IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolution for Misc. CIDs | | | | |
| Date: 2023-03-28 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Abdel Karim Ajami | Qualcomm Inc |  |  | [aajami@qti.qualcomm.com](mailto:aajami@qti.qualcomm.com) |
| Alfred Asterjadhi |  |  |  |
| Abhishek Patil |  |  |  |
| Duncan Ho |  |  |  |
| George Cherian |  |  |  |
| Gaurang Naik |  |  |  |
| Yanjun Sun |  |  |  |

Abstract

This submission proposes resolution for CIDs received in LB271 (11be D3.0).

15245, 15744, 15843, 15934, 16651, 16145, 17795, 17084, 15651, 17086

***TGbe editor: The baseline for this document is 11be D3.0***

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: Revised based on offline feedback.

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 TGbe Draft. This introduction is not part of the adopted material.

Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e., they are instructions to the 802.11 editor on how to merge the text with the baseline documents).

TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 15245 | 35.8.5.1 | 620.09 | An operation for the following case should be clarified in addition to the text described in 35.8.5.1.  The case is if there is not enough time for the frame exchange to complete before the R-TWT SP and selected a random backoff count using the present CW, and then if the backoff counts reach zero before the start of the R-TWT SP. | Proposed to add the text as "if there is not enough time for the frame exchange to complete before the R-TWT SP and selected a random backoff count using the present CW, and then if the backoff counts reach zero before the start of the R-TWT SP, A non-AP EHT STA should select again a random backoff count using the present CW (without advancing to the next value in the sequence)." | **Revised**  Per the current rule, in the scenario described by the commenter, an R-TWT scheduled STA will restart the RBO again since there is not enough time for transmission before the start time of the R-TWT SP and hence no further changes are needed We add a NOTE to clarify the behavior cited by the commentor.  TGbe editor, please implement changes as shown in 11-23/673r1 tagged as 15245 |
| 15744 | 35.8.5.1 | 620.09 | "In addition, before starting transmission of any PPDU, the non-AP EHT STA with dot11RestrictedTWTOptionImplemented set to true shall check if there is enough time for the frame exchange to complete prior to the start of the R-TWT SP and, if there is not enough time, then the STA shall defer transmission by selecting a random backoff count using the present CW (without advancing to the next value in the sequence)." When a STA knows there is not enough time, it may defer transmission several times due to the back off count reaching zero again and again. It may be inefficient. | Please add the following language. "If there is not enough time, then the STA may defer transmission until the end of R-TWT SP, and then selects a random backoff count using the present CW." | **Rejected**  The cited rule helps to avoid collisions at the start of the R-TWT SP. The suggestion of the commenter would preclude a STA from contending within the R-TWT SP which complicates the protocol unnecessarily and lead to inefficiencies with respect to member R-TWT STAs.  TGbe editor, no further changes needed. |
| 15843 | 35.8.4 | 619.55 | "Agreement" is the term for individual TWT. | Change 'agreement' to 'schedule'. | **Revised**  Agree in principle, we revise the term ‘agreement’ to ‘schedule’.  Tgbe editor, please implement changes as shown in 11-23/673r1 tagged as 15843 |
| 15934 | 35.8.4 | 619.54 | [10:25] is a typo | remove the [10:25] | **Rejected**  The cited text [10:25] refers to the part of the TSF timer that is carried in the Target Wake Time subfield and is already used in baseline Broadcast TWT.  TGbe editor, no further changes are needed. |
| 16651 | 35.8.4 | 619.54 | [10:25] is a typo | remove the [10:25] | **Rejected**  Same resolution as CID 16651  TGbe editor, no further changes are needed. |
| 16145 | 35.8.4 | 619.57 | The term "first R-TWT SP" is better to specify the first R-TWT SP from what. For example, when the Beacon frame includes new R-TWT schedule(s), does the first R-TWT SP mean the scheduled R-TWT SP at first after receiving/transmitting the Beacon frame? | Please clarify the term "first R-TWT SP". | **Revised**  Agree in principle. We clarify the first R-TWT SP and related aspects.  Tgbe editor, please implement changes as shown in 11-23/673r1 tagged as 16145 |
| 17795 | 35.8.4 | 619.58 | Clarify how the STA compute the Next R-TWT SP start time based on the first R-TWT SP start time received in the TWT element | As in the comment | **Revised**  Agree in principle. Same resolution as CID 16145  Tgbe editor, please implement changes as shown in 11-23/673r1 tagged as 16145 |
| 17084 | 35.8.4 | 619.52 | "An R-TWT scheduling AP when announcing an R-TWT schedule, shall" poor wording | Change to "When an R-TWT scheduling AP announces an R-TWT schedule, it shall" | **Revised**  Agree in principle, we revise the sentence.  Tgbe editor, please implement changes as shown in 11-23/673r1 tagged as 16145 |
| 15651 | 35.8.5.1 | 620.13 | How a STA could defer a transmission by selecting a random backoff ? This is not clear. Moreover the wording in the bracket is not also clear. | Please modify the sentence such as "and select a random backoff count using the present CW" and remove the bracket | **Revised**  We clarify the cited sentence.  Tgbe editor, please implement changes as shown in 11-23/673r1 tagged as 15651 |
| 17086 | 35.8.5.1 | 620 | "(without advancing to the next value in the sequence)" not clear as to which sequence this is | Delete the cited text | **Revised**  We clarify the cited sentence. Same resolution as CID 15651  Tgbe editor, please implement changes as shown in 11-23/673r1 tagged as 15651 |

