IEEE P802.11
Wireless LANs

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| LB271 Remaining CIDs on TWT |
| Date: June 20th, 2023 |
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 Abstract

This submission proposes resolutions for the following 12 comment received for TGbe LB271:

* 12 CID: 17577, 16472, 17284, 15929, 16646, 15244, 15743, 18215, 18314, 18218, 16296, 16461

SP: Do you agree to the resolutions provided in doc 11-23/1125r4 for the following CIDs for inclusion in the latest 11be draft?

17577, 16472, 17284, 15929, 16646, 15244, 15743, 18215, 18314, 18218, 16296, 16461

Revisions:

* Rev 0: Initial version.
* Rev 1: Minor online changes made during the call
* Rev 2: Minor editorial.
* Rev 3: Based on offline discussion with several members, added another option for CID 15244 resolution.
* Rev 4: Thanks to several members for their valuable input. Further revision for CID 15244. Thanks to Kaiying, Insun, Yue for text-suggestion for CID 15244 resolution.

***TGbe editor: Please note Baseline is 11be D3.2***

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** | **Commenter** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 17577 | Brian Hart | 243.27 | Not really an interval in "Aligned within a 1 TU interval", more like an error/offset. Imprecision in "corresponding schedule" and "this schedule". Redundancy in the first two sentences. Noun has the wrong number. | Try merging the first two sentences and making other fixes via "The Aligned subfield equal to 1 indicates that there is a schedule on other link(s) of the AP MLD that is aligned, to within 1 TU, with the schedule indicated by the Broadcast TWT Parameter Set field; otherwise there ..." | **Revised.**The sentence is revised for better clarity.**TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #17577.** |
| 16472 | Arik Klein | 243.28 | The current sentence seems to limit the aligned schedule to one schedule per link, which seems incorrect. Please revise as suggested | "consider revise the sentence as follows: ""If the subfield is set to 1, it indicates that there is \*at least one\* schedule on other link(s) that is alignedwithin a 1 TU interval with this schedule""" | **Revised.**The suggested changes may create a connotation that one link may have multiple such schedules that are all aligned with a schedule advertised on another link as aligned schedule—this connotation would not be accurate. Also, the phrase “link(s)” in the sentence capture both single link and multiple links. The sentence is revised for better clarity.**TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #17577.** |
| 17284 | Hanqing Lou | 243.27 | Need to clarity the definition of "schedule" here. If the TWTs on different links contain the same set of timing parameters, do we consider them as one schedule or different schedules? The "schedule" in the first sentence and second sentence have different meaning. | Please clarity and clear the definition of the term "schedule" under MLD | **Revised.**The sentence is revised for better clarity.**TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #17577.** |
| 15929 | Zhou Lan | 243.14 | aligned subfield in Request Type field format in Broadcast TWT Parameter Set field name is not a descriptive name. | rename the field to a more descriptive name such as "ML aligned schedule" | **Rejected.**The usage of “aligned schedule” is clear from the context of the related text in the spec. Also, in the current 11be spec, the “aligned schedule” uniquely identifies the context of the usage of the term. |
| 16646 | Mohamed Abouelseoud | 243.14 | aligned subfield in Request Type field format in Broadcast TWT Parameter Set field name is not a descriptive name. | rename the field to a more descriptive name such as "ML aligned schedule" | **Rejected.**The usage of “aligned schedule” is clear from the context of the related text in the spec. Also, in the current 11be spec, the “aligned schedule” uniquely identifies the context of the usage of the term. |
| 15244 | Akira Kishida | 619.03 | When NSTR mobile AP MLD announces a Broadcast TWT schedule, it should be informed using the primary link. | As in the comment. | **Revised.** Agree in principle. The corresponding text highlighting the broadcast TWT advertisement for the NSTR mobile AP MLD is added in clause 35.3.24.3.**TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #15244.** |
