IEEE P802.11 Wireless LANs

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| LB 271 Resolution for some CIDs related to R-TWT |
| Date: Mar. 2023 |
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 Abstract

This submission proposes resolutions for following **23** CIDs received for TGbe LB271:

15832, 16064, 16065, 16697, 17268, 16698,

16669, 16066, 16141, 16570, 16571, 15841, 16143, 16144, 18255, 15842,

16067, 17083, 15933, 16650, 16142, 16115, 15848

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: address some feedback and re-structure the announcement subclause (into two, for AP and non-AP STA, respectively) for better clarity.
* Rev 2: revise some text to improve wording; change that the reserved value is for EHT STAs; remove an ‘deletion’ condition in m).
* Rev 3: editorial.
* Rev 4: added an example in the main text.
* Rev 5: revise during the presentation. Defer CIDs other than {15832, 16064, 16065, 16697, 17268, 16698}.
* Rev 6: revise text from offline comments. Thanks for Laurent’s major input.
* Rev 7: revise text from offline comments. Thanks for Abhi’s input.

***TGbe editor: The baseline for this document is 11be D3.1 and REVme3.0***

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.

The dark greyed rows are the CIDs already Sped in r4.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 15832 | Muhammad Kumail Haider | 35.8.4 | 0.00 | "..with the Restricted TWT Schedule subfield set to 2.." Field is missing here | amend as "..with the Restricted TWT Schedule Info subfield set to 2" | **Accepted** |
| 16064 | Binita Gupta | 35.8.4 | 619.14 | R-TWT schedule' is a more generic term and covers all the SPs associated with that schedule. Suggest renaming the subclause title to "R-TWT Schedule announcement" | As in comment. | **Revised.**Agree in principle. Following the baseline text (see REVmeD2.0 P3907L43-46: *Broadcast TWT**announcements are broadcast TWT schedules advertised in broadcast TWT elements contained in broadcast Management frames.***)**, and make the corresponding change.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #16064.** |
| 16065 | Binita Gupta | 35.8.4 | 619.17 | The requirement applies only if R-TWT membership is setup on the link where the EHT AP is operating, and not in general when any R-TWT membership is set up. Clarify this to be precise. | Modify to "f there is any R-TWT membership set up on the link where an EHT AP is operating, the EHT AP shall announce ..." | **Rejected**The comment fails to point out an issue –TWT operation is per link. In the MLO context, a STA (AP or non-AP STA) is also referring to a STA operating on a specific link. There is no need to call it out. |
| 16697 | Yonggang Fang | 35.8.4 | 619.29 | "An R-TWT scheduling AP that includes a Restricted TWT Parameter Set field in a broadcast TWT element shall set the Restricted TWT Traffic Info Present subfield of the Restricted TWT Parameter Set field to 0 ...". The Restricted TWT Parameter Set should be Broadcast TWT Info according to Figure 9-770 | Please have consistence in the spec | **Rejected**.Text was added back in D2.0 stating “A Broadcast TWT Parameter Set field that has the Broadcast TWT Recommendation field value equal to 4 is referred to as a Restricted TWT Parameter Set field.” See D3.1 P245L40.  |
| 17268 | Zinan Lin | 35.8.4 | 619.32 | If the Restricted TWT Schedule subfield is set to 0 (a.k.a. the schedule is idle), is there any need for the presence of the Restricted TWT Traffic Info? In other words, when the Restricted TWT Schedule subfield is set to 0, what is the value setting of the Restricted TWT Traffic Info Present? | Please clarify it | **Rejected**The Restricted TWT Traffic Info subfield is intended for the membership setup procedure, and \*not\* present in frames with the negotiation type set to 2 as specified in the 2nd paragraph of 35.8.3 per D3.1. |
| 16698 | Yonggang Fang | 35.8.4 | 619.33 | How to set the value of Restricted TWT Schedule Info field in the adertisement of R-TWT schedule for the csae that shedule is for non-transsmited BSS and is not available for new membership? | Please clarify in the spec | **Rejected**For purpose of membership setup, a non-AP STA still needs to parse the R-TWT Parameter Set subfield (in the Broadcast TWT element) carried in the RNR element as described in 11.1.3.8.4 (Inheritance of element values). This is baseline. |

