IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LB 266 - CR for ML Reconfiguration clause 35.3.6 part 2 | | | | |
| Date: October 12, 2022 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Binita Gupta | Meta Platforms, Inc. |  |  | binitagupta@meta.com |
| Chunyu Hu |  |  |  |
| M. Kumail Haider |  |  |  |
| Morteza Mehrnoush |  |  |  |

Abstract

This submission proposes resolutions for following 18 CIDs received for TGbe LB266:

10021 11640 13067 13987 10022 13068 10073 10095 10633 10634

11103 11636 13281 13282 13900

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: Added CID 13282, updates to resolution of CIDs 11433 and 11636.
* Rev 2: Updates to CID 11433 and 12807 resolutions
* Rev 3: Revisions based on feedback during TGbe call and offline feedback.

***TGbe editor: The baseline for this document is* 11be D2.3 + 22/1765r0*.***

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.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***CID*** | ***Commenter*** | ***Clause*** | ***Page*** | ***Comment*** | ***Proposed Change*** | ***Resolution*** |
| 10021 | Morteza Mehrnoush | 35.3.6.2.2 | 426.07 | In AP removel case, if a TID is only mapped to a link where the AP will be removed, it's not clear what is the mapping for this TID after AP removal. Is default TID-to-link mapping will be in effect after AP removal (all TID to all link mapping) and the AP or non-AP MLD have to renegotiate the TID-to-Link mapping? | as in comment | Revised  Agree in principle. Text has been added to specify the behavior for TID-to-link mapping when one or more TIDs are not mapped to any links after an AP removal.  **TGbe editor, please make the changes tagged by CID #10021 in 22/1838r0.** |
| 11640 | Morteza Mehrnoush | 35.3.6.2.2 | 426.07 | In AP removal case, if a TID is only mapped to a link where the AP will be removed, it's not clear what is the mapping for this TID after AP removal. Is default TID-to-link mapping will be in effect after AP removal (all TID to all link mapping) and the AP or non-AP MLD have to renegotiate the TID-to-Link mapping? | as in comment | Revised  Same resolution as CID #10021.  **TGbe editor, please make the changes tagged by CID #10021 in 22/1838r0.** |
| 13067 | Chittabrata Ghosh | 35.3.6.2.2 | 426.07 | In AP removel case, if a TID is only mapped to a link where the AP will be removed, it's not clear what is the mapping for this TID after AP removal. Is default TID-to-link mapping will be in effect after AP removal (all TID to all link mapping) and the AP or non-AP MLD have to renegotiate the TID-to-Link mapping? | as in comment | Revised  Same resolution as CID #10021.  **TGbe editor, please make the changes tagged by CID #10021 in 22/1838r0.** |
| 13987 | Geonjung Ko | 35.3.6.2.2 | 426.01 | TID-to-link mapping is unclear after removing affiliated APs. | Clarify TID-to-link mapping after a removal of affiliated APs | Revised  Same resolution as CID #10021.  **TGbe editor, please make the changes tagged by CID #10021 in 22/1838r0.** |
| 10022 | Morteza Mehrnoush | 35.3.6.2.2 | 426.54 | It's not clear after AP removal, PM state of the STAs affiliated with non-AP MLD, and TWT negotiation over the removed link etc. Please add text to clarify the corresponding behaviors. | as in comment | Rejected  D2.0 already captures following text which encompasses the issue raised in this CR. Group prefers to not add any additional text, based on feedback received during the call.  “At the TBTT indicated by the value of the Delete Timer subfield in transmitted Reconfiguration Multi-Link elements, an associated non-AP MLD shall consider the link corresponding to the removed AP nonexistent, and the SME of the affiliated (#11041)non-AP STA associated with the removed affiliated AP shall delete any information maintained for that link...” |
| 13068 | Chittabrata Ghosh | 35.3.6.2.2 | 426.54 | It's not clear after AP removal, PM state of the STAs affiliated with non-AP MLD, and TWT negotiation over the removed link etc. Please add text to clarify the corresponding behaviors. | as in comment | Rejected  D2.0 already captures following text which encompasses the issue raised in this CR. Group prefers to not add any additional text, based on feedback received during the call.  “At the TBTT indicated by the value of the Delete Timer subfield in transmitted Reconfiguration Multi-Link elements, an associated non-AP MLD shall consider the link corresponding to the removed AP nonexistent, and the SME of the affiliated (#11041)non-AP STA associated with the removed affiliated AP shall delete any information maintained for that link...” |
| 10073 | Thomas Derham | 35.3.6.2.2 | 426.40 | There is no need to disallow inclusion of all other optional fields in BSS Transition Management Request frame when used for link removal. In particular, it may be useful to include one or more BSS Transition Candidate List entries to recommend other candidate APs or MLDs that the STA might prefer to roam to while the link of the currently associated MLD is down. | Allow BSS Transition Candidate List Entries field to be included (also consider if there are use cases for other optional fields) | Revised  Agree in principle. Text has been added to support optionally sending BSS Transition Candidate List entries in the BTM.  **TGbe editor, please make the changes tagged by CID #10073 in 22/1838r0.** |
