IEEE P802.11  
Wireless LANs

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| LB 266 - CR for ML Reconfiguration clause 35.3.6 | | | | |
| Date: August 24, 2022 | | | | |
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Abstract

This submission proposes resolutions for following 36 CIDs received for TGbe LB266:

10237, 13325, 14065, 11081, 12618, 12619, 13276, 13678, 13679, 13680,

14016, 14066

10371, 10718, 11040, 11041, 11429, 11565, 11569, 11636, 12081, 12083,

12084, 12219, 12620, 12621, 12996, 12997, 12998, 13278, 13279, 13280,

13681, 14018, 14019, 14020

CIDs to be Straw Polled for 11-22/1487r4:

12618, 10718, 13280, 14018

CIDs to be Straw Polled for 11-22/1487r6:

13278, 13279, 12996, 12081, 12082, 14017, 12080

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1:
  + Deferred CIDs 10717, 11658 and 13066 per offline discussion. Updates to resolution for CIDs 12618, 13678,11569, 11429, 14020 per offline discussion. Updates to resolution description in the Table for some CIDs
* Rev 2 – deferred CID 11636
* Rev 3 – Edits during the MAC Ad-hoc call
* Rev 4 – Revised text for CIDs 12618, 10718, 13280, 14018 based on offline discussions
* Rev 5 – Text revision for CIDs 13278, 13279, 12996, 12081. Added resolution for new CIDs 12082, 14017, 12080.
* Rev 6 – Some text updates for CID 13278 per offline feedback. Made the baseline to be D2.2+1453r2

