishek Patil | Qualcomm Inc. |  |  |  |

Abstract

This submission proposes resolutions for multiple comments related to TGax D2.0 with the following CIDs:

* 11338, 11343, 11377, 11993, 12281, 12317, 13778 (7 CIDs)

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** |
| 11338 | Alfred Asterjadhi | 270.60 | Actually all STAs (not only HE) that are associated with the AP support TWT for this to be the case. In addition the AP can set the Responder PM Mode subfield to 1 for the broadcast TWT case. So make sure that subclause 27.7.3 is inline with it. | Clarify. Here and in 27.3.3.2. | Revised –Agree in principle. Clarified that the rule applies when all STAs (not only HE) have declared support for TWT.TGax editor to make the changes shown in 11-18/0044r0 under all headings that include CID 11338. |
| 11343 | Alfred Asterjadhi | 270.32 | The two procedures are independend so no need to say that individual TWT agreements are required. Remove that portion of the sentence. And in next paragraph the STA needs not be aware of other STAs memberships too. | Delete ", without requiring that an individual TWT agreement has been established between them," Specify that STAs need not be aware of other STAs memberships to broadcast TWT schedules. | Revised –Agree in principle. Proposed resolution accounts for the suggested changes, clarifying the portions that apply to the AP and to the non-AP STAs.TGax editor to make the changes shown in 11-18/0044r0 under all headings that include CID 11343. |
| 11377 | Bibhu Mohanty | 270.16 | Column titles for all of the tables in section 27.7 can be kept short by adding some of the repeating description to the title of the table. Also the field name for Wake TBTT Negotiation should be changed as it's purpose is overloaded (to also indicate an individually addressed frame carrying b-TWT). | As in comment | Revised –Agree in principle. Proposed resolution accounts for the suggested changes, clarifying the settings in a concise way for all the tables of this category. The proposed resolution also fixes some bugs and inconsistencies encountered during the review of these tables.TGax editor to make the changes shown in 11-18/0044r0 under all headings that include CID 11377. |
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| 11993 | James Yee | 270.36 | typo in "does not need to be", but since it is already stated in10.43 that " STAs need notbe made aware of the TWT values of other STAs", these first 2 sentences of this paragraph are unnecessary and should be deleted. | As suggested. | Rejected –Agree that this is already stated in 10.43. However, since in the past rounds of resolutions certain comments asked for such a statement to be added the proposal is to keep the statement since it provides some additional insights on to the properties of the twt operation.No changes are needed to address this comment. |
| 12281 | Kazuyuki Sakoda | 270.17 | There is no mentioning of HE TWT application to mesh STAs. TWT is a nice feature for better power saving. It should be used for MBSS, too. | Please define a set of rules how HE mesh STAs can leverage TWT. | Rejected –There are no restrictions that forbid mesh STAs to deploy TWT. But there is also no need to define additional rules for mesh STAs either. |
| 12317 | Laurent Cariou | 270.16 | TWT requesting STAs and TWT scheduled STA have rules and operation which is described when they are in PS mode. TWT requesting and TWT scheduled STAs should be defined as being PS STAs, to clarify the specification. | Modify the definition of TWT requesting STA and TWT scheduled STAs to add the condition of being PS STAs. | Rejected –TW operation contains a subset of rules that apply to the STAs when in PS mode, however there is a superset of rules that apply to STAs independently of whether they are in PS mode or in any other mode. Please refer to clauses 10.43, and the subclauses of 27.7 et. al. that extensively describe these rules and mechanisms.  |
| 13778 | Yanjun Sun | 271.01 | The note in its current form is misleading. AP can't be unavailable outside TWT SPs. It may have legacy or STAs that don't support TWT STAs associating with it. The note needs to clarify that this applies only when the all the associated STAs have declared support for TWT or the AP employs other mechanisms to signal non-TWT STAs that it is unavailable outside the TWT SP periods. | Either remove the note or clarify that the AP employs other mechanisms to signal to STAs not supporting TWT that it is unavailable outside the TWT SP periods. | Revised –Agree in principle. Proposed resolution is to clarify that the AP may set the TWT required bit to 1 if all STAs (not only HE STAs) support TWT.TGax editor to make the changes shown in 11-18/0044r0 under all headings that include CID 13778. |

**Discussion: *None***

* TWT operation
* General

Target wake time (TWT) allows an AP to manage activity in the BSS by scheduling STAs to operate at different times in order to minimize contention between STAs and to reduce the required amount of time that a STA in PS mode needs to be awake.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 11343, 13778):***