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| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 16141 | SunHee Baek | 35.8.4 | 619.20 | The terms both "nontransmitting AP" and "transmitting AP" aren't official terms. "nontransmitting AP" is changed to "AP corresponding to the nontransmitted BSSID" and "transmitting AP" is changed to "AP corresponding to the transmitted BSSID". | As in the comment | **Revised**Agree in principle. There are some major text changes which reflect what the comment points out.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16570 | Arik Klein | 35.8.4 | 619.20 | Please replace the term "nontransmitting AP" with "AP corresponding to nontransmitted BSSID within a multiple BSSID set" | As in comment | **Revised**Agree in principle. There are some major text changes which reflect what the comment points out.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16571 | Arik Klein | 35.8.4 | 619.20 | An AP that is corresponding to nontransmitted BSSID is relevant only in multiple BSSID set only but not for co-hosted BSSID set, where each of the APs in this set transmits Beacon and Probe Response frames (as defined in 26.17.7) | Please remove the words "or co-hosted BSSID set" from the following sentence: "The membership is setup either with its associated EHT AP, or with any nontransmitting AP that belongs to the same multiple BSSID set or co-hosted BSSID set as the transmitting AP" | **Revised**Agree in principle. There are some major text changes which reflect what the comment points out.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16143 | SunHee Baek | 35.8.4 | 619.38 | The term "transmitting AP" isn't official terms. "transmitting AP" is replaced to "AP corresponding to the transmitted BSSID". | As in the comment | **Revised**Agree in principle. There are some major text changes which reflect what the comment points out.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16144 | SunHee Baek | 35.8.4 | 619.42 | The term "nontransmitting AP" isn't official term. "nontransmitting AP" is replaced to "AP corresponding to the nontransmitted BSSID". | As in the comment | **Revised**Agree in principle. There are some major text changes which reflect what the comment points out.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 15848 | Chunyu Hu | 9.4.2.199 | 244.50 | When the Restricted TWT Schedule Info has value 3, the schedule doesn't correspond to the transmitting AP, the Broadcast TWT ID needs to be re-interpreted otherwise there can be duplicated value. | As in comment. | **Revised.**Agree in principle. Make 31 a reserved value and set to 31 in this case.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15848.** |
| 15841 | Muhammad Kumail Haider | 35.8.4 | 619.24 | Subclause 11.1.3.8.4 doesn't fully cover the case for the transmitted BSSID as there is a new additional change as specified in the third bullet at L42. Fix the last setence to reflect so. | As in comment. | **Revised.** See discussion. **TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16066 | Binita Gupta | 35.8.4 | 619.17 | The first paragraph in 35.8.4 needs to be revised to account for different cases - 1) the EHT AP is not in a multiple BSSID set, or 2)the EHT AP is a transmitted BSSID of the multiple BSSID set or 3) the EHT AP is a Nontransmitted BSSID of the multiple BSSID set. 4) EHT AP is a co-hosted BSSID. Define how R-TWT schedules can be advertised for each of these cases. | Revise the paragraph as per the comment to capture requirements for R-TWT schedule announcement for the cases mentioned. | **Revised**See discussion. **TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #16066.** |
| 18255 | Li-Hsiang Sun | 35.8.4 | 619.42 | There should be a requirement that TWT element with rTWT Schedule Info set to 3 is not included in nonTXBSSID profile, and not subject to inheritance | as in comment | **Revised**Agree with principle. See discussion. **TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #18255.** |