| 15743 | KENGO NAGATA | 619.03 | If the TWT scheduling AP is an NSTR mobile AP MLD, it shall announce a broadcast TWT schedule on primary link. | "Please add the following language.""If the TWT scheduling AP is an NSTR mobile AP MLD, it shall announce a broadcast TWT schedule on primary link.""" | **Revised.** Agree in principle. The corresponding text highlighting the broadcast TWT advertisement for the NSTR mobile AP MLD is added in clause 35.3.24.3.**TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #15244.** |
| 18215  | Rubayet Shafin | 585.11 | While the procedure for individual TWT operation/negotiation with MLO is described in 35.3.24.2, the corresponding procedure for Broadcast TWT operation is currently missing. This is stark gap in the spec that needs to be closed. | Please provide the missing text corresponding to broadcast TWT. | **Rejected**The topic was discussed in the past but no consensus was reached (see 11-22/1051r4 for prior discussion on this). |
| 18314 | Yusuke Tanaka | 617.44 | Current R-TWT does not consider coordinated setting of R-TWT SPs on multiple links. This coordination enables ealier transmission of latency-sensitive traffic by multi-link operation and avoids tx/rx limitations due to NSTR constraints. | Please define R-TWT SP setting considering multi-link operation, especially coordinated setting of R-TWT SPs on multiple links. | **Rejected.**The general solution should be for broadcast TWT, which would then encompass the procedures for R-TWT. The MLD-level negotiation procedure for broadcast TWT was discussed in past in 11be group but no consensus was reached (see 11-22/1051r4 for prior discussion on this).  |
| 18218 | Rubayet Shafin | 617.44 | Restricted TWT would be an important feature for TDLS communication. However, the use of Broadcast TWT schedule, which is the basis of restricted TWT operation, by two TDLS peers STAs for communication over the TDLS direct link is not defined for TDLS operation (though individual TWT agreement can be established for the TDLS direct link by the amendmends made in 11ax). | Please provide text to enable the utilization of broadcast/restricted TWT schedule by two TDLS peer STAs. | **Revised**Agree in principle. A mechanism is needed to communicate over a direct link during broadcast TWT SPs and make sure that the peer STA is also aware of this bTWT schedule so that it makes itself available during the SPs. Necessary text is included. **TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #18218.** |
| 16296 | Pascal VIGER | 619.12 | The broadcast TWT setup is performed between a requesting STA and the AP. In case of P2P communication during a SP between the requesting STA and its peer STA, it is not clear how this peer STA is enrolled in the bTWT agreement. Indeed, if the peer STA is not informed about the TWT agreement, the peer STA could be in doze state and not be able to receive the data from the requesting STA. | The standard shall propose a mean to inform a P2P communication receiver STA that it will be involved as a receiver during a bTWT SP. | **Revised**Agree in principle. A mechanism is needed to communicate over a direct link during broadcast TWT SPs and make sure that the peer STA is also aware of this bTWT schedule so that it makes itself available during the SPs. Necessary text is included. **TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #18218.** |
| 16461 | Qing Xia | 618.35 | Currently, the standard lacks a mechanism to setup R-TWT membership on P2P link. | Add a mechanism to setup R-TWT membership on P2P link | **Revised**Agree in principle. A mechanism is needed to communicate over a direct link during broadcast TWT SPs and make sure that the peer STA is also aware of this bTWT schedule so that it makes itself available during the SPs. The R-TWT case would be covered by the B-TWT procedure.**TGbe editor, please make change as shown in this doc 11-23/1125r4 tagged by #18218.** |

***TGbe editor: Please update the paragraph (The Aligned subfield indicates…) in clause 9.4.2.198 (TWT element) as follows: (*#17577*)***

The Aligned subfield indicates whether the corresponding schedule is available on more than one of the links of the AP MLD. If the subfield is set to 1, it indicates that there is a schedule on other link(s) that is aligned within a 1 TU interval with the schedule identified by the Broadcast TWT Parameter Set field (#17577); otherwise, there is no such schedule on the other link(s). The subfield is reserved if the Negotiation Type subfield of the Control field of the broadcast TWT element is set to 3.