***TGbe editor: The baseline for this document is 11be D2.0***

***TGbe editor: The baseline for r6 version of this document is 11be D2.2+1453r2***

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*** |
| 10237 | John Wullert | 35.3.6.2.1 | 425.52 | "A new affiliated APs shall be announced" has a plural/singular disconnect | Change to "Any new affiliated APs..." | **Revised**  The text is revised to fix grammar.  **TGbe editor, please make the changes tagged by CID #10237 in 22/1487r3.** |
| 13325 | Muhammad Kumail Haider | ï»¿35.3.6.2.1 | 425.52 | "ï»¿ï»¿A new affiliated APs shall be..." --> "ï»¿A new affiliated AP shall be..." | as in comment | Revised  Same resolution as for 10237.  **TGbe editor, please make the changes tagged by CID #10237 in 22/1487r3.** |
| 14065 | Pooya Monajemi | 35.3.6.2.1 | 425.53 | Grammar: "A new affiliated APs" | Remove "A" at the beginning of sentence | Revised  Same resolution as for 10237.  **TGbe editor, please make the changes tagged by CID #10237 in 22/1487r3.** |
| 11081 | Po-Kai Huang | 35.3.6.1 | 425.43 | "reconfiguration" has been used in the baseline. Having this short version of feature name may create confusing when merged with revme. Suggest to revise the following sentence. "Multi-link reconfiguration (ML reconfiguration, or reconfiguration for short) refers to" to "Multi-link (ML) reconfiguration refers to" | Change the sentence to "Multi-link (ML) reconfiguration refers to" | Accepted  **TGbe editor, please make the changes tagged by CID #11081 in 22/1487r3.** |
| 12618 | Arik Klein | 35.3.6.2.1 | 425.52 | When a new affiliated AP is added, a new Common Info is added to the Basic Multi-Link element included in the Beacon or Probe Response frames transmitted by the new affiliated AP or by another Transmitted BSSID within the multiple BSSID set to which the new affiliated AP is pertained. Please add it to the current paragraph. | 1. Modify the current sentence as follows:” A new affiliated Aps shall be announced through the Basic Multi-Link element \*transmitted by other Aps affiliated with the same AP MLD or by the new affiliated AP\*(by changing the Maximum Number Of Simultaneous Links field of the MLD Capabilities and Operations field of the Common field)” 2. Add the following sentence: “In addition, a new Basic Link element is added in the Beacon and Probe Response transmitted by the new affiliated AP or by another transmitted BSSID within the multiple BSSID set to which the new affiliated AP is pertained”. | Revised  Text is revised to add requirements on how the new affiliated AP is announced by existing APs transmitting beacons and probe response frames and when existing AP is a nontransmitted BSSID of a multiple BSSID set. For the new affiliated AP text is added to refer to relevant clauses for including Basic ML element and RNR element in the Beacon and Probe Response frames.  **TGbe editor, please make the changes tagged by CID #12618 in 22/1487r4.** |
| 12619 | Arik Klein | 35.3.6.2.1 | 425.54 | Replace the "field" with "subfield" in the following sentence: "by changing the Maximum Number Of Simultaneous Links field of the MLD Capabilities and Operations field" | The sentence should be revised as follows: "by changing the Maximum Number Of Simultaneous Links subfield of the MLD Capabilities and Operations subfield" | Accepted.  Text is revised as per suggestion.  **TGbe editor, please make the changes tagged by CID #12619 in 22/1487r3.** |
| 13276 | Binita Gupta | 35.3.6.2.1 | 425.52 | Need to provide specific requirements for the AP/AP MLD when a new affiliated Aps are added e.g. how are relevant fields updated in the Basic ML element – only Maximum Number Of Simultaneous Links field is captured in current text. Are there other fields which are updated in the Basic ML element? E.g. including per-STA Profile subelement for the new AP in the Basic ML element. Similarly capture specific details on updates to Reduced Neighbor Report element when affiliated Aps are added. Current text lacks detailed description. | As in comment | Revised  For the first point, no Per-STA Profile subelement is included in the Basic ML element for the new AP in Beacon and Probe Response (which is non-ML Probe Response), so no change needed. For the RNR, added text to specify that TBTT Information field includes MLD Parameters subfield.  **TGbe editor, please make the changes tagged by CID #13276 in 22/1487r3.** |
| 13678 | James Yee | 35.3.6.2.1 | 425.53 | The meaning of "new affiliated AP" is unclear. Does it mean that the added AP must be 'new' in the sense that no AP with its configuraton is allowed to have been affiliated with the AP MLD at any time in the past? This seems unnecessary restrictive. | Instead of "Adding new affiliated APs", this subcluse should be "Adding affiliated APs" and make similar changes in the subclause. | Revised  Agree that the ML Reconfiguration feature for adding APs to an MLD is intended to support both adding an AP which was never affiliated with the AP MLD as well as an AP which might have been affiliated with the AP MLD in past, got removed and now getting added again. The text is updated as per suggestion to remove ‘new’ and replace with ‘added’.  **TGbe editor, please make the changes tagged by CID #13678 in 22/1487r3.** |
| 13679 | James Yee | 35.3.6.2.1 | 425.53 | Given that the procedure of adding an affiliated AP is not instantaneous, if is not correct to say that "An AP MLD may add new affiliated APs (at) anytime". Further, if "Removing affiliated APs" is not described as being done at 'anytime', why describe Adding using 'anytime'?" | Remove 'anytime' from the description of the Adding affiliated APs procedure. | Revised.  Text is revised based on the suggestion.  **TGbe editor, please make the changes tagged by CID #13679 in 22/1487r3.** |
| 13680 | James Yee | 35.3.6.2.1 | 425.58 | The term ‘new co-hosted AP’ is not well defined and what does it have to do with this feature? | Please explain. | Revised  The co-hosted AP is referring to the new affiliated AP. The NOTE text is revised to clarify that the co-hosted AP as well as the nontransmitted BSSID is referring to the new affiliated AP.  **TGbe editor, please make the changes tagged by CID #13680 in 22/1487r3.** |
| 14016 | kaiying Lu | 35.3.6.2.1 | 425.50 | The removed affiliated APs may be easily added back. However, adding a new affiliated AP may not be easy. The subclause should limit to add the removed affiliated APs back only. | As in comment. | Rejected  The scope of ‘Adding new affiliated APs’ feature is to be able to add an AP to an AP MLD. There can be operational use cases where the added AP is a new AP (and not an already removed AP). Hence this feature should not restrict that the new AP should only be an AP which was removed earlier. |
| 14066 | Pooya Monajemi | 35.3.6.2.1 | 425.54 | Addition of a new AP in the Basic Multi-Link element will also include other information | Either add "including" before "by changing the Maximum...", or add the rest of the information added to the Basic Multi-Link element, or remove the parentheses' contents altogether. Also suggest adding the word "updating" after "shall be announced through" | Rejected  The text specifies the key information which needs to be updated in the Basic ML element when an affiliated AP is added. Comment fails to identify what other information should be included in the Basic Multi-Link element when an AP is added. For the second point, the text already identifies that aspect with “by changing…”. Hence, no change needed. |

**35.3.6.1 General**

***TGbe editor: Please modify the 1st paragraph in this subclause as shown below:***

*Multi-link (ML) reconfiguration*  (#11081) refers to a set of procedures  
through which an AP MLD can add one or more affiliated APs to the AP MLD, or remove one or more  
affiliated Aps from the AP MLD.

35.3.6.2.1 Adding (#13678)affiliated APs

***TGbe editor: Please modify existing text and add new paragraphs in this subclause as shown below:***

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

If an existing AP of the AP MLD where the affiliated AP is being added corresponds to a nontransmitted BSSID in a multiple BSSID set, then the AP that corresponds to the transmitted BSSID in the same multiple BSSID set shall follow the procedures in 35.3.4.4 (Multi-Link element usage rules in the context of discovery) and 35.3.4.1 (AP behavior) to announce the added affiliated AP through the Basic Multi-Link element and the Reduced Neighbor Report element (#12618).

