IEEE P802.11
Wireless LANs

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| Comment Resolution on TWT |
| Date: March 11, 2024 |
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 Abstract

This submission proposes resolutions for the following 23 comments received for Initial SA Ballot:

23 CIDs:

22111    22112    22113    22119    22120    22121

22122    22123    22124    22125    22126

22131     22142    22143    22144    22145    22146

22147   22148      22149    22150    22151    22190

SP: Do you agree to the resolutions provided in doc 11-24/334r1 for the following CIDs for inclusion in the latest 11be draft?

22111    22112    22113    22119    22120    22121

22122    22123    22124    22125    22126

22131     22142    22143    22144    22145    22146

22147   22148      22149    22150    22151    22190

Revisions:

* Rev 0: Initial version.
* Rev 1: Added a CID

***TGbe editor: Please note Baseline is 11be D5.1***

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.

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| **CID** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 22111 | 589.47 | Please add AP-side and non-AP STA side behavior to enable cross-link broadcast TWT setup. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22112 | 589.47 | Cross-link broadcast TWT setup procedure is currently missing in this subclause and needs to be added. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22113 | 589.47 | The Link ID Bitmap subfield in the TWT element is not defined for the Broadcast TWT Parameter Set field. Therefore, unlike i-TWT, there is no way to request to set up broadcast TWT schedules in an MLD-manner. | Define the Link ID Bitmap subfield for Broadcast TWT as well. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22119 | 589.47 | The usage of the TWT Information frame needs to be extended for better adaptation to TWT needs in conjunction with MLD operations. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/841r0 for prior discussion on this. |
| 22120 | 589.47 | An R-TWT link replacement procedure is currently missing in the spec and needs to be included to ensure smooth operation of the latency-sensitive applications of the non-AP MLD. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22121 | 589.47 | An AP MLD before disabling a link (for example, using advertised TTLM) should always ensure that any R-TW schedule on that link is moved to a replacement link and the corresponding non-AP MLDs are notified about the new replacement link for the R-TWT. Such a mechanism needs to be provided in the spec. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22122 | 589.47 | Before an AP is removed using ML reconfiguration, AP MLD should check if there is any R-TWT schedules on that link, and if there is any, then the AP MLD should move the schedule to a different link. A mechanism to allow such procedures need to be added in the spec. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22123 | 589.47 | When an AP MLD initiate an advertised TTLM to disable a link, if there was one or more R-TWT schedule on that link, the AP MLD must take precautionary measures to ensure that the non-AP STAs operating on that link and are members of the R-TWT schedules are not affected. Spec should provide a mechanism to ensure that the latency-applications corresponding to those R-TWT schedules are not affected. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22124 | 589.47 | Before a link is deleted or removed, if there was one or more R-TWT schedule on that link, then, in order to ensure smooth operation of the latency-sensitive applications, the AP MLD should provide an alternative link for the non-AP MLD for that R-TWT as a replacement. | A mechanism is needed to seamless transition of the R-TWT schedule from the soon-to-be-deleted link to the new link before the link is removed. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22125 | 589.47 | Due to power saving purpose or regulatory reasons, a link between an AP MLD and a non-AP MLD can be muted or become unavailable. If the non-AP MLD had an r-TWT schedule set up on that link for its latency-sensitive traffic, there needs to be a method to seamlessly retrieve or transmit latency-sensitve BUs on another link before the first link becomes unavailable. Currently, such a mechanism is missing. Note that renegotiating another schedule for the second link might not be a seamless process. | The spec needs to provide some mechanisms to handle the case where an rTWT schedule is established on a link and the link is becoming unavailable. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22126 | 589.47 | For Restricted TWT (rTWT) operation, if an STA is done with transmitting latency-sensitive packets in uplink before the end of restricted TWT service period (SP) and there is no packet waiting for that STA in downlink for remainder of the SP, then it causes channel under-utilization for that STA if the STA is prohibited to transmit latency-tolerant traffic for remainder of the SP. Channel under-utilization due to under-utilized restricted TWT SP can be reduced by allowing latency-tolerant traffic in addition to latency-sensitive traffic for transmission during rTWT SP. Once the scheduled STA is done transmitting latency-sensitive traffic during rTWT SP, and if there is still time remaining in the SP, the scheduled STA can choose to transmit its latency-tolerant packets (if any) during remaining of the SP. This will improve the channel utilization for the STA . However, it creates fairness issue. Regarding contention among the scheduled STAs, if one scheduled STA starts transmitting latency-tolerant traffic during the restricted TWT SP, it is not fair for other scheduled STAs that are still transmitting latency-sensitive traffic during the SP. Also, an STA with ill intention may abuse this functionality by setting up TWT parameters such that there is always additional time left in the restricted TWT SP after transmitting latency-sensitive packets. How to handle these situation is not clear. | The spec needs to provide mechanisms and procedures to handle the r-TWT fairness issue as described in the comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-22/1427r0 for prior discussion on this. |