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* *Start of resolution for CID #15244*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

***Option-1***

***TGbe editor: Please add the following paragraph as the new last paragraph in clause 35.3.24.3 (Broadcast TWT operation) (#15244)***

(#15244)An AP affiliated with an NSTR mobile AP MLD and operating on the primary link may advertise a broadcast TWT schedule for the other AP affiliated with the same NSTR mobile AP MLD and operating on the nonprimary link by including the TWT element containing the corresponding Broadcast TWT Parameter Set field in the STA Profile field of the Per-STA Profile subelement of the Basic Multi-link element corresponding to the AP operating on the nonprimary link carried in the Beacon frames and Probe Response frame that it transmits on the primary link. The value in the Broadcast TWT Persistence subfield corresponding to the broadcast TWT schedule shall be in reference to the most recent TBTT and BI indicated by the AP operating on the primary link.

***TGbe editor: Please revise the first paragraph of clause 35.3.4.4 (Multi-Link element usage in the context of discovery) as the new last paragraph in clause 35.3.24.3 (Broadcast TWT operation) (#15244)***

If an AP affiliated with an AP MLD is not in a multiple BSSID set or the AP corresponds to a transmitted BSSID in a multiple BSSID set, then the AP, in a Beacon frame and a Probe Response frame that is not a multi-link probe response that it transmits,

— shall include the Multi-Link Control field and the Common Info field of the Basic Multi-Link element for the AP MLD as defined in 9.4.2.312.2 (Basic Multi-Link element)

— shall not include the Link Info field of the Basic Multi-Link element for the AP MLD unless conditions in 35.3.11 (Multi-link procedures for (extended) channel switching and channel quieting) are satisfied or unless the AP is affiliated with an NSTR mobile AP MLD and operating on the primary link, and advertises a broadcast TWT schedule for the other AP affiliated with the same NSTR mobile AP MLD and operating on the nonprimary link.

— may include a Reconfiguration Multi-Link element as defined in 9.4.2.312.4 (Reconfiguration Multi- Link element) and 35.3.6 (ML reconfiguration).

***Option-2***

***TGbe editor: Please add the following paragraphs as the new last two paragraphs in clause 35.3.24.3 (Broadcast TWT operation) (#15244)***

(#15244) If an AP affiliated with an NSTR mobile AP MLD and operating on the primary link intends to advertise a broadcast TWT schedule for the AP affiliated with the same NSTR mobile AP MLD and operating on the nonprimary link, then the AP operating on the primary link may advertise the schedule on the primary link and indicate that the schedule is an aligned schedule by setting the Aligned subfield of the Request Type field in the corresponding Broadcast TWT Parameter set field to 1.

NOTE 1--Since an NSTR mobile AP MLD can have a maximum of two links (the primary link and the nonprimary link), a non-AP MLD associated with the NSTR mobile AP MLD that receives the advertisement of the aligned schedule, through Beacon and Probe Response frames transmitted on the primary link, can uniquely identify the presence of the aligned schedule on the nonprimary link.

(#15244) A STA affiliated with a non-AP MLD associated with an NSTR mobile AP MLD that is operating on the nonprimary link, while sending a TWT request to the AP affiliated with the NSTR mobile AP MLD and operating on the nonprimary link, for requesting membership of the aligned schedule on the nonprimary link, shall use the same Broadcast TWT ID that is used to identify the aligned schedule advertised on the primary link.

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* *End of resolution for CID #15244*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* *Start of resolution for CID #18218*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

***TGbe editor: Please insert the following subclause under clause 9.4.2 (Elements):***

**9.4.2.xx3 B-TWT Information element**

The B-TWT Information element contains information identifying a broadcast TWT schedule. The element is defined in 9-xx6



Figure 9-xx6: B-TWT Information element format

The Element ID and Length fields are defined in 9.4.2.1 (General).

The format of the B-TWT Info field in the B-TWT Information element is shown in Figure 9-xx7 (B-TWT Info field format)



Figure 9-xx7: B-TWT Info field format

The Broadcast TWT ID subfield in the B-TWT Info field identifies a broadcast TWT schedule advertised by the AP.