For the added affiliated AP, rules defined in 35.3.4.4 (Multi-Link element usage rules in the context of discovery) and 35.3.4.1 (AP behavior) shall be followed for including Basic Multi-Link element and Reduced Neighbor Report element in the Beacon and Probe Response frames transmitted by the added AP when it is not a nontransmitted BSSID of a multiple BSSID set and for including those elements by the transmitted BSSID of a multiple BSSID set when the added AP is a nontransmitted BSSID of that multiple BSSID set (#12618).

(#12618)***TGbe editor: Please modify the NOTE in this subclause as shown below:***

NOTE—The MAC address of any added (#13678) affiliated AP which is a (#13680) co-hosted AP is assumed to be within the address space defined by the value of the Max Co-Hosted BSSID Indicator field (see 9.4.2.249 (HE Operation element) and 26.17.7 (Co-hosted BSSID set)). Similarly, the MAC address of any added(#13678) affiliated AP which is a (#13680) nontransmitted BSSID is assumed to be within the address space defined by the value of the MaxBSSID Indicator (see 9.4.2.45 (Multiple BSSID element) and 11.1.3.8 (Multiple BSSID procedure)).

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| ***CID*** | ***Commenter*** | ***Clause*** | ***Page*** | ***Comment*** | ***Proposed Change*** | ***Resolution*** |
| 10371 | Tomoko Adachi | 35.3.6.2.2 | 426.47 | If a non-AP MLD only has one setup link and if that link is removed by the AP MLD, then the affiliated AP should also transmit a Disassociation frame to the STA that is affiliated with the non-AP MLD. | Change "... to all associated STAs that are not affiliated with a non-AP MLD." to "... to all associated STAs that are not affiliated with a non-AP MLD and all associated STAs that are affiliated with a non-AP MLD and have single setup link." | Revised  Agree that AP MLD shall disassociate the non-AP MLDs which have only a single link setup with the removed AP after the affiliated AP is removed. Text is added to specify this behavior.  **TGbe editor, please make the changes tagged by CID #10371 in 22/1487r3.** |
| 11040 | Po-Kai Huang | 35.3.6.2.2 | 426.54 | About "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 STA associated with the removed affiliated AP shall delete any information maintained for that link." For non-AP MLD, it is possible that the only setup link is being removed. Add sentence to clarify that if there are no remaining setup links, then AP MLD just disassociate non-AP MLD. | Add "At the TBTT indicated by the value of the Delete Timer subfield in transmitted Reconfiguration Multi-Link elements, for an associated non-AP MLD, if the removed link is the only setup link, then AP MLD shall disassociate the non-AP MLD." | Revised  Agree in principle. Text is revised as per suggestion. Also added a requirement for the AP MLD to remove the affiliated AP at the TBTT indicated by the Delete Timer, which is missing in the current text.  **TGbe editor, please make the changes tagged by CID #11040 in 22/1487r3.** |
| 11041 | Po-Kai Huang | 35.3.6.2.2 | 426.54 | About “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 STA associated with the removed affiliated AP shall delete any information maintained for that link.” For non-AP MLD, it is possible that the only setup link is being removed. Add sentence to clarify that if there are no remaining setup links, then just disassociate from AP MLD. | Add “After a non-AP MLD deletes any information maintained for the removed link, if there is no more setup links, then the non-AP MLD shall disassociate the AP MLD.” At the end of the paragraph. | Revised  Agree in principle. Text is revised as per suggestion.  **TGbe editor, please make the changes tagged by CID #11041 in 22/1487r3.** |
| 11565 | Xiaofei Wang | 35.3.6.2.2. | 426.18 | this sentence seems to be missing some parts | complete the sentence | Revised  The sentence is revised to make it read well.  **TGbe editor, please make the changes tagged by CID #11565 in 22/1487r3.** |
| 12083 | Gabor Bajko | 35.3.6.2.2 | 426.18 | Replace "Additionally, in order to terminate the BSS a to-be-removed affiliated AP belongs to (see 6.3.12 (Stop)) ..." with "Before the affiliated AP is removed ..." |  | Revised  The SME behavior captured is specifically for terminating the BSS associated with the removed AP. hence keeping the text which specifies ‘to terminate the BSS’. The text is revised to make it read better.  **TGbe editor, please make the changes tagged by CID #11565 in 22/1487r3.** |
| 12081 | Gabor Bajko | 35.3.6.2.2 | 426.49 | "to transmit Disassociation frames to all associated STAs that are not affiliated with a non-AP MLD." Defeats the purpose. The AP wants to disassociate only the STAs which are associated with the removed AP. | Change the sentence to "to transmit Disassociation frames to STAs that are associated with the to-be-removed affiliated AP (and are not affiliated with the remaining Aps)" | Revised.  Agree in principle. Revised text to clarify that the text is referring to all non-AP STAs associated with the AP being removed that are not affiliated with a non-AP MLD.  **TGbe editor, please make the changes tagged by CID #12081 in 22/1487r6.** |
