IEEE P802.11
Wireless LANs

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| LB266 CR for Leftover CIDs |
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Abstract

This submission proposes resolutions of comments received from TGbe comment collection LB266 based on TGbe D2.2.

12588 11879 13598 13244 10666 11880 11373 10667 11951 11156 12347 13873 ~~11833~~ (13 CIDs)

Revisions:

* Rev 0: Initial version of the document.
1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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 802.11be 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** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 14088 | 35.8 | 509.39 | A non-AP MLD that has multiple TWT agreements established across multple links should be able to tear down one or more agreements/schedule on a link while sending the TWT Teardown frame (or its equivalent) on a different link for efficient MLO and TWT operation. However, such mechanism is currently missing in 11be. | Please provide necessary mechanism to enhance the operation of TWT Teardown frame to make it more suitable for MLDs. | Revised-Agree with the comment. The opeation of TWT teardown is added. Apply the the changes marked as #14088 in this document. |
| 12588 | 35.8.2 | 510.06 | In this paragraph, it allows multiple TWT elements in one TWT Setup frame. In the text of 11ax, the TWT Setup frame may contain one or two TWT elements. And two TWT elements indicate a range of TWT parameter. Thus, 1) clarification is needed whether a range of TWT parameter is supported in multiple TWT elements corresponding to different link(s) in 11be. 2) TWT Setup frame Action field format in 9.6.24.8 TWT Setup frame format should be modified to support multiple TWT elements described here. | as the comment described. | Revised-Agree with the comment in principle. Apply the changes marked as #12588 in this document |
| 11879 | 35.8.2 | 509.58 | What about the case of multiple links indicated in the Link ID Bitmap subfield of the TWT element? Please call out this case as well if such case is valid (since only one TWT field is present in the TWT element then this can be possible only if TSF timers accross links are having the same values, hence clairfy this part too). Also TWT reference rule in the response is missing. Either make the respective sentence as an independent bullet or add the same sentence as a subbullet of the next item as well. | As in comment. | Revised-TWT reference rule in the response is added. For the case of multiple links, The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2.Apply the changes marked as #11879 in this document  |
| 13598 | 35.8.2 | 510.07 | "During the negotiation of TWT agreements, a TWT requesting STA affiliated with an MLD and a TWT responding STA affiliated with another MLD may include multiple TWT elements where each of the Link ID Bitmap subfields in each TWT element indicates different link(s) in the same TWT Setup frame."Based on the current spec, when a MLD operating in the EMLSR/EMLMR mode establishes TWTs over multiple links, the MLD may include multiple TWT elements. In such case, the multiple TWT elements should have the same start time and end time over multiple links. And, the Demand TWT is only option.For Suggest TWT and Request TWT (it means that the AP MLD provides the aligned TWTs over multiple links), the spec should define some normative behavior. | As in the comment. | Revised-Agree with the comment in principle. "aligned TWT" requirement is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 13244 | 35.8.1 | 510.05 | For current baseline, a TWT element should only allow indicating a single link in the Link ID bitmap since the group has not aligned on how Target Wake Time field in a single TWT element can be applicable for multiple links with different TSF timer. Add a requirement to indicate this. This is similar to requirement of supporting only one link in the Link ID bitmap of Multi-Link Link Information element for EHT Baseline. | Add following text "If dot11EHTBaseLineFeaturesImplementedOnly is equal to true, only one bit in the Link ID bitmap field (if present) ofthe Individual TWT Parameter Set field of the TWT element shall be set to 1." | Revised-Agree with the comment in principle. Instead of multiple link indicated by the Link ID Bitmap field to achive aligned TWT, "aligned TWT" requirement is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 10666 | 35.8.2 | 509.55 | The fields in a TWT element are with respect to a specific link - esp. the timing fields carry absolute TSF for a particular link. The spec requires that the TSF offset between links is constant (within +/-30us error margin). However, that doesn't address the issue since the TSF on each link is different. | Replace "link(s)" with "link" from all the locations in this subclause | Revised-Agree with the comment in principle. Instead of multiple link indicated by the Link ID Bitmap field to achive aligned TWT, aligned TWT" requirement is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 11880 | 35.8.2 | 510.06 | This statement is too generic. Since multiple TWT elements can be added in the same frame then specify that in each of them only one bit can be set to one in the link id bitmap. That way pathological cases of overlapping bits being set to 1 with different parameters are avoided. | As in comment. | Revised-Agree with the comment in principle. Instead of multiple link indicated by the Link ID Bitmap field to achive aligned TWT, aligned TWT" requirement is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 11373 | 35.8 | 509.39 | TWT operation is link specific. Operation of unicast TWT and broadcast TWT across multiple links (including EMLSR) should be defined. | As in comment. | Revised-Broadcast TWT agreement across multiple links was discussed in DCN 22/254r6. The group didn't reach consensus. For individual TWT agreement across multiple links, "aligned TWT" requirement is added during the TWT negotiation to achived aligned TWT SPs for EMLSR/NSTR/EMLMR, even for STR. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID.  |
| 10667 | 35.8.2 | 509.56 | Why does TGbe spec have a separate mechanism exclusively for TWT setup while all other individually addressed mgmt frames use the mechanism described in clause 35.3.14.2? TGbe spec should clearly state the reasons justifying the need and the benefit why TWT setup cannot include Multi-Link Link Information element (9.4.2.317). If there isn't a clear reason or benefit for having a separate scheme for TWT, update the text to remove Link ID Bitmap field from TWT element and have a uniform mechanism to identify a link in an individual addressed mgmt. frame. | As in comment | Revised-Disagree with the comment. According to subclause 35.3.24.2 (Individual TWT agreements) in 802.11be D2.2, more than one TWT element could be carried in a TWT setup frame and these TWT elements could also be applied to different link sets. However, a Multi-Link Information element can’t have the above-mentioned functionality as the Link ID Bitmap subfield. Instead of multiple link indicated by the Link ID Bitmap field to achive aligned TWT, "aligned TWT" requirement is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 11951 | 35.8 | 509.39 | 802.11be should define a TWT flow that can be operated in multiple links and is optimized for EMLSR access. EMLSR transmits data in a single links at a time. AP should consider that EMSLR STA is avaiable on all links, or if AP early terminates SPs, both SPs are terminated at the same time.When the STA operates EMLSR mode both links should be triggered at the same and early terminated at the same time. | Please, define ML TWT operation rules for EMSLR access mode that allow EMLSR operation on both links, i.e. STA is available at all links and early termination terminates all links. | Revised-For EMLSR, "aligned TWT" (including the same start time and end time) requirement for multiple links is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 11156 | 35.8 | 509.39 | How TWT/bTWT/rTWT operation will coexist with EMLMR is not clear. | Please provide procedures and rules to enable TWT operation with EMLMR | Revised-For EMLMR, "aligned TWT" (including the same start time and end time) requirement for multiple links is added during the TWT negotiation. The corresponding change was addressed by the resolution of CID 12821 in DCN 22/1526r2. Incorporate the changes marked as #12821 in DCN 22/1526r2.Note to TGbe Editor, there is no further change for this CID. |
| 12347 | 36.3.20.3 | 769.22 | "is caused for a PSDU length of 2048 octets for BPSK modulation with DCM or 4096 octets for all other moudlations". There is no good reason for singling out DCM in this way. It is simpler and better to state a unified reference length. | Change to "is caused for a PSDU length of 2048 octets" (i.e., delete the rest of the sentence). | Rejected-The cited part is baseline in 802.11REVme Draft 2.0. It is reasonable that BPSK with DCM has a half of length that is used for other modulations. |
| 13873 | 　 | 0.00 | please specify local scoreboard size of each link | please complete the missing case | Revised-Agree with comment. Apply the the changes marked as #13873 in this document. |
| ~~11833~~ | 9.2.4.7.10 | 129.01 | Table formatting issues. Re-size to fit the page. Also table becoming too big. Maybe a good to split into two tables I would say. | As in comment. | Accepted- |

