IEEE P802.11
Wireless LANs

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| CC36 CR for clause 10 and clause 11 |
| Date: March 10, 2022 |
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 Abstract

This submission proposes resolutions for following CIDs received for TGbe CC36 based on TGbe D1.5:

4028 4030 5040 5042 5280 6458 5309 5310 5387 (9 CIDs)

4304 5287 6108 6945 (4 CIDs)

Revisions:

* Rev 0: Initial version of the document.
* Rev 1:Editorial fix

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.***

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| **CID** | **Commenter** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 4028 | Abhishek Patil | 11.2.3.15 | 184.54 | The TIM broadcast procedure is broken in MLO. A STA affiliated with a non-AP MLD can independently select its power state/mode and perform operations that can aid power-save on that link. The TIM broadcast procedure provides a mechanism for a STA to save power (see REVme 0.00 P2172 L01 for details). For power-save reasons, a non-AP MLD can have all its affiliated STAs in power-save mode and one of the affiliated STA can setup broadcast TIM operation with the AP on its link. Such STA wakes-up only to listen to the TIM frame. The STA would listen to the Beacon frame on the link (to receives the most recent BSS parameters) only if the Check Beacon field is incremented. Since Multi-Link element is not part of the list of elements that trigger an increment of Check Beacon field, the non-AP MLD will not receive any updates to the AP's multi-link parameters or any updates to the BSS parameters on other links of the AP MLD. This can have undesired consequences. An update to ML IE needs to be treated as a criteria for incrementing the Check Beacon field. | The list of events that classifies as critical updates needs to include Basic variant ML IE for the TIM broadcast procedure to work. | Revised-Agree with the broken issue mentioned by the commenter. However, it is not reasonable to classify the change to the Basic ML IE as critical update since it contains lots of noncritical elements in the Beacon frame. Propose resolution to address this broken issue of TIM broadcast procedure. TGbe editor:Please implement the changes as shown in doc 11-22/0611r1 tagged as 4028 |
| 4030 | Abhishek Patil | 11.2.3.15 | 185.26 | A non-AP STA that is monitoring only the TIM frames will miss the critical updates for another link. | Modification to the BSS Parameter Change Count subfield carries in the Reduced Neighbor Report element for a reported AP must be classified as a criteria for causing the Check Beacon field to increment. | Revised-Agree with the broken issue mentioned by the commenter. Propose resolution to ad-dress this broken issue of TIM broadcast procedure. TGbe editor:Please implement the changes as shown in doc 11-22/0611r1 tagged as 4030 |
| 5040 | Gaurang Naik | 11.2.3.15 | 185.26 | Modification of the Multi-Link element should be included in the list of events that classify as critical updates. Without this, a non-AP STA that is monitoring only TIM frames will miss all those critical update on the other links of the AP MLD that are included in the Beacon - e.g., Channel Switch Announcement, Quiet element, etc. | Include "Modification of the Multi-Link element" in the list of events that classify as critical updates. | Revised-Agree with the broken issue mentioned by the commenter. However, it is not reasonable to classify the change to the Basic ML IE as critical update since it contains lots of noncritical elements in the Beacon frame. Propose resolution to ad-dress this broken issue of TIM broadcast procedure. TGbe editor:Please implement the changes as shown in doc 11-22/0611r1 tagged as 5040 |
| 5042 | Gaurang Naik | 11.2.3.15 | 184.54 | If a STA affiliated with a non-AP MLD is only monitoring TIM frames, there is no mechanism in the spec to notify the non-AP MLD about critical updates on the other links. | Specify a mechanism to notify the non-AP MLDs that only monitor the TIM frames about critical updates on the other links. | Revised-Agree with the broken issue mentioned by the commenter. Propose resolution to ad-dress this broken issue of TIM broadcast procdure. TGbe editor:Please implement the changes as shown in doc 11-22/0611r1 tagged as 5042 |
| 5280 | Insun Jang | 11.2.3.15 | 184.62 | What about Multi-link element? For example, the chagnes of Common Info field would impact on the associated non-AP MLD. Need to consider it as critical update | As in the comment | Rejected-The Common Info field of ML element doesn’t contain any critical events as defined in 11.2.3.15 (TIM Broadcast). Moreover, since the Common Info field of ML element contains BPCC of the reporting AP, which is increased once there is critical update, the proposed change may increase BPCC multiple times just because of one critical event. |
| 6458 | namyeong kim | 11.2.3.15 | 185.23 | We need to consider the Common Info field of Multi-Link element as critical update events. The contents of Common Info field is for MLD, so it's very critical informaiton for all non-AP STAs associated with the AP MLD. Therefore, we need to consider the modification of a Common Info field of the Multi-Link element as critical update event. | Please add "Modification of Common Info field of a Multi-Link element" in critical update event list in 11.2.3.15 TIM Broadcast section. | Rejected-The Common Info field of ML element doesn’t contain any critical events as defined in 11.2.3.15 (TIM Broadcast). Moreover, since the Common Info field of ML element contains BPCC of the reporting AP, which is increased once there is critical update, the proposed change may increase BPCC multiple times just because of one critical event. |
| 5309 | Jarkko Kneckt | 11.2.3.15 | 185.01 | When AP switches channel to the 6 GHz band, the regulatory maximum transmission power of the AP and the non-AP STA may change. The non-AP STA needs to know the regulatory maximum transmission power in the new channel befor`e the STA may communicate with the AP. To simplify this operation, the AP should signal the regulatory maximum transmission power for the new channel in the 6 GHz band. | Please add a signaling for the regulatory maximum transmission powers allowed in the new channel before the AP changes its channel. | Rejected-After the channel switch, the RNR will provide regulatory maximum transmission powers (20 MHz PSD field) for each affiliated AP. There is no need to add another signaling for the regulatory maximum transmission powers allowed before the AP changes its channel. |
| 5310 | Jarkko Kneckt | 11.2.3.15 | 185.01 | The 802.11be should provide means to modify AP capabilities and ML element parameter values. The mechanism should be able to signal the coming new parmeter values that are taken into use in the new channel after the switch before the actual channel switch.This notification signaling allows STAs to prepare for the coming change of the parameter values. | Please add possilibility for AP to change its capabilities, signal the new parameter values and notify the adoption of the new parameter values by using Change Sequence Counter and Check Beacon counter values | Revised-This notification signaling regarding channel switch the commenter mentioned is carried ML element (see 35.3.11 in 802.11 be D1.5). There is no need to use Change Sequence Counter and Check Beacon counter values.TGbe editor:There is no text change for this CID. |
| 5387 | Jeongki Kim | 11.2.3.15 | 185.25 | "r) Modification of the EHT Operation element" is the newly added text. So, it should be underlined in the subclause. | make the indicated text underlined text | Accepted- |