An HE STA can negotiate individual TWT agreements, as defined in 10.43 (Target wake time (TWT)), subject to the additional rules and restrictions that are defined in 27.7.2 (Individual TWT agreements). An HE non-AP STA can establish memberships in broadcast TWT schedules, as defined in 27.7.3 (Broadcast TWT operation), which can be used as defined in 27.7.3.3 (Rules for TWT scheduled STA), 27.14.2 (Power save with UORA), and 27.14.3 (Opportunistic power save)(#7618, #7400). An HE AP can deliver broadcast TWT parameter sets to non-AP HE STAs(#6256)as described in 27.7.3.2 (Rules for TWT scheduling AP), 27.14.2 (Power save with UORA), and 27.14.3 (Opportunistic power save). *(#11343, 13778)* (#4767)(#4846)

A STA does need not to be aware of the values of TWT parameters of the TWT agreements of other STAs in the BSS of the STA or of TWT agreements of STAs in other BSSs. A STA does not need to be aware that a TWT service period (SP) can be used to exchange frames with other STAs(#7619, #5963). Frames transmitted during a TWT SP can be carried in any PPDU format supported by the pair of STAs that have established the TWT agreement corresponding to that TWT SP, including HE MU PPDU, HE TB PPDU, etc.(#4767, #4846)

An HE STA with dot11TWTOptionActivated equal to true shall set:

* The TWT Requester Support subfield to 1 in the HE Capabilities element that it transmits if it supports operating in the role of a TWT requesting STA(#9978); otherwise set to 0.
* The TWT Responder Support subfield to 1 in the HE Capabilities elements that it transmits if it supports operating in the role of a TWT responding STA; otherwise set to 0.
* The Broadcast TWT Support subfield to 1 in the HE Capabilities element that it transmits if it supports operating in the role of a TWT scheduled STA or in the role of a TWT scheduling AP(#6919); otherwise set to 0.

An HE AP shall set the TWT Responder Support subfields of the Extended Capabilities element and HE Capabilities element to 1.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 11338):***

An HE AP may set the TWT Required subfield to 1 in HE Operation elements it transmits to request TWT participation by all STAs that are associated to it and that have declared support for TWT. A STA that supports TWT and is associated with an HE AP(#10277) from which it receives an HE Operation element whose TWT Required subfield is 1 shall either negotiate individual TWT agreements, as defined in 27.7.2 (Individual TWT agreements), or participate in broadcast TWT operation, as defined in 27.7.3 (Broadcast TWT operation).

NOTE—The AP sets the TWT Required subfield to 1 when it is unavailable outside of TWT SPs (see 27.7.2 (Individual TWT agreements), 27.7.3 (Broadcast TWT operation) and 10.43.7 (TWT Sleep Setup)).*(#11338)* (#7396)

* Individual TWT agreements

**TGax Editor: *Change the below of this subclause as follows (#CID 11377):***

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| * HE individual TWT setup exchange command interpretation
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| TWT Setup Command field within an initiating frame*(#11377)* | TWT Setup Command field within a response frame *(#11377)* | TWT condition after the completion of the exchange |
| Request TWT or Suggest TWT or Demand TWT with Broadcast subfield = 0 | Accept TWT with Broadcast subfield = 1 | This response is not allowed. |
| Request TWT with Broadcast subfield = 0 | Dictate TWT with Broadcast subfield = 1 | No individual TWT agreement exists with the associated TWT Flow identifier. A broadcast TWT schedule exists that uses the TWT parameters identified in the response frame including a Broadcast TWT ID subfield. The broadcast TWT schedule is not necessarily a newly created broadcast TWT schedule. The responding STA will not create any new individual TWT agreement with the requester at this time. The STA transmitting the initiating frame is not a member of the broadcast TWT. |
| Accept TWT with Broadcast subfield set to 0 and with an individual address in the RA field of the MPDU. | No frame transmitted | The STA receiving this frame now has an individual TWT agreement with the transmitter of the frame where the parameters of the individual TWT agreement are identified by the initiating frame. |
| Accept TWT with Broadcast subfield set to 1 and with an individual address in the RA field of the MPDU. | No frame transmitted | Only an HE AP is permitted to transmit this sequence. The STA receiving this frame is a member of the broadcast TWT identified by the initiating frame. |
| Alternate TWT or Dictate TWT with Broadcast subfield = 0 | No frame transmitted | The STA receiving this frame is not, through the receipt of this frame, a member of the TWT identified by the initiating frame but can use the information provided to create a request to join a TWT in a subsequent initiating frame that it transmits. |
| NOTE 1—The Negotiation Type field of the TWT element contained in these frames is equal to 0. *(#11377)*NOTE 2—Initiating frame settings not listed in the table are not allowed. The initiating frame is a TWT request frame if the TWT Request field is 1; otherwise it is a TWT response frame. The response frame is a TWT response frame *(#11377)* |