| 12084 | Gabor Bajko | 35.3.6.2.2 | 426.56 | Text says: "the SME of the affiliated STA associated with the removed affiliated AP shall delete any information maintained for that link." Is the affiliated AP removal a temporary or permanent action? If it is a temporary action, and the affiliated AP may come back, then the STAs would need to reassociate to re-establish the link with that AP, if the quoted text is followed by the STAs. Which may defeat the purpose of the procedure. If the STAs retain the information maintained for that link, then when the AP comes back, the link can be used again. | If AP removal is temporary, then it would make sense to reuse the established link after the AP comes back. The STAs would just need to retain the information pertaining for that link, but an indication for how long should they pertain it (when will the AP come back) would probably be needed. Potential enhancement could be to define an affiliated AP removal time and when the AP removal is not permanent, then advertise this removal time also. And delete the quoted sentence. | Rejected  The AP removal is meant to remove the AP from the AP MLD including removing all the related state information on the AP MLD and non-AP MLD. For a temporary AP removal, AP link disable and enable feature is defined in D2.1. |
| 12620 | Arik Klein | 35.3.6.2.2 | 426.18 | The procedure for terminating the BSS to which the to-be-removed affiliated AP belongs, includes Disassociation frame transmission and BSS termination activated by the SME (see 6.3.12). The timing for Disassociation frame transmission and BSS termination are defined using the values of the Disassociation timer and BSS Termination Duration that are included in the BSS Transition Management Request frame. What is the timing of Disassociation frame transmission and BSS termination in case that no association non-MLD STA support the BTM feature (so no BSS Transition Management Request frame is transmitted)? | Need to add rules for the timing of Disassociation frame transmission and BSS termination in case that no association non-MLD STA support the BTM feature (so no BSS Transition Management Request frame is transmitted). | Rejected  The Disassociation frame transmission is based on Disassociation Timer field which is defined based on Delete Time and not BSS Termination duration. See spec text below. No new rules needed.  “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.” |
| 12621 | Arik Klein | 35.3.6.2.2 | 426.48 | Correct the section number referenced in the following sentence:"...it shall follow the procedure in 11.3.6.8 (AP, AP MLD, or PCP disassociation initiation procedure) to transmit Disassociation frames.." | Replace 11.3.6.8 with 11.3.5.8 (based on REVme D1.0) | Rejected  The reference11.3.6.8 (AP, AP MLD, or PCP disassociation initiation procedure) is correct based on 11be D2.0 spec. |
| 12996 | Chunyu Hu | 35.3.6.2.2 | 426.18 | Does removing an AP always terminate the BSS? If not, then change "in order to terminate" to "if to terminate". May also want to put a note that, if none of associated STAs on the operating link of this to-be-removed AP, then no need to perform this step. | As in comment | Revised  Removing an AP also terminates the BSS associated with that AP. Text is also revised to specify behavior when BTM is transmitted by the affiliated AP and state that the behavior in bullet points applies only when BTM is transmitted.  Same resolution as 13279.  **TGbe editor, please make the changes tagged by CID #13279 in 22/1487r6.** |
| 13278 | Binita Gupta | 35.3.6.2.2 | 426.31 | If the Disassociation Timer field value points to a TBTT later than the TBTT pointed to by the value of the Delete Timer field of the Reconfiguration Multi-Link element in transmitted beacons, then how will the affiliated AP send the Disassociation frame, because the AP would have been removed at the TBTT pointed by the Delete Timer. Address this inconsistency. | As in comment | Revised  Revised text to clarify that the BSS termination is done after the Delete Timer when BTM is sent and added additional text to clarify associated behavior.  **TGbe editor, please make the changes tagged by CID #13278 in 22/1487r6.** |
| 13279 | Binita Gupta | 35.3.6.2.2 | 426.18 | Clarify if the procedures indicated by 1) , 2) and 3) apply for only non-AP STA not affiliated with a non-AP MLD or it applies for non-AP STA affiliated with a non-AP MLD as well. | As in comment | Revised  Revised text to specify when the BTM is sent and also that the procedure indicated applies only when the affiliated AP transmits the BTM. Added some additional text to clarify associated behavior. Added text to specify that the BTM sent by the affiliated AP being removed may provide preference for other AP MLDs to associate with for single link non-AP MLDs.  **TGbe editor, please make the changes tagged by CID #13279 in 22/1487r6.** |
| 11569 | Xiaofei Wang | 35.3.6.2.2 | 426.62 | In the example, given in Note on P427L62, if STA2 is no longer affiliated the non-AP MLD, then would STA2 adapt the MLD MAC address for the non-AP MLD according to the rules on P405L34? | As in comment | Revised  NOTE is simplified to clarify that when an affiliated AP is removed, the link between the removed AP and the corresponding non-AP STA affiliated with the non-AP MLD is removed. The non-AP STA which does not have any setup link may or may not remain affiliated  with the non-AP MLD based on the value of *dot11MultiLinkActivated* MIB, setting of which is independent of the link removal.  **TGbe editor, please make the changes tagged by CID #11569 in 22/1487r3.** |
| 12997 | Chunyu Hu | 35.3.6.2.2 | 416.59 | The "with the AP MLD" in "An AP MLD with two Aps affiliated with the AP MLD" is redundant. | Remove the redundant phrase. | Revised  Text is revised per suggestion.  **TGbe editor, please make the changes tagged by CID #12997 in 22/1487r3.** |
| 12998 | Chunyu Hu | 35.3.6.2.2 | 426.60 | It’s the removal procedure rather than the AP MLD that results in ... | Change the sentence "the AP MLD results in ..." to "after the remove procedure is complete, there is only one AP left being affiliated with the AP MLD" | Revised  Text is revised to simplify.  **TGbe editor, please make the changes tagged by CID #12998 in 22/1487r3.** |