| 10095 | Yiqing Li | 35.3.6 | 425.38 | Add AID reassignment procedure after ML reconfiguration | As commented | Rejected  It is not clear from CID description why AID reassignment is needed after ML reconfiguration and what issue need to be addressed. |
| 10633 | Abhishek Patil | 35.3.6.2.1 | 425.56 | In order to keep the link IDs continuous, an AP MLD must assign the same Link ID to an AP that is being added, to the same channel as before if that AP was previously affiliated with the AP MLD and was removed as part of the ML reconfiguration procedure. This will also conform to the definition of link ID (tuple consisting of BSSID, Channel, Op Class). | As in comment | Rejected  Based on the offline feedback, members prefer to leave the Link ID assignment to the implementation. Similar CID 10597 was Rejected in 11-22/1773r9 per quarantine procedure as members could not reach consensus on a proposed resolution to resolve that comment. |
| 10634 | Abhishek Patil | 35.3.6.2.2 | 426.03 | Typically on the client side, there can be a lag between discovery and association. During ML (re)setup is possible that a non-AP MLD, in its (re)association request frame, requests an affiliated AP that will be removed as part of ML Reconfiguration procedure. | Provide a Status Code value for rejecting the inclusion of such an AP in the ML setup | Revised  Agree in principle. Added a failure Status Code to indicate that the AP is removed or being removed for (re)association response.  **TGbe editor, please make the changes tagged by CID #10634 in 22/1838r0.** |
| 11103 | Brian Hart | 35.3.6.2.1 | 425.53 | Consider an AP MLD that removes an affiliated AP, then advertises its addition (with the same MAC address) according to this procedure. Then assume there is a STA in a deep sleep that misses the removal + re-add. Now the non-AP STA thinks it has the AP in its MLD setup but the AP MLD does not agree. Of course the non-AP STA should have received an indication from the AP during the AP removal procedure, but perhaps the non-AP STA was in a very deep sleep and/or there was a sequence of unlucky collisions such that the information got lost. | Add a note as to how the non-AP MLD might detect this scenario and/or any mitigations that the non-AP MLD should perform. If extra AP signaling is unavoidable, then add that too. | Revised  A note is added to indicate that if non-AP MLD believes that it has a link to an AP which is removed, the frame transmission on that link will fail and then non-AP MLD can take implementation specific action (e.g. redo ML setup) to rectify the state mismatch. Note also clarifies that this could apply to non-MLD non-AP STA as well.  **TGbe editor, please make the changes tagged by CID #11103 in 22/1838r0.** |
| 11636 | Morteza Mehrnoush | 35.3.6.2.2 | 427.01 | In addition to STR and NSTR link pair relationship, the EMLSR and EMLMR non-AP MLD behavior upon AP removal should be defined. In AP MLD with two affiliated APs, if one affiliated AP is removed, the non-AP MLD can only do frame exchange over one link so no EML(SR/MR) operation is needed at AP and non-AP MLD. Please add clarification in the text. | as in comment | Revised  There is a proposal in 22/1860r2 to optimize EMLSR operation when only a single EMLSR non-AP STA is in awake state. The single EMLSR link after AP removal case should be addressed as part of that proposal. For AP Removal clause added notes to clarify that after AP removal if only a single EMLSR or EMLMR link is left, then AP MLD and non-AP MLD continue to operate per procedures defined in EMLSR or EMLMR clause. Any enhancements for single link EMLSR or single link EMLMR should be defined in respective clause and not under 35.3.6.2.2.  **TGbe editor, please make the changes tagged by CID #11636 in 22/1838r0.** |
| 13281 | Binita Gupta | 35.3.6.2.1 | 425.57 | Which MLME primitive triggers addition of a new affiliated AP? Provide reference to the MLME primitive from clause 6.3 for adding a new affiliated AP to an AP MLD. | As in comment | Revised  Reference is added to existing MLME-START.request for adding an affiliated AP.  **TGbe editor, please make the changes tagged by CID #13281 in 22/1838r0.** |
| 13282 | Binita Gupta | 35.3.6.2.2 | 426.08 | Which MLME primitive triggers removal of an affiliated AP? Provide reference to the MLME primitive from clause 6.3 for removing an affiliated AP from an AP MLD. | As in comment | Revised  Added reference to the new MLME-BSS-AP-REMOVAL.request defined in CR doc 22/ 1765r0 for the removal of an AP.  **TGbe editor, please make the changes tagged by CID #13282 in 22/xxxxr0.** |
| 13900 | Ming Gan | 35.3.6.2.2 | 426.14 | this requirement is too strong, please change it to "should" | change shall to should | Revised  This shall requirement is already rephrased to a should requirement as part of CID 12082 resolution in 22/1487r7.  TGbe editor implement changes for CID 12082. |

