IEEE P802.11
Wireless LANs

|  |
| --- |
| Proposed Spec TextRestricted TWT |
| Date: 2021-01-01 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Chunyu Hu | Facebook | 1 Hacker Way, Menlo Park, CA 95034 |  | chunyuhu07@gmail.com |
| Dave Cavalcanti | Intel |  |  |  |
| Dibakar Das | Intel |  |  |  |
| Zhigang Han | ZTE |  |  |  |
| Liuming Lu | Oppo |  |  |  |
| John Wullert | Perspecta Labs |  |  |  |
| Qi Wang | Apple |  |  |  |
| Alfred Asterjadhi | Qualcom |  |  |  |
| Kumail | Facebook |  |  |  |

Abstract

This submission proposes spec text for restricted TWT to be incorporated into the latest 801.11be draft.

Revisions:

* Rev 0: Initial version of the document, and addressed comments from various participants (listed in the above author list.)
* Rev 1: Address further comments from co-authors and Boon Ng.
* Rev 2: Editorial change suggested by Kumail.
* Rev 3: Address comments from Xiangdong and Liuming; and resolved comments received in the meeting.
* Rev 4. Address comments from Qi and Alfred. Merged the text with existing subclauses 35.x replacing low latency operation now that the group has agreed on rTWT.
* Rev 5. Incorporate more changes to address comments from Yongho and Alfred.

The text is based on the following motions:

In R1, there exists a mode where an EHT AP may announce restricted service periods (SPs) such that:

* Any non-AP EHT STA that supports following the announced restricted SPs, and associated to the AP, shall end its TXOP before the start of the restricted SP(s).
* Non-AP EHT STAs are allowed to ignore the quiet intervals (which are advertised in Quiet elements by the AP) if they overlap with the restricted SP.
* An EHT AP may announce quiet intervals with Quiet elements that overlap with restricted SPs and the abovementioned exception applies. The rules on transmitting Quiet elements for restricted SPs are TBD.
* The support for the restricted SPs is optional for the non-AP EHT STA.
* The support for this mode is optional for the EHT AP.
* NOTE – Such restricted SPs are intended to provide more predictable latency performance for latency sensitive traffic.

[Motion 148, #SP345, [23] and [304]]

In R1, there exists a mode, known as restricted TWT, where EHT STAs use TWT setup procedure as baseline to set up a restricted SP agreement.

* The name “restricted TWT” is TBD.

[Motion 150, #SP371, [92] and [305]]

***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.***

**3. Definitions, Acronyms, and Abbreviations**

**3.1 Definitions**

***TGbe editor: add the following definition:***

**restricted target wake time (TWT):** TWT with enhanced medium access protection and resource reservation for latency sensitive traffic.

Restricted target wake time (TWT) service period (SP): A restricted period of time during which only TWT stations (STAs) that are members of that TWT schedule can transmit and/or receive frames that are part of latency sensitive traffic.

***TGbe editor: Substitute the subclause 35.x in D0.3 with the following subclause 35.x text:***

35. Extremely High Throughput (EHT) MAC specification

35.x Restricted TWT

**35.x.1 General**

Traffic originating from many real time applications has stringent latency requirements (e.g., very low average latency and worst case latency of the order of a few to tens of milliseconds, and small jitter, all of which can have certain reliability constraints as well). Such traffic is referred to as *latency sensitive traffic* in this subclause. Restricted target wake time (TWT) operation described in this subclause allows an AP to use enhanced medium access protection and resource reservation mechanisms to provide more predictable latency, reduced worst case latency and/or jitter, with higher reliability for latency sensitive traffic.

An EHT STA that supports restricted TWT operation shall set dot11RestrictedTWTOptionImplemented to true and the Restricted TWT Support subfield in transmitted EHT Capabilities elements to 1; otherwise, the STA shall set dot11RestrictedTWTOptionImplemented to false and the Restricted TWT Support subfield in transmitted EHT Capabilities elements to 0.

A non-AP EHT STA establishes membership for one or more restricted TWT schedules with its associated EHT AP by following the rules defined in 26.8.3 (Broadcast TWT operation) with the additional rules defined in 35.x. 2 (Restricted TWT agreement setup). An EHT AP that has dot11RestrictedTWTOptionImplemented equal to true may announce one or more restricted TWT service periods (SPs) as described in 35.x. 3 (Restricted TWT SPs announcement). EHT STAs that support restricted TWT operation follows the rules as defined in 26.8.3 (Broadcast TWT operation) and the additional rules and restrictions that are defined in 35.x. 4 (Channel access rules for restricted TWT SPs) if the EHT AP has announced restricted TWT SPs.

**35.x.2 Restricted TWT agreement setup**

TBD

**35.x.2.y Latency sensitive traffic differentiation**

This subclause defines a mechanism that differentiates latency sensitive traffic from other types of traffic.

**35.x.3 Restricted TWT SPs announcement**

If there is any restricted TWT agreement set up, the EHT AP shall announce the restricted TWT SP schedule information in the in a modified broadcast TWT element contained in transmitted Beacon, TBD (broadcast and/or individual) Probe response frames, (Re)Association frames, and other TBD frames as described in TBD.

In order to provide additional protection for restricted TWT SPs, subject to TBD rules, the EHT AP may announce quiet intervals by including Quiet elements in MGMT frames that it transmits, that overlap with restricted TWT SPs. Non-AP EHT STAs may ignore the quiet intervals that overlap with restricted TWT SPs following the rules below:

* Non-AP EHT STAs with dot11RestrictedTWTOptionImplemented set to true shall follow channel access rules as defined in 35.x.3.4 (Channel access rules for restricted TWT SPs).
* Non-AP EHT STAs with dot11RestrictedTWTOptionImplemented set to false may behave as if such overlapping quiet intervals do not exist.

**35.x.4 Channel access rules for restricted TWT SPs**

A non-AP EHT STA with dot11RestrictedTWTOptionImplemented set to true as a TXOP owner shall ensure the TXOP ends before the start of any restricted TWT SPs if the TXOP is obtained outside of a restricted TWT SP.

**Straw Poll: Do you support to incorporate the proposed draft text in this document 11-21/142r6, to the latest TGbe Draft?**

**Result: Yes/No/Abstain**