***TGbe editor: Please modify the subclause 9.6.14.1 Unprotected WNM Action fields as following (CID #4028 4030 5040 5042)***

**9.6.14 Unprotected WNM Action details**

**9.6.14.1 Unprotected WNM Action fields**

Unprotected WNM Action frames are not encapsulated using mechanisms defined for robust Management frames. An Unprotected WNM Action field, in the field immediately after the Category field, differentiates the formats. The Unprotected WNM Action field values associated with each frame format is defined in Table 9-517 (Unprotected WNM Action field values).

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| Table 9-517—Unprotected WNM Action field values |
| Value | MeaningTime Priority |
| 0 | TIM |
| 1 | Timing Measurement |
| 2 | Multi-Link TIM |
| 3-255 | Reserved |

***TGbe editor: Please add the following subclause (CID #4028 4030 5040 5042)***

**9.6.14.2 Multi-Link TIM frame format**

The format of the Multi-Link TIM frame Action field is shown in Figure 9-x1 (TIM frame Action field format).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category | UnprotectedWNM Action | Link Number | Per-Link Check Beacon 1 | … | Per-Link Check Beacon n | Timestamp | TIM Element |
| Octets: | 1 | 1 | 1 | 2 |  | 2 | 8 | 4–256 |

Figure 9-x1 –Multi-Link TIM frame Action field format

The Category field is defined in 9.4.1.11 (Action field).

The Unprotected WNM Action field is defined in 9.6.14.1 (Unprotected WNM Action fields).

The Link Number field indicates the number n of the Per-Link Check Beacon fields. The value (n) of the Link Number field is less than 16.

The format of the Per-Link Check Beacon field is shown in Figure 9-x2 (Per-Link Check Beacon field format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Link ID | Reserved | Check Beacon |
| Bits: | 4 | 4 | 8 |

Figure 9-x2–Per-Link Check Beacon field format

The Link ID subfield specifies a value that uniquely identifies the link that the AP affiliated with the AP MLD is operating on.

The Check Beacon field is defined as an unsigned integer initialized to 0, which increments when a critical update occurs to the operational parameters for that AP operating on the link indicated by the Link ID field (see 11.2.3.15 (TIM Broadcast)).

The Timestamp field is defined in 9.4.1.10 (Timestamp field). The field contains a TSF timestamp when the TIM Broadcast Response frame contained a Status field set to “Accept, timestamp present in TIM frames” or “Overridden, timestamp present in TIM frames.” The field is reserved otherwise.

The TIM Element field contains a TIM element as specified in 9.4.2.5 (TIM element). The bit corresponding to buffered group addressed frames is reserved for all BSSIDs.

***TGbe editor: Please add the subclause 35.18 TIM Broadcast for MLD (CID #4028 4030 5040 5042)***

**35.18 TIM Broadcast for MLD**

A STA affiliated with MLD that executes TIM broadcast procedures shall follow the rules defined in subclause 11.2.3.15 (TIM Broadcast) except that the TIM frame is replaced by the Multi-Link TIM frame.