| 13681 | James Yee | 35.3.6.2.2 | 426.59 | The Note can be more succintly stated as: "An AP MLD with two affiliated APs that removes one of its affiliated APs will have only one affiliated AP after the removal. Further, a non-AP MLD that is associated with the AP MLD prior to the removal will have only one affiliated non-AP STA after the affiliated AP of the associated AP MLD is removed.", but I also wonder what is the point of including such a note. What is the purpose? | Simplify the note or remove it altogether. | Revised  Revised NOTE text to simplify it.  **TGbe editor, please make the changes tagged by CID #13681 in 22/1487r3.** |
| 10718 | Xiandong Dong | 35.3.6.2.2 | 427.01 | what does the word "capabilities" mean, please clarify | as in the comment | Revised  The text is revised to add references to relevant clauses related to NSTR and STR capabilities and operations.  **TGbe editor, please make the changes tagged by CID #10718 in 22/1487r4.** |
| 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 | TBD |
| 12219 | Stephen McCann | 35.3.6.2.2 | 427.01 | An MLD should not be constrained to have a STR link pair. It should be able to have as many STR links as it wishes. Therefore this sentence only applies to NSTR link pairs. | Change the cited sentence to “If an AP affiliated with an AP MLD is removed, any NSTR requirements and capabilities that correspond to a link pair that includes the link corresponding to the removed AP shall no longer apply.” | Rejected  The text is only referring to STR requirements and capabilities involving the removed link. The MLD can certainly have other STR link pairs. |
| 13280 | Binita Gupta | 35.3.6.2.2 | 427.01 | Clarify specifically that eMLSR and eMLMR capabilities no longer apply if the removed AP is part of an EMLSR or eMLMR link pairs. | As in comment | Revised  Agree in principle. Added text to specify that the link corresponding to the removed AP shall be removed from the EMLSR links and/or EMLMR links for non-AP MLDs.  **TGbe editor, please make the changes tagged by CID #13280 in 22/1487r4.** |
| 14018 | kaiying Lu | 35.3.6.2.2 | 427.01 | If an AP affiliated with an AP MLD is removed, EMLSR requirements and capabilities corresponding to the removed AP shall no longer apply. | As in comment. | Revised  Agree in principle. Added text to specify that the link corresponding to the removed AP shall be removed from the EMLSR links and/or EMLMR links for non-AP MLDs.  **TGbe editor, please make the changes tagged by CID #14018 in 22/1487r4.** |
| 14019 | kaiying Lu | 35.3.6.2.1 | 425.55 | After removing an affiliated AP, it would be beneficial to give the AP MLD a choice to keep advertising the removed AP to be added back in the future. | Clarify it. | Rejected  Such use cases where an AP is temporarily removed can be handled by the AP disable/enable feature added in D2.1. No change needed. |
| 11429 | Gaurang Naik | 35.3.6.2.2 | 426.07 | When an AP is removed, other Aps of the AP MLD must stop advertising the removed AP in their respective RNR elements in Beacon and Probe Response frames. | Add a note saying “Once an AP affiliated with an AP MLD is removed, the TBTT Information field corresponding to that AP is not included by the other Aps affiliated with the same AP MLD or by the transmitted BSSIDs in the same multiple BSSID set as the APs affiliated with the same AP MLD”. | Revised  Agree in principle. Text is added as per suggestion.  **TGbe editor, please make the changes tagged by CID #11429 in 22/1487r3.** |
| 14020 | kaiying Lu | 35.3.6.2.2 | 426.01 | After removing an affiliated AP, clarify whether the TBTT Information field corresponding to the removed AP in the RNR element is removed or not. | As in comment. | Revised  Added text to clarify that removed AP is not advertised in the RNR.  **TGbe editor, please make the changes tagged by CID #14020 in 22/1487r3.** |
| 12082 | Gabor Bajko | 35.3.6.2.2 | 426.16 | The "MLD max idle period" is not defined, but whether it ends up being defined or replaced with "BSS Max Idle Period", it will have a relation with the BSS Max Idle period, which is not a unique value per MLD, as 35.3.12.3 says: "An AP MLD may provide different BSS Max Idle Period values for different non-AP MLDs". Thus, the initial value for the Delete Timer subfield should perhaps be the largest max idle period agreed by the MLD and all non-AP MLDs. |  | Revised  It was discussed in the group that the MLD max idle period can be set quite long for certain IoT non-AP MLDs (e.g. in hours), setting Delete Timer to be larger than the maximum of all the MLD max idle period is not desirable when such devices are present. The text is revised to specify that the Delete Timer value should provide sufficiently large enough time to announce the removal of affiliated AP before the AP is removed.  **TGbe editor, please make the changes tagged by CID #12082 in 22/1487r6.** |
| 14017 | kaiying Lu | 35.3.6.2.2 | 426.16 | The MLD max idle period is non-AP MLD specific. The Delete Timer for removing an AP is for all assoicated STAs with that AP. The initial value of the Delete Timer subfield shall be longer than any values of MLD max idle period of all affiliated non-AP MLDs. | As in comment. | Revised  It was discussed in the group that the MLD max idle period can be set quite long for certain IoT non-AP MLDs (e.g. in hours), setting Delete Timer to be larger than the maximum of all the MLD max idle period is not desirable when such devices are present. The text is revised to specify that the Delete Timer value should provide sufficiently large enough time to announce the removal of affiliated AP before the AP is removed.  **TGbe editor, please make the changes tagged by CID #14017 in 22/1487r6.** |

