IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Comment resolutions for 27.7 and 27.7.1 | | | | |
| Date: 2018-05-01 | | | | |
| 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. |  |  |  |
| Matthew Fischer | Broadcom Ltd. |  |  |  |

Abstract

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

* 11338, 11343, 11377, 11993, 12281, 12317, 13778, 13293, 13294, 13779,
* 12045, 11840, 11035 (13 CIDs)

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Added other CIDs. Changes highlighted in green.
* Rev 2: Some changes based on discussions during the presentation. Changes are highlighted in this color.

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.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 11-18/0044r2 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 11-18/0044r2 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 11-18/0044r2 under all headings that include CID 11377. |
| 11993 | James Yee | 270.36 | typo in "does not need to be", but since it is already stated in10.43 that " STAs need not be 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.  Please note that broadcast TWT is not available to be used by mesh STAs (since the AP is only allowed to be a TWT scheduled AP. But mesh STAs can use individual TWTs). |
| 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 –  TWT 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 11-18/0044r2 under all headings that include CID 13778. |
| 13293 | Robert Stacey | 270.21 | Surely it allows the AP and only the AP to manage activity. What sort of activity? Jumping jacks? It is not clear how it minimizes contention (minimize is a strong statement - implies the optimal amount of contention). Clarify or remove the statement. It is not clear how it reduces the time a STA in PS mode is awake. Clarify this statement or remove it. | "TWT operation allows an AP to control when an associated non-AP HE STA that supports TWT has access to the WM. This control allows the AP to reduce WM contention during certain periods by <describe how>. This control also allows an AP to reduce the amount of time a non-AP HE STA in PS mode spends in the awake state by <describe how>" | Revised –  Proposed resolution adds more clarifications on what sort of activity is managed. Not sure how jacks can jump (or whether we need to control their jumps) but certainly a next generation amendment can consider solving this if it is a problem.  TGax editor to make the changes shown in 11-18/0044r2 under all headings that include CID 13293. |
| 13294 | Robert Stacey | 270.43 | The applicability of the shall statement to an implementation is not clear. dot11TWTOptionActivated is a MIB object managed by an external management entity. How does such a STA set these capability fields if the MIB object is false or the MIB is not implemented? Also, the relationship of the MIB object to an HE STA is unclear with the situation further confused by it being in the Dot11S1GStationConfig table. Can a manament entity write a value true to the MIB object in all cases? What if there is no implementation support? Can the value be changed while the STA is associated with an AP? | Remove the paragraph. The descriptions in the capability fields themselves are sufficient for an implementer to determine how to set these fields appropriately. The shall statements should apply to behavior WHEN the fields are set a certain way. For example, A STA that sets the TWT Responder Support subfield to 1 shall respond to a TWT Request frame with a TWT Reponse frame. Or equivalently, a STA that supports the TWT responder role, shall... | Revised –  This is supposed to be a capability MIB variable here. Proposed resolution is to specify that it is a capability variable.  TGax editor to make the changes shown in 11-18/0044r2 under all headings that include CID 13294. |
| 13779 | Yanjun Sun | 272.45 | There is no such frame as TWT Request frame or TWT Response frame. The comment applies to several such instances in this section. | Add spec text to clarify that all reference to TWT Request frames indicate a TWT Setup frame carrying a TWT element with Request subfield set to 1. Conversely, TWT Response frame refers to TWT Setup frame carrying a TWT element with Request subfield set to 0. | Revised –  Agree in principle. Proposed resolution accounts for the suggested changes, clarifying these terms in the tables that provide the exchanges.  TGax editor to make the changes shown in 11-18/0044r2 under all headings that include CID 13779. |
| 12045 | Jarkko Kneckt | 272.36 | The note underneath the table 27-2 and table in clause 10-43 do not define whether other response frame settings are allowed to the requests. For some requests only specific response is allowed and this could be clarified in the Note. | Change the note to: Request and response frame settings not listed in the table are not allowed." | Revised –  Agree in principle with the comment. Since there are different tables covering different combinations the proposal is to provide a statement that the request and response settings that are not listed in the tables of different subclauses are not allowed.  TGax editor to make the changes shown in 11-18/0044r2 under all headings that include CID 12045. |
| 11840 | Guoqing Li | 271.57 | Table 27-2, there are other frame exchange possibilites that are not included in this table. For example, when an unsolicated TWT is received, a STA can send a Reject to deny this unsolicated TWT setup. | Please state that this table listed some frame exchange possiblities, not all. | Rejected –  The intention is to give an exhaustive list of the possible sequences since it is beneficial to list them all in these tables (no ambiguity). The example cited, is not correct, since the teardown can be performed with a TWT Teardown frame, which is not part of the TWT setup. |
| 11035 | Abhishek Patil | 272.45 | Clarify at the beginning of the section that TWT Request frame (TWT Response frame) corresponds to a TWT Setup frame carrying TWT element with Request subfield=1 (=0) | As in comment | Revised –  Agree in principle. Proposed resolution accounts for the suggested changes, clarifying these terms in the tables that provide the exchanges.  TGax editor to make the changes shown in 11-18/0044r2 under all headings that include CID 11035. |

