IEEE P802.11
Wireless LANs

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| LB271 CR for ML Reconfiguration Add Delete Link  |
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Abstract

This submission proposes resolutions for following 21 CIDs received for TGbe LB271:

15985 15028 15147 15638 15844 15987 16094 16116 16155

16156 16172 16173 16416 16478 17885 18116 18117 18187 18274

18322 16443

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: Editorial updates
* Rev 2: Clarified that AP MLD does not send unsolicited Link Reconfiguration frame to a non-AP MLD.
* Rev 3: Added procedure for multi-link reconfiguration recommendation by the AP MLD. Clarified that the non-AP MLD can include both add and delete link in the same request frame. Changes are highlighted in blue. Deferred CID 15613.

***TGbe editor: The baseline for this document is 11be D3.1.***

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*** | ***Clause*** | ***Page*** | ***Comment*** | ***Proposed Change*** | ***Resolution*** |
| 15985 | 35.3.6.1 | 510.08 | Current draft spec defines ML reconfiguration operations from an AP MLD perspective and enables AP MLD to dynamically add or delete an AP to the AP MLD. Spec draft is missing support for similar multi-link reconfiguration operations from a non-AP MLD perspective, which can enable a non-AP MLD to dynamically add or delete a link to its ML setup without requiring to do a reassociation. Such a mechanism is desired for a non-AP MLD to take full benefit of MLO without negatively impacting its operation and overall performance when it needs to add or delete links from its ML setup. | Define ML reconfiguration operations for non-AP MLD to enable a non-AP MLD to dynamically add or delete links to its ML setup. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.Motion 521 on the CR doc 22/1709r6 proposing ML Reconfiguration Add/Delete link procedure in the last round had strong group support (74Y, 37 N, 15 A)**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 15028 | 35.3.5 | 505.20 | There are many use cases where a STA needs to add a link that could not be added at original time of association (e.g. because radio resource was unavailable), or after AP makes a new link available.Use of reassociation mechanism results in poor user experience due to state resets, frame exchange delays, and in general because SA Query comeback procedure will need to be initiated (since PMF is active). | Define add/remove link mechanism that does not require reassociation (or disassociation+association).Existing reviewed contributions can be used as the basis | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 15147 | 35.3.6 | 510.04 | Since AP may add or remove link for various purpose, there is an undoubted benefits for the client to also add or remove links without going to reasocaition. | suggest to adopt 11-22-1709r6 | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| ~~15613~~ | ~~35.3.6~~ | ~~510.03~~ | ~~Seamless link-set change procedures should be defined for the non-AP MLD.~~ | ~~The ML reconfiguration procedure should be extended for the non-AP MLD.~~ | ~~Revised~~~~Agree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.~~**~~TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.~~** |
| 15638 | 35.3.6.1 | 510.08 | Multi-Link reconfiguration only considers link adding/deleting of AP side. There is a case that non-AP side wants to add a link after detecting that AP side is adding a link. Also, there is a case that non-AP side wants to remove part of links according to the non-AP conditions such as communication quality becoming poor for a particular link, remaining battery capacity becoming low and so on. Link adding/removing of non-AP side should also be considered. | Add link adding/removing procedure of Non-AP side in 35.3.6 Multi-Link reconfiguration. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 15844 | 35.3.6 | 0.00 | A non-AP MLD should be able to add or delete links to its ML setupwithout having to do reassociation. Reassociation is disruptive to MLO operation as it leads to loss of state/context and disrupting of traffic delivery | Method for non-AP MLD to dynamically add or delete links should be defined for ML setup | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 15987 | 35.3.6.2.1 | 510.17 | When a new affiliated AP is added to an AP MLD, a non-AP MLD should be able to request adding a setup link with the new AP to its ML setup to take benefit of the new link without tearing down existing set of links and requiring to do a reassociation. A reassociation teardowns all the association, security, BA and other context already established and is very disruptive to non-AP MLD operation and will impact its performance as well as network performance because it results in signaling overhead to establish all the context between peer MLDs again. | Define a mechanism to enable a non-AP MLD to dynamically add a link to its ML setup, including setting up group keys (GTK/IGTK/BIGTK) for the new link, with a new AP after that AP was added to the AP MLD. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16094 | 35.3.6 | 510.03 | We need a mechanism to allow a non-AP MLD to add or delete one or more link(s) without the teardown of exisitng multi-link setup, i.e., just modificaitons of exisiting multi-link setup, which is efficient since MLD-level parameters/agreements are maintained and overhead of frame exchange is reudced | As in the comment | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16116 | 35.3.6.1 | 510.06 | There is an overhead for a non-AP STA to perform a reassociation/resetup to add or remove links. | Add link adding/removing procedure of Non-AP side in 35.3.6 Multi-Link reconfiguration. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16155 | 35.3.6.1 | 510.08 | It seems that the means of adding links by non-AP MLD is not defined.Non-AP MLD may want to add links after detecting that AP MLD add links. | Add a procedure means for non-AP MLD to add links to 35.3.6 Multi-Link reconfiguration. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16156 | 35.3.6.1 | 510.08 | It seems that the means of removing links by non-AP MLD is not defined.Non-AP MLD may want to remove links in several situation. | Add a procedure means for non-AP MLD to remove part of links to 35.3.6 Multi-Link reconfiguration. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16172 | 35.3.6.2.1 | 510.14 | Once an associated AP MLD adds new affiliated APs, it is natural that some of its associated non-AP MLDs would also setup new links with the newly added APs; the addition of the new links should be made possible without having to tear down the existing ML Setup. | Expand the ML reconfiguration procedure to also allow non-AP MLDs to add new links to its existing ML setup (i.e., without having to tear down the existing ML Setup and re-performing a new ML Setup including the links with the newly added APs). | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16173 | 35.3.6.2.2 | 510.46 | Similar to the removal of affiliated APs by an AP MLD, a non-AP MLD should also be able to remove its one or more affiliated non-APs without having to tear down the existing ML Setup. One reason for it (e.g., compared to disabling a link through TID-link-mapping, or PS mechanisms) could be simpler link management etc. | Expand the ML reconfiguration procedure to also allow non-AP MLDs to remove affiliated non-AP STAs (i.e., without having to tear down the existing ML Setup and re-performing a new ML Setup excluding the links). | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16416 | 35.3.6 Multi-Link reconfiguration | 510.04 | Suppose a use case : if a non-AP MLD has set up links with an AP MLD and later AP MLD adds an AP, non-AP needs to have more links for data transmission and wants to add the new link corresponding to the added AP. In current specification, in order to have more setup links the non-AP MLD has to be firstly disassociated with the AP MLD and then (re)setup the links, which would cause the service interruption. Therefore Multi-Link reconfiguration needs to include the addition or deletion of one or more links between a non-AP MLD and AP MLD on the condition that the non-AP MLD has setup more than one link. | The mechanism to add or delete one ore more links between a non-AP MLD and AP MLD on the condition that the non-AP MLD has set up more than one link and is associated with the AP MLD needs to be specified. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16478 | 35.3.6.1 | 510.08 | The ML Reconfiguration shall also include a set of procedures through which a non-AP MLD can add one or more affiliated non-AP STA to an existing ML setup with its associated AP MLD as well as remove on or more affiliated non-AP STA from an existing ML setup with its associated AP MLD | Add subclauses to support:1. Adding one or more affiliated non-AP STA to an existing ML setup with its associated AP MLD2. Removing on or more affiliated non-AP STA from an existing ML setup with its associated AP MLD | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 17885 | 35.3.6.2.1 | 510.14 | The text that allows non-AP MLD to add the newly added AP to its existing ML setup with the AP MLD is missing. | Please add rules for how a non-AP MLD can add the newly added AP to its existing ML setup with the AP MLD without requiring reassociation. | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 18116 | 35.3.6.2.1 | 510.14 | The spec needs to provide guidance on how a non-AP MLD that has performed ML setup with an AP MLD can seamlessly (i.e., without requiring reassociation) include an AP, that was recently added as an affiliated AP to the AP MLD, to its existing ML setup. | As in comment | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 18117 | 35.3.6.2.2 | 510.46 | Standard must provide a mechanism for a non-AP MLD to remove a link from its ML setup without requiring reassociation. Mechanisms such as power save or T2LM are temporary and still block resources (such as memory and descriptors) at both MLDs. A removal procedure will provide a clean mechanism to release these resources. | As in comment | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 18187 | 35.3.6.2.1 | 510.14 | On adding an AP to the existing AP MLD all the following processes happen: the BA agreement gets extended to that link, non-default TID-to-Link mapping may take place, a new GTK corresponding to the new link is conveyed to the non-AP MLD. Add normative text for all these cases. Additionally these processes are inherently disruptive on current ongoing traffic flows and need to happen seamlessly, i.e. without breaking existing AP MLD and non-AP MLD association. | As in comment | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 18274 | 35.3.6.2.2 | 511.47 | A non-AP MLD should be able to use Reconfiguration ML element to remove a non-AP STA. This procedure should be specified as well. | as in comment | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 18322 | 35.3 | 479.01 | When the AP MLD adds back a new AP, how the non-AP MLD re-enables the corresponding link is not clear. | Please clarify | RevisedAgree in principle. New ML reconfiguration action frame messaging and associated procedures are defined to add and delete links and recommend links to the ML setup of a non-AP MLD.**TGbe editor, please make the changes tagged by CID #15985 in 11-23/0765r3.** |
| 16443 | 9.4.2.312.4 | 366.53 | The operation Update Type field is always present and can only be set to 0 for performing the update. In the regular usage of ML Reconfiguration element, this update is not used. | either make that Operation Update Type be present or not depending on a presence bit. Or add a new entry in the field to define a mode where there is no Updates. For Backward compatibility reasons, this entry should be entry 0. Then move Operation Parameter Update entry to value 1. | RevisedAgree in principle. Added a new entry with value 0 to indicate AP removal for the Operation Update Type field.**TGbe editor, please make the changes tagged by CID #16433 in 11-23/0765r3.** |