**Discussion for CIDs 13278, 13279 and 12996:**

These CIDs ask for further clarification on procedures involved in AP removal process in term of when the AP is removed from the AP MLD, when the BSS is terminated, when BTM Request frames are transmitted and when Disassociation frames are transmitted as part of the entire process.

With the Reconfiguration ML element announcing that the AP will be removed at the Delete Timer, no separate disassociation frames are needed for the non-AP MLDs which have a single link with the removed AP, since such non-AP MLDs are considered to be disassociated at Delete Timer.

For associated non-AP STAs not affiliated with a non-AP MLD (legacy non-AP STAs), disassociation frame(s) need to be sent by the AP to disassociate these STAs before terminating the BSS per baseline. The disassociation frame can be sent broadcast or individually addressed. If it is sent broadcast and gets sent before the Delete Timer, it will also be received by the non-AP MLDs. This will cause all the non-AP MLDs to get disassociated with the AP MLD per current spec text behavior which specifies that disassociation frame received by the non-AP MLD disassociates the MLD. This will be a wrong outcome for AP removal, since non-AP MLDs may have other setup links and should continue to operate on those links. Also, the group did not reach consensus on making changes to legacy disassociation frame to have a different interpretation for non-AP MLDs at the time of CR doc 21/0534. Given that, and to avoid the wrong outcome of disassociating MLDs when an AP is removed, the disassociation frames for legacy non-AP STAs are sent after the Delete Timer.

Further, assuming some option for a broadcast disassociation frame to indicate that it corresponds to an AP removal, it is still not desired that non-AP MLDs receive any disassociation frames before the Delete Timer, because it will result in non-AP MLDs with a single setup link to the get disassociated before the Delete Timer and non-AP MLDs with multiple links to remove the AP before the Delete Timer. This is not a correct behavior per Reconfiguration ML element, since expected reconfiguration behavior is that the non-AP MLDs should consider AP to be removed only at the Delete Timer.

Hence to ensure correct outcome from ML reconfiguration AP removal process, any disassociation frame sent for legacy non-AP STAs are transmitted after the Delete Timer.

Sending BTM is required when there are legacy STAs associated. When there are no legacy STAs BTM should be optional to send for EHT STAs since Reconfiguration ML element is providing information needed for AP removal.

If transmitted, the BTM can be sent before the Delete Timer and it includes a Disassociation Timer field which is after the Delete Timer and has the BSS Termination Included and Link Removal Imminent subfield set to 1. The BTM will be received by the non-AP MLDs as well and will indicate that the AP/BSS is being terminated. Per CR doc 22/1228r2, for non-AP MLDs which have only a single link with the AP being removed, this BTM indicates that the non-AP MLD will be disassociated. For non-AP MLDs which have multiple links with the AP MLD, this BTM indicates that the non-AP MLD will remain associated on remaining links. For single link non-AP MLDs, the BTM can provide information for preferred AP MLDs to associate with per clause 35.3.25 (BSS transition management for MLDs).

Table below captures sequence of operations for two scenarios. For scenario 2, there are two cases - with and w/o BTM sent.