***TGbe editor: Please append the below two rows in Table 9-498 (TDLS Action field values) as follows:***

|  |
| --- |
| * TDLS Action field values
 |
|  Action field value | Meaning |
| : | : |
| 11 | TDLS Broadcast TWT Request |
| 12 | TDLS Broadcast TWT Response |
| 13–255 | Reserved |

***TGbe editor: Please insert the following subclause (9.6.12.xx1 TDLS Broadcast TWT Request Action field format) including the Table (Table 9-xx2—Information for TDLS Broadcast TWT Request Action field) under clause 9.6.12 (TDLS Action field formats)*:**

**9.6.12.xx1 TDLS Broadcast TWT Request Action field format**

The TDLS Broadcast TWT Request Action field contains information shown in Table 9-xx2 (Information for TDLS Broadcast TWT Request Action field).

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| Table 9-xx2: Information for TDLS Broadcast TWT Request Action field |
| Order | Information | Notes |
| 1 | Category | The Category field is defined in 9.4.1.11 (Action field) |
| 2 | TDLS Action | The TDLS Action field is defined in 9.6.12.1 (TDLS Action field). |
| 3 | Dialog Token | The Dialog Token field contains a value that is unique among TDLS Broadcast TWT Request Action fields for which a corresponding TDLS Broadcast TWT Response Action field has not been received. The dialog token is specified in 9.4.1.12 (Dialog Token field). |
| 4 | Link Identifier | The Link Identifier element is specified in 9.4.2.60 (Link Identifier element). |
| 5 | B-TWT Information | The B-TWT Information element is specified in 9.4.2.xx3 (B-TWT Information element). |

***TGbe editor: Please insert the following subclause (9.6.12.xx4 TDLS Broadcast TWT Response Action field format) including the Table (Table 9-xx5—Information for TDLS Broadcast TWT Response Action field) under clause 9.6.12 (TDLS Action field formats)*:**

**9.6.12.xx4 TDLS Broadcast TWT Response Action field format**

The TDLS Broadcast TWT Response Action field contains information shown in Table 9-xx5 (Information for TDLS Broadcast TWT Response Action field).

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| Table 9-xx5: Information for TDLS Broadcast TWT Response Action field |
| Order | Information | Notes |
| 1 | Category | The Category field is defined in 9.4.1.11 (Action field) |
| 2 | TDLS Action | The TDLS Action field is defined in 9.6.12.1 (TDLS Action field). |
| 3 | Dialog Token | The Dialog Token field is set to a value contained in the corresponding TDLS Broadcast TWT Request Action field. The dialog token is specified in 9.4.1.12 (Dialog Token field). |
| 4 | Status Code | The Status Code is specified in 9.4.1.9 (Status Code field) |
| 5 | Link Identifier | The Link Identifier element is specified in 9.4.2.60 (Link Identifier element). |
| 6 | B-TWT Information | The B-TWT Information element is specified in 9.4.2.xx3 (B-TWT Information element). |

***TGbe editor: Please insert the following subclause 11.20.xx8 (TDLS operation with broadcast TWT) under subclause 11.20 (Tunneled direct link setup)***

If a TDLS peer STA that is a member of a broadcast TWT schedule intends to transmit frames to another TDLS peer STA over a TDLS direct link during the TWT SP corresponding to the broadcast TWT schedule, then the TDLS peer STA may send a TDLS Broadcast TWT Request frame to the other TDLS peer STA, where the broadcast TWT schedule is identified by the Broadcast TWT ID subfield in the B-TWT Information element in the TDLS Broadcast TWT Request frame. If the other TDLS peer STA, upon reception of the TDLS Broadcast TWT Request frame, responds by transmitting a TDLS Broadcast TWT Response frame with the status code SUCCESS, then the other TDLS peer STA is expected to be in the Awake state during the TWT SPs corresponding to the broadcast TWT schedule. In the TDLS Broadcast TWT Response frame, the Broadcast TWT ID subfield value in the B-TWT Information element shall be the same as that in TDLS Broadcast TWT Request frame.

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* *End of resolution for CID #18218*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***