**27.7.3.2 Rules for TWT scheduling AP**

**TGax Editor: *Change the below of this subclause as follows (#CID 11377):***

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| * Broadcast TWT announcements
 |
| TWT Setup Command field within an initiating frame  | TWT Setup Command field within a response frame*(#11377)* | Condition after the completion of the exchange |
| Accept TWT *(#11377)* |  No frame transmitted | Only an HE AP is permitted to transmit this sequence. The STA receiving this frame is a member of the broadcast TWT identified by the initiating frame. A broadcast TWT schedule is either created or already exists and uses the TWT parameters identified in the initiating frame, including a broadcast TWT ID. The broadcast TWT schedule is identified by the broadcast TWT ID and the TA of the initiating frame. |
| Alternate TWT |  No frame transmitted | When transmitted by a TWT scheduling AP, some of the parameters of the broadcast TWT schedule identified by the broadcast TWT ID and the TA of the initiating frame will change in the future. The new parameters will be present in the next frame transmitted by the TWT scheduling AP that has a broadcast TWT with the same broadcast TWT ID and same TA, but with the TWT command value set to Accept TWT. |
| Reject TWT |  No frame transmitted | When transmitted by a TWT scheduling AP, the broadcast TWT schedule identified by the broadcast TWT ID and the TA of the initiating frame will be terminated in the future. The termination occurs when a Beacon is transmitted by the TWT scheduling AP that does not include a broadcast TWT with the same broadcast TWT ID and same TA as the initiating frame. |
| NOTE 1 – The Negotiation Type field of the TWT element contained in these frames is equal to 2.NOTE 2—Initiating frame settings not listed in the table are not allowed. The initiating frame is a TWT response frame. *(#11377)* |

* Rules for TWT scheduled STA

**TGax Editor: *Change the below of this subclause as follows (#CID 11377):***

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| * Broadcast TWT membership exchanges
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| TWT Setup Command field within an initiating frame*(#11377)* | TWT Setup Command field value within a response frame*(#11377)* | Condition after the completion of the exchange |
| Demand TWT | Accept TWT | A broadcast TWT schedule exists or has been created with the TWT parameters indicated in the initiating frame and repeated in the responding frame. The STA transmitting the initiating frame is a member of the Broadcast TWT schedule identified by the Broadcast TWT ID and the TA of the response frame. |
| Request TWT or Suggest TWT | Accept TWT | A broadcast TWT schedule exists or has been created with the TWT parameters indicated in the response frame. The STA transmitting the initiating frame is a member of the broadcast TWT schedule identified by the broadcast TWT ID and the TA of the response frame. |
| Suggest TWT | Alternate TWT | No new broadcast TWT schedule has been created with the TWT parameters indicated in the initiating frame. The responder is offering an alternative set of parameters vs. those indicated in the initiating frame, as a means of negotiating TWT parameters with the requester. The TWT scheduled STA can send a new request with any set of TWT parameters and the TWT scheduling AP might create(#11845) a new broadcast TWT schedule using the parameters indicated in the responding frame. |
| Request TWT or Demand TWT | Alternate TWT | This response is not allowed. |
| Suggest TWT or Demand TWT | Dictate TWT | A broadcast TWT schedule is either created or already exists and is using the TWT parameters identified in the response frame, including a broadcast TWT ID. The TWT scheduling AP(#12094) will not create any new broadcast TWT schedule with the TWT scheduled STA at this time. The STA transmitting the initiating frame is not a member of the broadcast TWT schedule identified by the broadcast TWT ID and the TA of the response frame. |
| Request TWT or Suggest TWT or Demand TWT | Reject TWT | The STA transmitting the initiating frame is a not a member of a broadcast TWT identified by the broadcast TWT ID and the TA of the response frame, if such a broadcast TWT exists. |
| Accept TWT |  No frame transmitted | Not permitted to be transmitted by a TWT scheduled STA.When transmitted by a TWT scheduling AP, the recipient STA's membership in the broadcast TWT schedule identified by the broadcast TWT ID and the TA of the initiating frame is established. |
| Alternate TWT | No frame transmitted | Not permitted to be transmitted by a TWT scheduled STA or a TWT scheduling AP. |
| Reject TWT | No frame transmitted | When transmitted by a TWT scheduled STA, the transmitting STA's membership in the broadcast TWT schedule identified by the broadcast TWT ID and the RA of the initiating frame is terminated. |
| NOTE 1—The Negotiation Type field of the TWT element contained in these frames is equal to 3. *(#11377)*NOTE 2—Initiating frame settings not listed in the table are not allowed. The initiating frame is a TWT request frame if the TWT Request field is 1; otherwise it is a TWT response frame. The response frame is a TWT response frame. *(#11377)* |