\**9.4.1.9 Status Code field**

***TGbe editor: Please add the following new row in the Table as shown below:***

**Table 9-78—Status codes**

|  |  |  |
| --- | --- | --- |
| **Status code** | **Name** | **Meaning** |
| … | … | … |
| <ANA>  (#10634) | DENIED\_INCLUDED\_AP\_IS\_REMOVED\_OR\_BEING\_REMOVED\_ | Association is denied because one or more APs requested for ML setup in the (Re)Association Request frame is either removed or is being removed from the AP MLD. |

**35.3.6.2.1 Adding affiliated APs(#13678)**

***TGbe editor: Please update following paragraph in this subclause as shown below:***

An AP MLD may add (#13678)one or more affiliated APs (#13679)to the AP MLD (#13281)(see 6.3.11.2 (MLME-START.request)). Each added affiliated AP(#10237) shall be announced through the Basic Multi-Link element (by changing the Maximum Number  
Of Simultaneous Links (#12619)subfield of the MLD Capabilities and Operations subfield), and through the  
Reduced Neighbor Report element (by including a TBTT Information field (#13276)with MLD Parameter  
field for the added AP), in the Beacon and Probe Response frames (#12618)transmitted by other APs  
affiliated with the same AP MLD.

**35.3.6.2.2 Removing affiliated APs**

***TGbe editor: Please update following paragraph in this subclause as shown below:***

An AP MLD may remove one or more of its affiliated APs (#13282)(see 6.3.xxx.2 (MLME-BSS-AP-REMOVAL.request)). (#14015)An AP MLD that is an NSTR mobile AP MLD shall not remove the affiliated AP operating on the primary link (see 35.3.19 (NSTR mobile AP MLD operation)). The AP MLD shall announce the removal of any affiliated AP through a Reconfiguration  
Multi-Link element (see 9.4.2.312.4 (Reconfiguration Multi-Link element)) (#14015)in all Beacon frames  
transmitted by its affiliated APs, as well as all Probe Response frames it transmits, until the affiliated AP has  
been removed.