| 16669 | Liwen Chu | 35.8.4 | 0.00 | since a transmitted BSSID AP or co-hosted AP transmits the non-idle R-TWT schedules of the other APs in the same multiple BSSID set or co-hosted AP set. The critical update of AP MLD and the AP that transmitted Beacon etc. should be changed accordingly. | As in comment | **Revised.**Agree in principle. Identified a few gaps (see more details in discussion).**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #16669.** |
| 15842 | Muhammad Kumail Haider | 35.8.4 | 619.44 | It's best to add an exemplary illustration/diagram of the announcement for the MBSS case to be clear. | As in comment. | **Revised.**Agree in principle.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16067 | Binita Gupta | 35.8.4 | 619.45 | Would be good to add a Figure to show for clarity how R-TWT schedules for transmitted and nontransmitted BSSID APs are carried in a Beacon or Probe Response frame, similar to Figure 35-12a. | As in comment. | **Revised.**Agree in principle.**TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #16066.** |
| 16142 | SunHee Baek | 35.8.4 | 619.22 | If an STA associate with an AP corresponding to the nontransmitted BSSID and receives a Beacon frame including all R-TWT schedules from an AP corresponding to the transmitted BSSID, then how does the STA distinguish the R-TWT schedules for the associated AP among the other R-TWT schedules with Restricted TWT Schedule Info subfield equal to 3? | Please clarify this case. | **Revised.**The STA associated with the AP corresponding to a nontransmitted BSSID still has to parse the nontransmitted BSSID profile in the multiple BSSID element to retrieve the schedule info as in the baseline for purpose of membership setup. The changes made for CID 15841 etc. further clarifies this. **TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 16115 | Insun Jang | 35.8.4 | 619.23 | When a STA is associated with a NonTxBSSID, how can it differentiate which rTWT schedules (carried in Beacon from TxBSSID) corresponds to the NonTxBSSID to has a membership with that NonTxBSSID? Please clarify that issue | As in the comment | **Revised.**The STA associated with the AP corresponding to a nontransmitted BSSID still has to parse the nontransmitted BSSID profile in the multiple BSSID element to retrieve the schedule info as in the baseline for purpose of membership setup. The changes made for CID 15841 etc. further clarifies this. **TGbe editor: please revise as specified in this doc {11-23/458r6} tagged by #15841.** |
| 17083 | Mark RISON | 35.8.4 | 619.46 | "A non-AP STA should not request to establish membership in an R-TWT schedule advertised by the R-TWTscheduling AP with the Restricted TWT Schedule subfield set to 2.NOTE--The R-TWT scheduling AP that receives a request from a non-AP STA to establish membership in an R-TWTschedule advertised by the AP with Restricted TWT Schedule Info subfield set to 2 might reject the request." -- why allow this? | Change "should" to "shall" and delete the NOTE | **Revised** – the “should” is for flexibility. E.g. there might be a STA tearing down its membership at the same time another STA requesting a new membership.Agree the NOTE is extra and can be removed.**TGbe editor: please remove the NOTE part (same as the resolution for CID 15933).** |
| 15933 | Zhou Lan | 35.8.4 | 619.49 | The following note is ont needed and does not add any new information "NOTE--The R-TWT scheduling AP that receives a request from a non-AP STA to establish membership in an R-TWT schedule advertised by the AP with Restricted TWT Schedule Info subfield set to 2 might reject the request." | Remove the note | **Accepted** |
| 16650 | Mohamed Abouelseoud | 35.8.4 | 619.49 | The following note is ont needed and does not add any new information "NOTE--The R-TWT scheduling AP that receives a request from a non-AP STA to establish membership in an R-TWT schedule advertised by the AP with Restricted TWT Schedule Info subfield set to 2 might reject the request." | Remove the note | **Accepted** |