* Scenario 1: AP being removed has legacy STAs associated
* Scenario 2: AP being removed does not have any legacy STAs associated
  + 2a: BTM is sent
  + 2b: BTM is not sent

Legacy STAs – refers to non-AP STAs which are not affiliated with a non-AP MLD.

|  |  |
| --- | --- |
| **Scenario 1** | **Scenario 2** |
| AP being removed has legacy STAs associated  Sequence of operation:   * BTM is sent before Delete Timer. Has Disassociation Timer set to a value > Delete Timer. BTM may include information on other AP MLDs for association. * AP MLD starts a disassociation timer based on the value for this field in the BTM. * AP MLD disassociates single link non-AP MLDs with only one link to the AP being removed (if any) at the Delete Timer. Note - AP MLD does not send any disassociation frames for this. * AP MLD removes the AP from the MLD at the Delete Timer. * AP sends disassociation frames at the Disassociation Timer for legacy STAs. * SME terminates the BSS at the BSS Termination TSF (> Disassociation Timer) indicated in BTM. | AP being removed does not have any legacy STAs associated  Sequence of operation:  Scenario 2a:   * BTM is sent with similar setting of subfields as for scenario 1. BTM may include information on other AP MLDs for association. * AP MLD starts a disassociation timer based on the value for this field in the BTM. * AP MLD disassociates single link non-AP MLDs with only one link to the AP being removed (if any) at the Delete Timer. Note - AP MLD does not send any disassociation frames for this. * AP MLD removes the AP from the MLD at the Delete Timer * Since no other non-AP STAs are associated with the AP, SME does not send any disassociation frames when the disassociation timer expires. * SME terminates the BSS at the BSS Termination TSF.   Note: AP behavior for Scenario 2a is kept similar to scenario 1 (both have BTM sent) to keep AP logic simple and consistent across two scenarios.  Scenario 2b:   * No BTM is sent. * AP MLD disassociates single link non-AP MLDs with only one link to the AP being removed (if any) at the Delete Timer. Note - AP MLD does not send any disassociation frames for this. * AP MLD removes the AP from the MLD at the Delete Timer * Since no other non-AP STAs are associated with the AP, no disassociation frames are sent. * SME terminates the BSS at the Delete Timer. |

**35.3.6.2.2 Removing affiliated APs**

***TGbe editor: Please modify the 2nd paragraph in this subclause as shown below:***

For each affiliated AP that the AP MLD intends to remove, the Reconfiguration Multi-Link element shall include a Per-STA Profile subelement with the subfields of the Per-STA Control field set as following: The Link ID subfield shall identify the AP, the Complete Profile subfield shall be set to 0, the Delete Timer Present subfield shall be set to 1, and the Delete Timer subfield shall be set to the number of TBTTs of that affiliated AP before it is removed [#14015,13901]or for NSTR mobile AP MLD the Delete Timer subfield shall be set to the number of the TBTTs of the AP operating on the primary link. The initial value of the Delete Timer subfield (#12082) (#14017) should point to a TBTT value that provides sufficiently large enough time to announce the removal of affiliated AP such that all associated non-AP MLDs including the ones in power save mode have the opportunity to receive Reconfiguration Multi-Link element at least once before the AP is removed . The Per-STA Profile subelement shall not include a STA Profile field.

***TGbe editor: Please add new paragraphs and modify the 3rd paragraph in this subclause as shown below:***

(#13278) To remove an affiliated AP, the SME of the AP MLD shall remove the AP from the AP MLD and terminate the BSS corresponding to the affiliated AP.

(#13279) The affiliated AP may transmit BSS Transition Management Request frame(s) to notify of BSS termination to associated non-AP STAs that support BTM and are not affiliated with a non-AP MLD or to notify of BSS termination to non-AP MLDs associated with the AP MLD of the affiliated AP. The affiliated AP shall transmit BSS Transition Management Request frame(s) if there are associated non-AP STAs that are not affiliated with a non-AP MLD and that support BTM to notify such non-AP STAs of BSS termination.

(#13279) If the affiliated AP being removed transmits BSS Transition Management Request frame(s) to notify termination of the BSS corresponding to (#11565) the affiliated AP (#11565, 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 35.3.25 (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; 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.

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

It shall start a disassociation timer with the initial value set to the value of the Disassociation Timer field, and shall decrement the timer by one after transmitting each Beacon frame, until the timer has the value of 0. The Disassociation Timer field in all subsequent transmitted BSS Transition Management Request frames shall be set to the value of this timer.

Once the disassociation timer reaches a value of 0, and before the TSF indicated by the BSS Termination TSF field, it shall follow the procedure in 11.3.6.8 (AP, AP MLD, or PCP disassociation initiation procedure) to transmit (#12081)Disassociation frame(s) to all non-AP STAs associated with the AP being removed that are not affiliated with a non-AP MLD. The (#13278) SME of the affiliated AP shall not transmit Disassociation frames until the disassociation timer has a value of 0.

(#13278) It shall terminate the BSS corresponding to the affiliated AP at the time indicated by the BSS Termination TSF field.