**Discussion:** None.

***TGbe editor: Please modify the subclause 9.6.24.8 TWT Setup frame format as follows***  *(#12588)*

**9.6.24.8 TWT Setup frame format**

The TWT Setup frame is sent by a STA to request the setup of a TWT SP and it is sent by a responding STA to indicate the status of a requested TWT SP. The Action field of the TWT Setup frame contains the information shown in Table 9-589 (TWT Setup frame Action field format).

**Table 9-589—TWT Setup frame Action field format**

|  |  |
| --- | --- |
| **Order** | **Information** |
| 1 | Category |
| 2 | Unprotected S1G Action |
| 3 | Dialog Token |
| 4 | One or two TWT (9.4.2.199 (TWT element)) for non-MLO;One or more TWT (9.4.2.199 (TWT element)) for MLO |

For non-MLO, a TWT Setup frame contains only one TWT element, except if used for the establishment of a TWT agreement with a range of TWT parameter values (see 10.47.9 (TWT parameter ranges)). In this case, an additional TWT element is present.

For MLO, a TWT Setup frame contains one or more TWT elements.

***TGbe editor: Please modify the subclause 35.3.24.2 Individual TWT agreements as follows***  *(#11879)*

**35.3.24.2 Individual TWT agreements**

—A TWT responding STA affiliated with a peer MLD that receives a TWT request that contains a Link ID Bitmap subfield in a TWT element shall respond with a TWT response that indicates the link in the Link ID Bitmap field of a TWT element. The link(s), if present, in the TWT element carried in the TWT response, shall be the same as the link indicated in the TWT element of the soliciting TWT request.

* The Target Wake Time field of the TWT element shall be in reference to the TSF time of the link indicated by the Link ID Bitmap field of the TWT element.
	+ 1. **Block ack procedures in Multi-link operation**

***TGbe editor: Please update the contents of this subclause as shown below:(#13873)***

A recipient MLD shall maintain a single common receive reordering buffer for each <peer MLD, TID> tuple under a block ack agreement, independent of the number of links that are setup. The receive reordering buffer shall be responsible for reordering MSDUs or A-MSDUs so that MSDUs or A-MSDUs are eventually passed up to the next MAC process in the order of received sequence number. It shall also be responsible for identifying and discarding duplicate frames (i.e., frames that have the same sequence number as a currently buffered frame) that are part of this block ack agreement. It shall maintain its own state independent of the scoreboard context control to perform this reordering as specified in 10.25.6.6 (Receive reordering buffer control operation). Each received MPDU shall be analyzed by the scoreboard context control as well as by the receive reordering buffer control. For each <peer MLD, TID> tuple under a block ack agreement, a recipient MLD shall have one or both of the following modes of operation:

* Maintain an independent scoreboard context control in each setup link only using partial state operation. The bitmap corresponding to each scoreboard context control shall have the same size *WinSizeR*, which is set to the smaller of BitmapLength and buffer size indicated in the ADDBA Response frame.
* Have a common (single) scoreboard context control maintained by the MLD using partial state operation or full state operation.