**IEEE P802.11
Wireless LANs**

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| **CC36 Comment Resolution for Some CIDs for 35.7.4.2****Restricted TWT / Quiet Interval** |
| **Date:** 2021-11-27 |
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**Abstract**

This submission proposes resolutions for the following CIDs (13) for TGbe CC36:

4160,

4706, 4937, 4939, 5075, 6336,

6545, 6546, 6744, 6969, 8216,

8217

(Above are in r2)

Below for r4/5 (6 CIDs):

4088, 4117, 4158, 4159

(new:) 4707, 4709

Revisions:

* Rev 0: Initial version of the document
* Rev 1: revised during the meeting, and deferred three CIDs: 4117, 4158, and 4159.
* Rev 2: deferred another CID: 4088
* Rev 3: revisit CID: 4088, 4117, 4158 and 4159

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.***

***TGbe editor: The baseline for this document is 11be D1.3.***

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| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 4088 | Abhishek Patil | 35.6.4.2 | 298.58 | Probe Response and (Re)Association Response frame includes Quiet element (per 35.3.9). | In addition to the Beacon frame, the sentence must include Probe and (Re)Assoc Response frames. | **Revised**Confirmed that (Re)Assoc Response frames do not include Quiet element. Added Probe Response frame in one missing place.**TGbe editor please implement changes as shown in this doc tagged by 4088.** |
| 4117 | Abhishek Patil | 35.6.4.2 | 298.60 | On its own, the sentence starting "See 35.3.9.3 ..." has very little meaning. It needs to be merged with the previous sentence. | Merge the two sentence as follows: "... with the same AP MLD transmit on their links as described in 35.3.9.2 ...." | **Revised**Agree in principle.**TGbe editor please implement changes as shown in this doc tagged by 4117.** |
| 4158 | Alfred Asterjadhi | 35.6.4.2 | 298.55 | More than one Quiet element...I think legacies only expect one Quiet element in a MGMT frames. At least according to baseline. Not certain what they would do if there are more than one Quiet elements. Double check and ensure that number of Quiet elements is backwards compatible. Also is it possible to include Quiet IEs in e.g., 2G4? Worth checking. And also worth checking if these Quiet IEs can be added in FILS Discovery frames, etc (6G?). | As in comment. | **Rejected.**A1. P802.11REVme\_D0.4 P2786L50-52 states “one or more Quiet elements in Beacon frames and Probe Response frames”A2. Agree in principle that the DFS procedures (11.8) don’t apply to 2.4GHz. However, my understanding is that the AP \*may\* schedule overlapping quiet intervals under the baseline rules and no need to specify which band it is (dis)allowed to do so.A3. P802.11REVme\_D0.4 P1894 9.6.7.36 (FILS Discovery frame format), doesn’t include Quiet element.  |
| 4159 | Alfred Asterjadhi | 35.6.4.2 | 298.55 | The AP MLD does not operate on more than one link, the other APs affiliated to that same AP MLD operate on those other links. Also I don't think the intention is clear for this sentence. Is it saying that Quieting of links will not be advertised on other links? Please make it clearer and include the reference to 35.3.9.2 as part of the sentence. | As in comment. | **Revised**Agreed in principle.**TGbe editor please implement changes as shown in this doc tagged by 4159.** |
| 4707 | Chien-Fang Hsu | 35.6.4.2 | 298.52 | The ending time rule is not given here. | Add the ending time rule of the quite interval and the rTWT SP. | **Reject**The quiet interval is proposed to achieve protection of r-TWT SP start time similar from legacy STA similar to EHT STAs capable of r-TWT. No sufficient info on what the ending time rules is needed here. |
| 4709 | Chien-Fang Hsu | 35.6.2 | 298.55 | It is not clear what overlapping here means. If multiple periods overlapped partially on one specific link, it may cause implementation diffuculties on the non-AP side and management of those periods is complicated. | Clarify the overlapping meaning here and make rules to prevent partial overlapping of multiple periods on one link for specific STA | **Revised**The “overlapping” was explained in the first paragraph in subclause 35.7.2.Further clarification was added as part of the resolution for CID 6336.**TGbe editor, no action is needed as the resolution (same as that for CID6336) was already accepted in 11-22/1930r2 (prio version of this doc).** |
| 4160 | Alfred Asterjadhi | 25.6.4.2 | 298.62 | Citing 11.8.3 is a bit ambiguous because it does not provide full context for 6G (where HE STAs are still VHT STAs, but VHT STAs themselves don't operate in 6G). So maybe also refer to 26.17.1 of TGax since it describes HE STAs as being VHT STAs, hence explicitly inheriting the rules in 6G band as well. | As in comment. | **Revised**Agree in principle. Add reference to 26.17.1 and 26.17.2.**TGbe editor please implement changes as shown in this doc tagged by 4160.** |
| 4706 | Chien-Fang Hsu | 35.6.4.2 | 298.51 | 1 TU here is not clear. It looks the duration is limited to 1 TU. 1 TU limitation is not useful for most cases. | Clarify if TU here is the unit of the SP | **Revised****TGbe editor please implement changes as shown in this doc tagged by 4706.** |
| 4937 | Eldad Perahia | 35.6.4.2 | 298.49 | “may schedule a quiet interval that overlaps with a restricted TWT service period”. Good idea to use Quiet mechanism to manage legacy STAs and bad non-AP EHT STAs. Will this mitigate interference from non-AP STAs coming out of power save? | As in comment | **Rejected**It would, regardless the PS mode, as the STA would have got the quiet element from received Beacons. |
| 4939 | Eldad Perahia | 35.6.4.2 | 298.51 | “shall have a duration of 1 TU”. But won’t a 1 TU limitation still allow legacy STAs and bad non-AP EHT STAs to transmit over an ongoing transmission during the restricted TWT service period? | As in comment | **Rejected**Quiet intervals are intended to be used to achieve similar protecting support as from EHT STAs that supports r-TWT. The requirement for EHT STAs supporting r-TWT is to give right-of-way when a r-TWT SP starts (by stopping their TXOP before the SP starts …) such that the chance a r-TWT STA can win the medium is increased. The existing rule doesn’t require the EHT STA to stay quiet \*during\* a r-TWT SP.Setting the quiet interval to minimum possible value, which is 1 TU, is to achieve similar protection effect. While CID 6545 points out that it may be unfair for legacy STAs, the “unfairness” is minimized at best effort.Setting the value of such a quiet interval to any other value, breaks this balance.Similar discussion happened during the development of this text and the group agreed to proceed with this path. |