# Discussion related to a few CIDs 16669, 18255 etc.:

As introduced in D3.0, when an R-TWT scheduling AP advertises its R-TWT schedules, it also advertises schedules for co-located APs. For the latter, the Restricted TWT Schedule Info subfield value carried in the corresponding R-TWT Parameter Set is set to 3. A set of questions are raised related to these:

* **Q1**. Does the nonTxBSSID profile also advertise the R-TWT schedule for the TxBSSID, or only includes its own R-TWT schedule?
* **Q2**. How the non-AP STA associated with the AP with the TxBSSID parse the TWT element for R-TWT that is outside the nonTxBSSID profile and in the nonTxBSSID profile in the multiple BSSID element?
* **Q3**: the same question but for a non-AP STA associated with the AP with the nonTxBSSID.
* **Q4**: how the criticial update flag (CUF) and the BSS Parameter Change Counter subfield for the TxBSSID and nonTxBSSID (in multiple BSSID element) are updated?

Consideration:

Each R-TWT Parameter Set field in the announcement has 15 bytes. If for Q1, we let the nonTxBSSID profile in the multiple BSSID element also advertise for the TxBSSID, then the Beacon (and other management frames) will be ‘bloated’ unnecessarily. Here is an example:

* In a multiple BSSID set with 16 APs, each AP establishes 4 R-TWT schedules.
* If the nonTxBSSID AP also needs to carry the R-TWT schedules of other APs in the same multiple BSSID set, the Beacon will carry (16 x 4 x 16 = 1024 R-TWT schedules.
* If the nonTXBSSID AP is not required to do so, then the R-TWT schedules carried in a Beacon takes (16 x 4 + 15 x 4) = 124 schedule.

Given this, we think it’s best not let nonTxBSSID profile to include R-TWT schedule for TxBSSID, and add necessary clarification and changes along with this direction, as laid out below.

Notation:

**RTSIV**: the Restricted TWT Schedule Info subfield value

## AP side behavior:

* **1.a)** In the TWT element outside the Multiple BSSID element, it includes R-TWT Parameter Set field with RTSIV set to {0, 1, 2} for its TxBSSID; and R-TWT Parameter Set field with RTSIV set to 3 for an active R-TWT schedule belonging to the nonTxBSSID. [already in D3.0]
* **1.b)** TWT IE carries within the nonTxBSSID profile only carries R-TWT schedule info for its own nonTxBSSID, and hence won’t have any RTSIV set to 3. [clarification to be added]
	+ Perhaps a NOTE to clarify that the R-TWT parameter set with RTSIV 1 or 2 in its nonTxBSSID profile will have a corresponding parameter set in the TWT element outside the Multiple BSSID element with RTSIV set to 3.
* **1.c)** In the multiple BSSID set case, follows the 11.1.3.8.4 (Inheritance of element values). [already in D3.0]
* **1.d)** In the co-located BSSID set case, each AP carries in its transmitted Beacon the R-TWT schedules of its own (w/ RTSIV set to {0, 1, 2}); and R-TWT schedule for other APs in the same set with RTSIV set to 3. [in line with D3.0, call out explicitly]

## STA side behavior:

Notation: STA1 – associated with the AP with TxBSSID; STA2 – associated with the AP with nonTxBSSID.

* **2.a)** STA1 honors all active R-TWT schedules ( RTSIV set to values other than 0). ‘Honor’ means following the channel access rules defined in 35.8.4 (Channel access rules for R-TWT SPs). [already in D3.0]
* **2.b)** STA2 also recognize the R-TWT Parameter Set field outside the Multiple BSSID element, and honors all active R-TWT schedules. [New text to be added]
* **2.c)** STA2 parses the R-TWT schedule info in its own nonTxBSSID profile and conduct necessary membership setup/change as it wishes. [Baseline]

Example:

**AP1**: corresponds to a TxBSSID (BSSID-1)

**AP2**: corresponds to a nonTxBSSID (BSSID-2)

R-TWT schedule **R1**: AP1’s active R-TWT schedule.

R-TWT schedule **R2**: AP2’s active R-TWT schedule.

|  |  |  |  |
| --- | --- | --- | --- |
| R1 is present (for AP1) | R2 is present(for AP2) | # of Restricted Parameter Set fields outside the Multiple BSSID element and their respective RTSIV  | # of Restricted TWT Parameter Set fields in the nontransmitted BSSID profile and their respective RTSIV |
| Y | N | 1, with RTSIV = 1 | 0 |
| N | Y | 1, with RTSIV = 3 | 1, with RTSIV = 1 |
| Y | Y | 2, with RTSIV = 1 and 3, respectively | 1, with RTSIV = 1 |

## CUF and BPCC:

* A) Currently, it’s required to set CUF and increment BPCC when a broadcast TWT element is inserted or removed. [Per baseline]
	+ This covers the case where a schedule changes information such as {SP duration, Target Wake Time, Wake Interval}, which is considered as a combined action of schedule removal and insertion.
* B) When the RTSIV changes from active (non-zero values) to inactive (0), and vice versa, CUF and BPCC need to be set/incremented as well. [new to cover the gap]
	+ This condition can be described as: “*whenever RTSIV changes, and the original and new values are not both in the set {1, 2},*” the CUF and BPCC need to be …
		- Note that if RTSIV changes to 3 from 1, e.g., it’s a schedule removal/insertion. Vice versa.
* C) When there are any R-TWT schedule critical parameters change (as defined in above) for the TxBSSID (only), the CUF/PBCC in the nonTxBSSID profile need to be set/incremented as well (despite it’s not reflected in the R-TWT Parameter Set field contained in the nonTxBSSID profile). [new to cover the gap]
	+ Otherwise the STA associated with the nonTxBSSID AP may skip parsing the Beacon.
* D) When there are any active R-TWT schedule critical parameters changes for the nonTxBSSID (only), the CUF/PBCC outside for the nonTxBSSID (outside the Multiple BSSID element) need to be set/incremented. [Per baseline]