* Negotiation of wake TBTT and wake interval

**TGax Editor: *Change the below of this subclause as follows (#CID 11377):***

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| * Wake TBTT negotiation exchanges
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| TWT Setup Command field value within an initiating frame *(#11377)* | TWT Setup Command field value within a response frame*(#11377)* | Condition after the completion of the exchange |
| Request TWT | Accept TWT or Alternate TWT or Dictate TWT or Reject TWT or no response | This exchange is not allowed. |
| Demand TWT or Suggest TWT | Accept TWT | A Wake TBTT agreement has been created with the Wake TBTT parameters indicated in the initiating frame. |
| Demand TWT or Suggest TWT | Reject TWT | No Wake TBTT agreement has been created. |
| Demand TWT or Suggest TWT | Alternate TWT | No Wake TBTT agreement has been created. The responder is offering an alternative set of parameters vs. those indicated in the initiating frame. The TWT scheduled STA can send a new request with any set of Wake TBTT parameters and the responder might create a Wake TBTT agreement using those parameters. |
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| NOTE 1 – The Negotiation Type field of the TWT element contained in these frames is equal to 1.NOTE 2—Initiating frame settings not listed in the table are not allowed. The initiating frame is a TWT request frame. *(#11377)* |

* TWT overview

**TGax Editor: *Change the below of this subclause as follows (#CID 11377):***

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| * TWT setup exchange command interpretation
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| TWT Setup Command field within an initiating frame*(#11377)* |  TWT Setup Command field within a response frame *(#11377)* | TWT condition after the completion of the exchange |
| Request TWT or Suggest TWT or Demand TWT | No frame transmitted | No new individual TWT agreement exists with the TWT flow identifier corresponding to the TWT flow identifier in the initiating frame. No new individual TWT agreement exists. |
| Demand TWT | Accept TWT | An individual TWT agreement exists that uses the TWT parameters identified in the initiating frame. The TWT parameters in the response frame match the TWT parameters of the initiating frame. |
| Suggest TWT or Request TWT | Accept TWT | An individual TWT agreement exists and that uses the TWT parameters identified in the response frame. |
| Demand TWT | Alternate TWT or Dictate TWT | No individual TWT agreement exists with the associated TWT flow identifier. The responder is offering an alternative set of parameters vs. those indicated in the initiating frame. The requesting STA can send a new request with any set of TWT parameters and the responder might create an individual TWT agreement using those parameters. |
| Suggest TWT | Alternate TWT | No individual TWT agreement exists with the associated TWT flow identifier. The responder is offering an alternative set of parameters to those indicated in the initiating frame, as a means of negotiating TWT parameters with the requester. The requesting STA can send a new request with any set of TWT parameters and the responder might create an individual TWT agreement using those parameters. |
| Suggest TWT | Dictate TWT | No individual TWT agreement exists with the associated TWT flow identifier. The responder offers an alternative set of parameters vs. those indicated in the TWT request. By selecting “Dictate TWT”, the responder indicates that it is not willing to accept any other TWT parameters for the requesting STA at this time. The requesting STA can send a new request, but will only receive an Accept TWT if it uses the dictated TWT parameters. |
| Request TWT or Suggest TWT or Demand TWT | Reject TWT | No individual TWT agreement exists with the associated TWT flow identifier. The responding STA will not create any new individual TWT agreement with the requester at this time. |
| NOTE 1—The Negotiation Type field of the TWT element contained in these frames is equal to 0.NOTE—Initiating frame settings not listed in the table are not allowed. The initiating frame is a TWT request frame. The response frame is a TWT response frame. *(#11377)* |