| 5075 | Gaurav Patwardhan | 35.6.4.2 | 298.47 | There is support missing for Quiet element when an AP affilied with an AP MLD signals Quiet element on one link and another AP operating on a different link and affilied with the same AP MLD is an EMA AP and cannot signal the Quiet element in a timely fashion. | Fix the subclause 35.6.4.2 to support the case where one of the APs in an AP MLD is an EMA AP as referenced by the comment. | **Rejected** – the comment no longer applies based on the normative text in the latest draft. Discussed and agreed by the commenter. |
| 6336 | Ming Gan | 35.6.4.2 | 298.50 | How many quite intervals could overlaps with a restricted TWT service period? Is that one to one mapping? Please clarify it. | As in comment | **Revised**One per SP.**TGbe editor please implement changes as shown in this doc tagged by 6336.** |
| 6545 | Patric Nezou | 35.6.4.2 | 298.49 | An EHT AP with dot11RestrictedTWTOptionImplemented set to true may schedule a quiet interval that overlaps with a restricted TWT service period. Each such service interval, referred to as an overlapping quiet interval in this subclause, if scheduled, shall have a duration of 1 TU, and shall start at the same time as the corresponding restricted TWT service period.Comment: It is unfair for legacy STAs to stop their transmission at the beginning of the service period because legacy STAs cannot be registered to transmit low latency traffics during the service period. | The methods to address the unfairness should be introduced | **Rejected**Quiet intervals are intended to be used to achieve similar protecting support as from EHT STAs that supports r-TWT. The requirement for EHT STAs supporting r-TWT is to give right-of-way when a r-TWT SP starts (by stopping their TXOP before the SP starts …) such that the chance a r-TWT STA can win the medium is increased. The existing rule doesn’t require the EHT STA to stay quiet \*during\* a r-TWT SP.Setting the quiet interval to minimum possible value, which is 1 TU, is to achieve similar protection effect. While CID 6545 points out that it may be unfair for legacy STAs, the “unfairness” is minimized at best effort.Setting the value of such a quiet interval to any other value, breaks this balance.Similar discussion happened during the development of this text and the group agreed to proceed with this path. |
| 6546 | Patrice Nezou | 35.6.4.2 | 298.49 | It is unfair for non low latency STAs to stop their transmission during the service period. Some penalties has to be applied for low latency STAs that successfully transmitted low latency data frames during the previous service period. | A methods to penalize low latency STAs outside the service period has to be introduced. | **Rejected**Other than the optional usage of Quiet intervals, non low latency STA still can tx during the r-TWT SP – they can still contend the medium following EDCA/MU-EDCA procedure. The overlapping quiet intervals are limited to 1 TU already minimizing the quiet time. It doesn’t appear fair nor necessary to penalize the low latency STAs outside of SPs. |
| 6744 | Rojan Chitrakar | 35.6.4.2 | 298.41 | Why mandate the overlapping quiet interval to be 1 TU; if the intention is to disallow legacy STAs from transmitting during the rTWT SP, the quiet interval should cover the entire rTWT SP. | Allow the AP to indicate the duration of the quiet interval to cover the entire rTWT SP. | **Rejected**Quiet intervals are intended to be used to achieve similar protecting support as from EHT STAs that supports r-TWT. The requirement for EHT STAs supporting r-TWT is to give right-of-way when a r-TWT SP starts (by stopping their TXOP before the SP starts …) such that the chance a r-TWT STA can win the medium is increased. The existing rule doesn’t require the EHT STA to stay quiet \*during\* a r-TWT SP.Setting the quiet interval to minimum possible value, which is 1 TU, is to achieve similar protection effect. While CID 6545 points out that it may be unfair for legacy STAs, the “unfairness” is minimized at best effort.Setting the value of such a quiet interval to any other value, breaks this balance.Similar discussion happened during the development of this text and the group agreed to proceed with this path. |
| 6969 | Sanghyun Kim | 35.6.4.2 | 299.01 | If a non-AP STA transmits CF-End frame during an R-TWT SP, legacy STAs may reset their NAV(Quiet interval is terminated by the non-AP STA). So, a non-AP STA that is a TXOP holder shall not transmit CF-END frame during an R-TWT SP (if there is Overlapping quiet interval). | It is recommended to not allow CF-END frame transmission of a non-AP STA during the rTWT SP. | **Rejected**While understand the comments intends to avoid side effect of CF-End, I see a case where AP may want to use CF-End: the NAV set for quiet interval at legacy STAs, the r-TWT SP terminates early and there is still remaining time covered by the quiet interval. |
| 8216 | Yusuke Tanaka | 35.6.4.2 | 298.52 | Here says “shall start at the same time as the corresponding restricted TWT service period”, but how much misalignemnt is acceptable? | Please clarify. | **Rejected**This is no misalignment between quiet intervals and corresponding r-TWT SP start times since they both use TSF. |
| 8217 | Yusuke Tanaka | 35.6.4.2 | 299.01 | Non-AP EHT STA may misunderstand that Quiet element was indiated for R-TWT and initiate transmission even if Quiet lement was indiated for the original purpose. | Please define rules for non-AP EHT STA to know whether Quiet element was indicated for quiet interval of R-TWT or for the original purpose of Quiet element. | **Rejected**It’s implicitly indicated by the overlapping time. The non-AP EHT STA needs to parse any advertised r-TWT schedule/SP information and check if a quiet interval overlaps with the r-TWT SP. |