When a STA affiliated with a non-AP MLD, receives a Check Beacon field for a certain AP that is affiliated with an AP MLD, with which the non-AP MLD has performed multi-link setup and the value of the Check Beacon field for the AP is different from the previously received value, then the non-AP MLD shall follow one of the following mechanisms:

—The STA affiliated with the non-AP MLD, which is associated with the AP, attempts to receive a Beacon frame or a Probe Response frame from the AP.

—Any STA affiliated with the non-AP MLD attempts to send a Probe Request frame to its associated AP soliciting information of the AP.

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| **CID** | **Commenter** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 4304 | Alfred Asterjadhi | 10.2.7 | 0.00 | I see different terms meaning the same, filter out or discard. Perhaps a good idea to just chose one and be consistent throughout. | As in comment. | Rejected-The commenter failed to identify the technical issue, "filter out" is used in 10.2.7(MAC data service). Encourage the commenter to submit a comment to 802.11 REVme |
| 5287 | James Yee | 10.2.7 | 166.07 | "with which it has done multi-link setup" is unnecessary to state since the AP MLD has already received from the non-AP MLD and such description appears nowhere else in the draft. One assumes a link has been setup for the MPDU to be received. | Delete the phrase. | Revised-The corresponding change is reflected in 802.11be D1.5. Please refer to the P412 L42 in 35.3.15.2 (Group addressed frame reception).TGbe editor:There is no further change for this CID |
| 6108 | Mark Hamilton | 10.2.7 | 166.07 | If the AP MLD changes the SA of an MPDU, it is changing the semantics of the MSDU and is not delivering the MAC Service transparently from ISS to ISS. What if the non-AP MLD that sent this MPDU was not the originator of the MSDU? Any receiver getting this MSDU will be confused about its source, unable to respond, etc. Why is it any harder/different for a non-AP MLD to filter out reflected broadcasts than it is for a non-AP STA? | Delete the changes in this subclause. Make the usual "non-AP STA \_or non-AP MLD\_" changes to the existing text, intead. | Revised-The corresponding text was moved from 10.2.7 (MAC data service) to 35.3.15 (Multi-link group addressed frame delivery and reception). Propose resolution to fix other issueTGbe editor:Please implement the changes as shown in doc 11-22/0611r1 tagged as 6108 |
| 6945 | Saju Palayur | 10.3.2.11 | 0.00 | Acknowledgment procedure should convey how MLD AP should handle the failure case of not receiving Ack from nSTR non-AP MLD at the time where simultaneous transmission to the same nSTR MLD is being held on two links. In the above case, AP MLD may not be able to retransmit the PPDU since the nSTR Non-AP MLD is on receive in the other link | add normative for the case as described | Rejected-When a STA belonging to NSTR link pair is receiving a new PPDU or a retransmitted PPDU, the AP may choose not to transmit a PPDU to another STA belonging of the same NSTR link pair because of interference leakage. The corresponding description is in 802.11be D1.5. Please refer to 35.3.16.4 Nonsimultaneous transmit and receive (NSTR) operation.TGbe editor:There is no text change for this CID. |

**5.1.5.10 Non-AP MLD role (CID# 6108)**

The MAC data plane architecture of a non-AP MLD as shown in Figure 5-2a (MAC data plane architecture (MLO) for unicast data frames(#2239)) is completed by replacing the role-specific behavior block with that shown in Figure 5-11 (Role-specific behavior block for a non-AP MLD(#2239)). The function of this block in a non-AP MLD is to perform destination address filtering as described in 10.2.8 (MAC data service).

**35.3.15.1 Group addressed frame delivery**

Each AP affiliated with an AP MLD shall schedule for transmission buffered group addressed frames immediately after every DTIM beacon except that a TWT scheduling AP affiliated with that AP MLD shall schedule for transmission the buffered group addressed frames during the broadcast TWT SPs located within the beacon interval during which the DTIM Beacon frame is transmitted (see 26.8.3.2 (Rules for TWT scheduling AP)).

(#4305)(#1809)An AP MLD that distributes a group addressed Data frame received from an associated non-AP MLD shall set the SA field of the broadcast group addressed Data frame equal to the MLD MAC address of the non-AP MLD. (CID # 6108)

**35.3.15.2 Group addressed frame reception**

A non-AP STA affiliated with a non-AP MLD shall follow the item (e) defined in 11.2.3.7 (Receive operation for STAs in PS mode) to receive the group addressed BUs sent by (#8246)its associated AP affiliated with the associated AP MLD.

If an indication of buffered group addressed frames in the TIM element about an AP affiliated with an AP MLD is received by any STA affiliated with a non-AP MLD, the STA affiliated with the non-AP MLD that is associated with the AP and that stays awake to receive group addressed Bus, shall elect to receive all group addressed frames that are scheduled for delivery on (#) (#8247)the link that the STA is operating on.(#4305)(#1809)

A non-AP MLD shall filter out the group addressed MPDU with the SA field set to the MLD MAC address of the non-AP MLD.