### Discussion:

**TWT Request**   
(T1 = 510 TUs)

**TSFTWT = 510 TUs = 522240 usecs**

TSFFirst R-TWT SP

**TSFAdjusted-TWT = TSFbased on First R-TWT SP = 521797 usecs**

**TSF=0**

**TWT Response** (TSFTWT = 510 TUs)

**Scenario 1:**

* R-TWT scheduled STA request to setup a new R-TWT schedule (new B-TWT ID) with TWT setup frame indicating T1 = 510 TUs and a TWT Wake Interval of 16667 microseconds
* AP sends a TWT Response frame with TWT field set to TSFTWT[10:25] where TSFTWT = 510 TUs and same TWT Wake Interval
* AP will compute TSFFirst R-TWT SP as:  
  TSFFirst R-TWT SP = = 5120 usecs (5 TUs)
* Member STA will adjust its target wake time to TSFAdjusted-TWT in order to align with the schedule announced by the AP using First R-TWT SP start time as follows:   
  TSFAdjusted-TWT = TSFTWT – mod(mod(TSFTWT, TWT Wake Interval), 1024) = 521797
* The Next R-TWT SP start time computed by other R-TWT scheduled STAs that receive the announcement with the TWT element carrying the First R-TWT SP start time and the TWT Wake Interval can do the following at Current TSF timer of 500 TUs:
  + TSFNext R-TWT SP = Current TSF timer – mod(Current TSF Timer- TSFFirst R-TWT SP , TWT Wake Interval) + TWT Wake Interval = 521797

**Scenario 2:** Another R-TWT scheduled STA request to setup a membership with the existing R-TWT schedule (existing B-RTWT ID) with a TWT setup frame indicating T2 (T2 could be 0 (Request TWT) where a STA is a member upon acceptance by the AP or T2 could be non-zero value (Demand TWT or Suggest TWT) indicating a time at which the STA want to start the membership)

* AP responds with a TWT response frame that indicates TSFTWT. For example, given that the R-TWT SP start times (in usecs) for the schedule above are: 521797, 538464, 555131, 571798, 588465. If the AP accept the STA to join starting from 555131 (one of the future R-TWT SP start times), the AP will set the value of the TWT field in the TWT Response to TSFTWT = 543 TU (556032 usecs) rounded up to the nearest TU value). Then the R-TWT Scheduled STA will compute the adjusted R-TWT SP start time as TSFAdjusted-TWT = TSFTWT – mod(mod(TSFTWT, TWT Wake Interval), 1024) = 555131 usecs which is the intended time that the AP want the STA to join