**Discussion:**

**Discussion-1** on CID 4158:

If extend the FILS Discovery frame include the quiet element. This is independent of restricted TWT and is about the overall baseline behaviour. Should we do this in 11me?

**Discussion-2** on CIDs {4706, 4939, 6744 || 6545} about the 1 TU duration requirement for overlapping quiet intervals.

Quiet intervals are intended to be used to achieve similar protecting support as from EHT STAs that supports r-TWT. The requirement for EHT STAs supporting r-TWT is to give right-of-way when a r-TWT SP starts (by stopping their TXOP before the SP starts …) such that the chance a r-TWT STA can win the medium is increased. The existing rule doesn’t require the EHT STA to stay quiet \*during\* a r-TWT SP.

Setting the quiet interval to minimum possible value, which is 1 TU, is to achieve similar protection effect. While CID 6545 points out that it may be unfair for legacy STAs, the “unfairness” is minimized at best effort.

Setting the value of such a quiet interval to any other value, breaks this balance.

Similar discussion happened during the development of this text and the group agreed to proceed with this path.

**35.7.4.2 Quieting STAs during restricted TWT service periods**

TGbe editor: please revise the first three paragraphs as follows:

An EHT AP with dot11RestrictedTWTOptionImplemented set to true may schedule (#6336) at most one quiet interval that overlaps with a restricted TWT service period. Each such (#4706)quiet interval, referred to as an overlapping quiet interval in this subclause, if scheduled, shall have a duration of 1 TU, and shall start at the same time as the corresponding restricted TWT service period.

Overlapping quiet intervals may be scheduled by including one or more Quiet elements in the Beacon and Probe Response frames that the EHT AP transmits. (#4159, 4117)An EHT AP affiliated with an AP MLD shall not include in its transmitted Beacon (#4088)or Probe Response frames any Quiet elements that correspond to overlapping quiet intervals that are scheduled and advertised by other APs affiliated with the same AP MLD (see 35.3.11 (Multi-Link Procedures for channel switching, extended channel switching, and channel quieting(#4112)(#2324)(#2600))).

NOTE—Unless specified otherwise (e.g., through the rules in this subclause), the channel access and transmission rules during quiet intervals are defined in 11.8.3 (Quiet channels for testing)(4160), 26.17.1 (Basic HE BSS operation) and 26.17.2 (HE BSS operation in the 6GHz band). AP can still use quiet intervals for channel testing by managing or avoiding the overlap between restricted TWT SPs and quiet intervals that it schedules.

***TGbe editor: end of revision***