**Discussion: *None***

* TWT operation
* General

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 13293):***

Target wake time (TWT) allows an AP to manage activity in the BSS 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. This is achieved by allocating STAs to operate at non-overlapping times and/or frequencies, and concentrate the frame exchanges in pre-defined service periods.*(#13293)*

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

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), and 27.7.7 (HE subchannel selective transmission operation). 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)* (#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)

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 13294):***

An HE STA with dot11TWTOptionImplemented *(#13294)* 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: *Replace “dot11TWTOptionActivated” with “dot11TWTOptionImplemented” throughout the draft and throughout the baseline (#CID 13294).***

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 11338, 13778):***

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 (by setting any one of TWT Requester Support or TWT Responder Support or Broadcast TWT Support subfield in the HE Capabilities element or the Extended Capabilities element that it transmits to 1). 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), and 27.7.3 (Broadcast TWT operation)). The AP might be unavailable outside of TWT SPs if it sets the Responder PM Mode subfield to 1 (see 10.43.7 (TWT Sleep Setup))).*(#11338, 13778)* (#7396)

* Individual TWT agreements

**TGax Editor: *Change the below of this subclause as follows (#CID 11377, 13779, 11035, 12045):***

|  |  |  |
| --- | --- | --- |
| * HE individual TWT setup exchange command interpretation | | |
| 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 |
| … |  |  |
| NOTE 1—The Negotiation Type field of the TWT element contained in these frames is 0 (if the Broadcast subfield is 0) or 3 (if the Broadcast subfield is 1).*(#11377, 13779)*  NOTE 2—Initiating frame and response frame settings that are not listed in the tables provided in 10.43 or 27.7 are not allowed*(#12045, 13779)*. The initiating frame is a TWT request if the TWT element contained in the frame has the TWT Request field equal to 1; otherwise it is a TWT response (see Table 9-262k (TWT Setup Command field values)). The response frame is a TWT response if the TWT element contained in the frame has the TWT Request field equal to 0*(#11377, 13779, 11035)* | | |

**27.7.3.2 Rules for TWT scheduling AP**

**TGax Editor: *Change the below of this subclause as follows (#CID 11377, 13779, 11035, 12045):***

|  |  |  |
| --- | --- | --- |
| * 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 |
| … |  |  |
| NOTE 1 – The Negotiation Type field of the TWT element contained in these frames is equal to 2.  NOTE 2— Initiating frame and response frame settings that are not listed in the tables provided in 10.43 or 27.7 are not allowed. The initiating frame is a TWT response.*(#11377, 13779, 11035, 12045)* | | |

* Rules for TWT scheduled STA

**TGax Editor: *Change the below of this subclause as follows (#CID 11377, 13779, 11035, 12045):***

|  |  |  |
| --- | --- | --- |
| * Broadcast TWT membership exchanges | | |
| 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 |
| … |  |  |
| NOTE 1—The Negotiation Type field of the TWT element contained in these frames is equal to 3. *(#11377, 13779)*  NOTE 2— Initiating frame and response frame settings that are not listed in the tables provided in 10.43 or 27.7 are not allowed. The initiating frame is a TWT request if the TWT element contained in the frame has the TWT Request field equal to 1 (see Table 9-262k (TWT Setup Command field values)); otherwise it is a TWT response. The response frame is a TWT response.*(#11377, 13779, 11035, 12045)* | | |

* + 1. Negotiation of wake TBTT and wake interval

**TGax Editor: *Change the below of this subclause as follows (#CID 11377, 13779, 11035, 12045):***

|  |  |  |
| --- | --- | --- |
| Table 27-8 Wake TBTT negotiation exchanges | | |
| 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 |
| … |  |  |
| NOTE 1 – The Negotiation Type field of the TWT element contained in these frames is equal to 1.  NOTE 2— Initiating frame and response frame settings that are not listed in the tables provided in 10.43 or 27.7 are not allowed. The initiating frame is a TWT request and the response frame is a TWT response.*(#11377, 13779, 11035, 12045)* | | |

* TWT overview

**TGax Editor: *Change the below of this subclause as follows (#CID 11377, 13779, 11035, 12045):***

|  |  |  |
| --- | --- | --- |
| * TWT setup exchange command interpretation | | |
| 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 |
| … |  |  |
| NOTE 1—The Negotiation Type field of the TWT element contained in these frames is equal to 0.  NOTE— Initiating frame and response frame settings that are not listed in the tables provided in 10.43 or 27.7 are not allowed. The initiating frame is a TWT request and the response frame is a TWT response.*(#11377, 13779, 11035, 12045)* | | |