***TGbe Editor: please revise the title of the subclause 35.8.3 to be “35.8.3 R-TWT Announcement” as follows. Please also change other places accordingly where this subclause is referred.***

## 35.8.3 R-TWT ~~SPs~~ announcement (#16064)

***TGbe Editor: please add a new subclause number here as follows:***

## 35.8.3.1 Rules for R-TWT scheduling AP (#15841,#16066,#18255)

***TGbe Editor: please revise the first few paragraphs in this subclause as below:***

(#15841,#16066,#18255)When there is any R-TWT membership set up with an R-TWT scheduling AP, the R-TWT schedule information shall be announced by including Restricted TWT Parameter Set field(s) in the broadcast TWT element as specified in 9.4.2.199 (TWT element) contained in transmitted Management frames as specified in 26.8.3 (Broadcast TWT operation):

* By the R-TWT scheduling AP if this AP is not a nontransmitted BSSID, or
* By the AP corresponding to the transmitted BSSID in the same multiple BSSID set if the R-TWT scheduling AP corresponds to a nontransmitted BSSID in the same multiple BSSID set.

When an AP that does not correspond to a nontransmitted BSSID advertises an R-TWT schedule for its own BSS, it shall include a Restricted Parameter Set field describing the R-TWT schedule:

* With the Restricted TWT Schedule Info subfield set to 0, 1 or 2 following the rules below:
	+ If the schedule does not have any non-AP member STA, or the schedule is suspended for all member STAs, the value shall be set to 0 (a.k.a. the schedule is idle); otherwise,
	+ If the schedule is not available for accepting new membership due to resource constraints (a.k.a. the schedule is full), the value shall be set to 2;
	+ Otherwise the value shall be set to 1;
* With the Broadcast TWT ID subfield set to the TWT ID of the R-TWT schedule.

When an AP corresponding to a transmitted BSSID advertises an R-TWT schedule for a nontransmitted BSSID in the same multiple BSSID set, it shall include both:

* A Restricted TWT Parameter Set field describing the R-TWT schedule in a broadcast TWT element carried in in the nontransmitted BSSID profile of the nontransmitted BSSID in the Multiple BSSID element:
	+ With the Restricted TWT Schedule Info subfield set to 0, 1 or 2, following the same rule as above,
	+ With the Broadcast TWT ID subfield set to the TWT ID of the R-TWT schedule
* And a Restricted TWT Parameter Set field describing the R-TWT schedule carried in a broadcast TWT element outside the Multiple BSSID element if the R-TWT schedule is active:
	+ With the Restricted TWT Schedule Info subfield set to 3,
	+ With the Broadcast TWT ID subfield set to 31.

A Restricted Parameter Set field included in a nontransmitted BSSID profile in a multiple BSSID element shall not have the Restricted TWT Schedule Info subfield set to 3.

When an R-TWT scheduling AP in a co-hosted BSSID set advertises an active R-TWT schedule, then all EHT APs in the same co-hosted BSSID set shall advertise the same R-TWT schedule:

* With the Restricted TWT Schedule Info subfield set to 3,
* With the Broadcast TWT ID subfield set to 31.

An R-TWT scheduling AP that includes a Restricted TWT Parameter Set field in a broadcast TWT element shall set the Restricted TWT Traffic Info Present subfield of the Restricted TWT Parameter Set field to 0 if the Negotiation Type subfield of the TWT element is equal to 2.