[#14015]NOTE 1— Since the non-AP STAs cannot discover or associate with the AP affiliated with NSTR mobile AP MLD operating on the nonprimary link, the NSTR mobile AP MLD does not use the BTM procedure to disassociate non-AP STAs when it is removing the AP operating on the nonprimary link

***TGbe editor: Please add following paragraphs after 3rd paragraph in this subclause:***

(#13279) A BSS Transition Management Request frame transmitted by the affiliated AP that is being removed may provide preference for other AP MLDs to associate with as per 35.3.25 (BSS transition management for MLDs) for the non-AP MLDs which have a single setup link with the AP being removed.

(#13279) When a non-AP STA affiliated with a non-AP MLD receives a BSS Transition Management Request frame from an AP with BSS Termination Included subfield and Link Removal Imminent subfield equal to 1, the non-AP MLD shall interpret the BTM to indicate that the BSS corresponding to the AP is being terminated

* and the non-AP MLD will be disassociated from the AP MLD if it has only a single setup link with the AP MLD on the link corresponding to the AP being removed,
* and the non-AP MLD will remain associated with the AP MLD if it has more than one setup links with the AP MLD.

(#13278) When the affiliated AP being removed is not transmitting BSS Transition Management Request frame(s) to notify the termination of the corresponding BSS, the SME of the affiliated AP shall terminate the corresponding BSS at the Delete Timer.

***TGbe editor: Please modify 4th paragraph (At the TBTT indicated …) in this subclause as shown below:***

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 non-AP (#11041) STA associated with the removed affiliated AP shall delete any information  
maintained for that link. After a non-AP MLD deletes any information maintained for the link corresponding to the removed AP, if there are no other setup links with the AP MLD, then the non-AP MLD shall (#13278) consider that it has been disassociated from the AP MLD (#11041) (#13278) and shall delete MLD association information.

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| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Clause | Page | Comment | Proposed Change | Resolution |
| 12080 | Gabor Bajko | 35.3.6.2.2 | 426.16 | There is no "MLD max idle period" defined in 11be, only an "MLD max idle period management" section, which refers to the use of the BSS Max Idle Period. Either define the "MLD max idle period" or replace it with "BSS Max Idle Period" (with the additional 3 instances of it in section 6) | as in comment | Revised  Agree in principle. The text is revised to define MLD max idle period and clarification added wherever needed.  **TGbe editor, please make the changes tagged by CID #12080 in 22/1487r6** |

***TGbe editor: Please modify text in following subclauses as shown below:***

**35.3.12.3 MLD max idle period management**(#12080) During multi-link setup, if the AP affiliated with an (#13617)AP MLD includes a BSS Max Idle Period element in the (Re)Association Response frame sent to a non-AP STA affiliated with a non-AP MLD, then the value carried in the Max Idle Period field is applied at the MLD level. When the Max Idle Period value in the BSS Max Idle Period element is applied at the MLD level, it is referred to as the MLD max idle period. The AP MLD shall use this timeout value for making disassociation decisions for the non-AP MLD to which the (Re)Association Response frame is sent. An AP MLD may provide different BSS Max Idle Period values for different non-AP MLDs.

**6.3.7.3 MLME-ASSOCIATE.confirm**

**6.3.7.3.2 Semantics of the service primitive**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | As defined in BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | (#10270)For non-MLO, indicates the BSS max idle period parameters of the AP or PCP. For MLO, indicates the MLD max idle period parameter parameter (#12080) specified by  the AP MLD to the non-AP MLD. This parameter is present if dot11WirelessManagementImplemented is true and is not present otherwise. |

**6.3.7.5 MLME-ASSOCIATE.response**

**6.3.7.5.2 Semantics of the service primitive**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | (#10270)For non-MLO, indicates the BSS max idle period parameters of the AP or PCP. For MLO, indicates the MLD max idle period parameter (#12080) specified by the AP MLD to the non-AP MLD. This parameter is present if dot11WirelessManagementImplemented is true or dot11S1GOptionImplemented is true; otherwise not present. |

**6.3.8.3 MLME-REASSOCIATE.confirm**

**6.3.8.3.2 Semantics of the service primitive**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | (#10270)For non-MLO, indicates the BSS max idle period parameters of the AP or PCP. For MLO, indicates the MLD max idle period parameter (#12080) specified by the AP MLD to the non-AP MLD. This parameter is present if dot11WirelessManagementImplemented is true or dot11S1GOptionImplemented is true; otherwise not present. |

**6.3.8.5 MLME-REASSOCIATE.response**

**6.3.8.5.2 Semantics of the service primitive**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | (#10270)For non-MLO, indicates the BSS max idle period parameters of the AP or PCP. For MLO, indicates the MLD max idle period parameter (#12080) specified by the AP MLD to the non-AP MLD. This parameter is present if dot11WirelessManagementImplemented is true or dot11S1GOptionImplemented is true; otherwise not present. |