***TGbe editor: Please update following paragraph in this subclause as shown below:***

(#13279) If the affiliated AP being removed transmits BSS Transition Management Request frame(s) to notify termination of the BSS (#11565)corresponding to the affiliated AP, the SME of that affiliated AP shall perform the following procedure to terminate the BSS

(#13279) It shall follow the procedure in 11.21.7.3 (BSS transition management request) and 35.3.23 (BSS transition management for MLDs) to transmit BSS Transition Management Request frame(s). It shall set the fields in the BSS Transition Management Request frame(s) as follows:

The Disassociation Imminent, BSS Termination Included, and Link Removal Imminent sub- fields of the Request Mode field are set to 1; (#10073)the Preferred Candidate List Included field is set per 9.6.13.9 (BSS Transition Management Request frame format) if the BSS Transition Candidate List Entries field is included; other subfields of the Request Mode field are reserved.

The Disassociation Timer field is set to the number of TBTTs of the affiliated AP before it transmits a Disassociation frame to the STA(s) receiving the BSS Transition Management Request frame. The Disassociation Timer field value shall point to a TBTT at or later than the TBTT pointed to by the value of the Delete Timer field of the Reconfiguration Multi-Link element in transmitted beacons.

The BSS Termination Duration field shall be present and contain a BSS Termination Duration subelement (see 9.4.2.36 (Neighbor Report element)), with the BSS Termination TSF field of the subelement set to the value of the TSF timer when the BSS the affiliated AP belongs to will be terminated. The BSS Termination TSF field value shall indicate a time that is later than the TBTT the Disassociation Timer field value points to.

(#10073)The BSS Transition Candidate List Entries field may be included specifying one or more Neighbor Report elements to provide BSS transition candidate list.

No other optional fields shall be present in the BSS Transition Management Request frame.

***TGbe editor: Please add following three paragraphs after existing NOTE 3 in this subclause:***

(#10021)If a non-AP MLD removes a setup link from its multi-link setup as a result of the removal of an AP affiliated with its associated AP MLD, and that results in one or more TIDs not being mapped to remaining setup links (if exists) for that non-AP MLD, then the non-AP MLD and the AP MLD shall operate with those TIDs mapped to all remaining setup links in both UL and DL for that non-AP MLD after the link removal until a new TID-to-link mapping is negotiated; Otherwise both the AP MLD and the non-AP MLD shall continue to operate based on the currently established TID-to-Link mapping on the remaining setup links for that non-AP MLD after the link removal.

(#11103)Note: If a non-AP MLD misses an AP removal indication from the associated AP MLD for some reason (e.g. due to deep sleep), it might incorrectly believe that it has a link setup with the affiliated AP which has been removed. Similarly, if a non-MLD non-AP STA misses BTM signaling when the affiliated AP was removed, it might incorrectly believe that it is associated with the affiliated AP which has been removed. In both cases, the transmission of frames on the link will fail for the non-AP MLD or the non-MLD non-AP STA. The non-AP MLD can take appropriate implementation specific action e.g. redo ML setup, to correct the state mismatch with the AP MLD. The non-MLD non-AP STA can reassociate with any available AP.

***TGbe editor: Please add following two notes after the last paragraph in this subclause:***

(#11636) Note: If an AP affiliated with an AP MLD is removed and if the link associated with the removed AP was one of the EMLSR links for a non-AP MLD and if there is only one remaining EMLSR link for that non-AP MLD after the AP removal, the AP MLD and the non-AP MLD continue to operate as per procedures defined in 35.3.17 (Enhanced multi-link single radio operation) on the remaining EMLSR link.

(#11636) Note: If an AP affiliated with an AP MLD is removed and if the link associated with the removed AP was one of the EMLMR links for a non-AP MLD and if there is only one remaining EMLMR link for that non-AP MLD after the AP removal, the AP MLD and the non-AP MLD continue to operate as per procedures defined in 35.3.18 (Enhanced multi-link multi-radio operation) on the remaining EMLMR link.