(#15841,#16066,#18255)

(#17083,#15933)

(#15841,#16066,#18255)Table 35-X describes an exemplary Management frame transmitted by an AP (AP1) that belongs to a multiple BSSID set. The multiple BSSID set has two BSSIDs, one transmitted BSSID and one nontransmitted BSSID, corresponding to AP1 and AP2, respectively. In this example, AP1 and AP2 have setup an R-TWT membership with their respective associated STAs, or haven’t setup any R-TWT membership, respectively (denoted as *present* or *not*). For notational convenience, in this table, 1) refer their respective active R-TWT schedules, if present, are referred as R1 and R2, respectively; 2) refer the value of the Restricted TWT Schedule Info subfield carried in the corresponding TWT element as RTSIV. The table shows how the Management frame is constructed in three cases.

|  |  |  |  |
| --- | --- | --- | --- |
| **R1 (of AP1) is present** | **R2 (of AP2) is present** | **Number of Restricted TWT Parameter Set fields outside the Multiple BSSID element, and their respective RTSIV(s)** | **Number of Restricted TWT Parameter Set fields in the nontransmitted BSSID profile carried in the Multiple BSSID element, and their respective RTSIV(s)** |
| Yes | No | 1, with RTSIV set to 1, for R1 | 0 |
| No | Yes | 1, with RTSIV set to 3, for R2 | 1, with RTSIV set to 1, for R2 |
| Yes | Yes | 2, with RTSIV set to 1 and 3, for R1 and R2, respectively | 1, with RTSIV set to 1, for R2 |

**Table 35-X ⎯An example of relevant contents in a Management frame transmitted by an AP for R-TWT announcement**

***TGbe Editor: please add a new subclause as follows:***

## 35.8.3.2 Rules for R-TWT scheduled STA ((#15841,#16066,#18255)

A non-AP STA should not request to establish membership in an R-TWT schedule advertised by the R-TWT scheduling AP with the Restricted TWT Schedule (#15832)Info subfield set to 2.

(#15841,#16066,#18255)A non-AP STA shall not request to establish membership in an R-TWT schedule advertised by the R-TWT scheduling AP with the Restricted TWT Schedule Info subfield set to 3.

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

***TGbe Editor: please revise the first paragraph as follows:***

(#15841,#16066,#18255)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 that does not correspond to a nontransmitted BSSID.

(#15841,#16066,#18255)A non-AP EHT STA with dot11RestrictedTWTOptionImplemented set to true as a TXOP holder and that is associated with an AP that corresponds to a nontransmitted BSSID shall ensure the TXOP ends before the start time of any active R-TWT SPs that the AP corresponding to the transmitted BSSID in the same multiple BSSID set advertises in a broadcast TWT element carried:

* Outside the Multiple BSSID element, and
* Within the nontransmitted BSSID profile corresponding to its associated AP in the Multiple BSSID element.

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). The QSRC[AC] for the MSDU or A-MSDU is not affected.

## 11.2.3.15 TIM Broadcast

***TGbe Editor: revise the thirteenth paragraph (“The following events about …”) as follows:***

The following events about the BSS parameters of the AP shall classify as a critical update:

…

m) Insertion of a Broadcast TWT element

m1) Insertion (#16669)or deletion of a Broadcast TWT Parameter Set field in an existing Broadcast TWT element

m2) Modification of a Restricted TWT Schedule Info subfield in a Broadcast TWT element such that its value is changed from or to 0 (#16669)

…

***TGbe Editor: insert a new paragraph right after NOTE 4 as follows:***

…

(#16669)When the AP belongs to a multiple BSSID set and the critical update occurs for any of the reasons as specified in m), m1) and m2) and the relevant TWT parameter set is a Restricted TWT parameter set, then this critical update shall be also considered as a critical update for all the reported nontransmitted BSSID(s).

An AP may classify other changes in the Beacon frame as critical updates.

## 9.4.2.199 TWT element

…

***TGbe Editor: revise the paragraph (“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 …”, P802.11beD3.1 P246L57) as follows:***

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 broadcast TWT whose membership corresponds to all STAs that are members of the BSS corresponding to the BSSID of the Management frame carrying the TWT element and that is permitted to contain Trigger frames with RA-RUs for unassociated STAs. The Broadcast TWT ID subfield in a Restricted TWT Parameter Set field is always set to a nonzero value(#15848), and is set to value 31 when the Restricted TWT Schedule Info subfield is set to 3.