| 22131 | 584.36 | Broadcast TWT for MLD is clarified in 11be. Currently, when All TWT subfield in the TWT Information frame is set to 1 in the TWT Information field in a TWT Information frame, all individual TWT agreements or broadcast TWT schedules are intended by the TWT Information field of the TWT Information frame. All individual TWT agreements or broadcast TWT schedules are meant to be suspended or resumed by the TWT Information frame. There is no way to exclude any particular TWT agreements or schedules from the group of schedules or agreements that are being suspended or resumed. This is not very conducive for restricted TWT operation, e.g., an r-TWT scheduled STA can have multiple broadcast/individual TWT schedules/agreements and restricted TWT schedules. For some purpose (e.g. power saving), the scheduled STA may want to suspend the broadcast TWT schedules while still maintain the r-TWT schedules for low latency purposes. | Please provide mechanism and framework for selective schedule exclusion from All TWT suspension/resumption procedure. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/841r0 for prior discussion on this. |
| 22142 | 589.47 | How a STA affiliated with a non-AP MLD can request aligned R-TWT schedule over multiple of its enabled links is not clear. Such a procedure would be very helpful for the latency-sensitive traffic handling for the non-AP MLD and needs to provided. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22143 | 589.47 | Broadcast TWT operation procedure for MLD is currently missing and needs to be added. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22144 | 589.47 | Since the Broadcast TWT ID subfield and the Last Broadcast Parameter Set subfields are not timing-related params, these can be independent of the Aligned schedules across two links. | Exclude these two parameters from the "SAME parameter" requirement for two schedule to be aligned across two links. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1779r1 for prior discussion on this. |
| 22145 | 589.47 | clarify that the Broadcast TWT ID of the two aligned schedules advertised on the two links can be the same or different (this is not a timing parameter). | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1779r1 for prior discussion on this. |
| 22146 | 589.47 | procedures for Aligned schedule and Broadcast TWT negotiation over one link for multiple links are currently missing and needs to be provided. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1779r1 for prior discussion on this. |
| 22147 | 589.47 | aligned schedule is defined for broadcast TWT. However, the broadcast TWT for MLD subclause is currently incomplete. Provide additional details to make the clause complete. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22148 | 589.47 | A STA affiliated with an MLD should be able to actively request for an aligned broadcast TWT schedule over multiple links to the AP MLD. Such a procedure is missing and needs to be provided. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22149 | 589.47 | For multi-link operation, it would be very useful to request for aligned broadcast TWT schedules to be established across multiple links of a non-AP MLD. However, such a procedure is currently missing for broadcast TWT. | Please add the procedure to request for aligned broadcast TWT to the AP. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22150 | 589.47 | A procedure for a STA affiliated with a non-AP MLD requesting for aligned R-TWT schedule to be established over multiple links between the AP MLD and the non-AP MLD is currently missing? Such procedure would be quite helpful in power saving and traffic management for the client devices and need to be provided. | as in comment. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22151 | 589.47 | 11be includes multi-link operation and restricted TWT operation. However, how restricted TWT will operate on multi-link devices (MLDs) is not clear. In general, mechanism for Broadcast TWT, which is a basis for restricted TTWT, for MLDs need to be defined. | Please provide text for R-TWT/B-TWT negotiation for MLD. | **Rejected**The issue was discussed previously, but the group could not reach a consensus. Please see doc 11-23/1781r3 for prior discussion on this. |
| 22190 | 589.50 | The word "whether" in this sentence suggests that more than one option will follow, but the remainder of the sentence sets the value of the parameter to one, which results in only a single option | Rephrase sentence as "A TWT scheduling AP affiliated with an AP MLD, while announcing a broadcast TWT schedule in the AP’s BSS, may explicitly indicate that a schedule is an aligned schedule by setting the Aligned subfield in the corresponding Broadcast TWT Parameter Set field to 1." | **Revised**Agree in principle. Revise the sentence for better clarity.**TGbe editor, please make change as shown in this doc 11-24/334r1 tagged by #22190.** |

***TGbe editor: Please* change the paragraph (A TWT scheduling AP affiliated with an AP MLD…) in Clause 35.3.24.2 (Broadcast TWT operation) as follows (#22190):**

A TWT scheduling AP affiliated with an AP MLD, while announcing a broadcast TWT schedule in the AP’s BSS, may explicitly indicate that the schedule is an aligned schedule by setting the Aligned subfield in the corresponding Broadcast TWT Parameter Set field to 1 (#22190).