### Proposed Text:

**35.8.3 R-TWT SPs announcement**

(#17084) If an R-TWT scheduling AP announces an R-TWT schedule whose TWT Wake Interval is not an integer multiple of 1 TU, it shall set the Target Wake Time field in the TWT element in transmitted Management frames to (#15843) (#16145) TSF First R-TWT SP [10:25], where TSFFirst R-TWT SP is the timestamp that corresponds to the reference start time of the First R-TWT SP that happened right after TSF timer equals 0 for the corresponding R-TWT schedule and TSFFirst R-TWT SP is computed as TSFFirst R-TWT SP = where TSFTWT is the TSF timer value in microseconds corresponding to the Target Wake Time that was carried in the TWT Response frame that successfully established an R-TWT membership or TSFTWT *­*is selected by the R-TWT scheduling AP if the AP start announcing an R-TWT schedule before any membership setup.

(#16145) For an R-TWT schedule with a TWT Wake Interval that is not an integer multiple of 1 TU, the R-TWT scheduled STAs receiving an R-TWT announcement through transmitted Management frames and the R-TWT scheduling AP shall determine the start time of subsequent R-TWT SPs that happen after the First R-TWT SP in a periodic R-TWT schedule based on the start time of the First R-TWT SP and the TWT wake interval of the corresponding R-TWT schedule. (#16145) When an R-TWT scheduled STA requests to establish a membership for an R-TWT schedule with a TWT Wake Interval value that is not an integer multiple of 1 TU, the following apply:

In order to align the target wake times based on the TWT membership setup with the target wake times that result from announcing the start time of the First R-TWT SP by the AP, the member R-TWT scheduled STA shall adjust its next R-TWT SP start time as TSFAdjusted-TWT = TSFTWT – mod(mod(TSFTWT, TWT Wake Interval), 1024) where TSFTWT is the TSF timer value in microseconds corresponding to the Target Wake Time that was carried in the TWT Response frame with Accept TWT that established the R-TWT membership. The member R-TWT scheduled STA shall determine the start times of the subsequent R-TWT SPs based on TSFAdjusted-TWT and the TWT Wake Interval of the corresponding R-TWT schedule.

(#16145) If an R-TWT scheduled STA requests to join an existing R-TWT schedule with a TWT Wake Interval that is not an integer multiple of 1 TU and the schedule is announced by the AP in the transmitted Management frames, the AP shall set the Target Wake Time field in the TWT element carried in the TWT Response frame to a value corresponding to one of the future R-TWT SP start times of the corresponding R-TWT schedule rounded up to the nearest TU so that the STA can compute the TSFAdjusted-TWT as the intended future R-TWT SP by the AP.

**35.8.4 Channel access rules for R-TWT SPs**

**35.8.4.1 TXOP and backoff procedures rules for R-TWT SPs**

A non-AP EHT STA with dot11RestrictedTWTOptionImplemented set to true as a TXOP holder shall ensure the TXOP ends before the start time of any active R-TWT SPs that are advertised by its associated AP or the AP corresponding to the transmitted BSSID in a multiple BSSID set in which its associated AP belongs to, as specified in 35.8.3 (R-TWT SPs announcement). In addition, before starting transmission of any PPDU, the non-AP EHT STA with dot11RestrictedTWTOptionImplemented set to true shall check if there is enough time for the frame exchange to complete prior to the start of the R-TWT SP and, if there is not enough time, then the STA shall defer transmission by selecting a random backoff count using the present CW[AC] (without advancing to the next value of CW[AC]) (#15651). The QSRC[AC] for the MSDU or A-MSDU is not affected.

(#15245) NOTE - If there is not enough time for the frame exchange to complete before the R-TWT SP and a non-AP EHT STA with dot11RestrictedTWTOptionImplemented set to true has selected a random backoff count using the present CW[AC], then if the backoff count reaches zero before the start of the R-TWT SP, the non-AP EHT STA selects again a random backoff count using the present CW[AC] without advancing to the next value of CW[AC].