**Discussion:**

Current ML reconfiguration operations are only defined from the AP MLD perspective, enabling an AP MLD to dynamically add or remove affiliated APs. Support for similar ML reconfiguration operations is missing from a non-AP MLD perspective, to enable a non-AP MLD to seamlessly add or delete links to its ML setup, without requiring non-AP MLD to do a reassociation (i.e., perform multi-link (re)setup). For example, a non-AP MLD may want to add a new link to its ML setup when the AP MLD it is associated with adds a new affiliated AP. Similarly, a non-AP MLD may want to delete a link it is no longer using (for whichever reason) from its ML setup to free up resources and simplify link management.

A non-AP MLD should be able to add and delete links seamless to its ML setup without requiring it to perform reassociation with the AP MLD, since reassociation is quite disruptive and tears down exiting association, security, BA and other contexts between the AP MLD and the non-AP MLD, which disrupts ongoing traffic on established setup links and causes additional network overhead to setup all the contexts again. Hence, a procedure needs to be defined for the non-AP MLD to seamlessly add or delete links to its ML setup. In addition, an AP MLD may want to suggest which link(s) to add and/or delete in the ML setup to associated non-AP MLD(s). For example, when a new affiliated AP is added to the AP MLD, it may suggest its associated non-AP MLD(s) to add that link to its ML setup.

This CR doc proposes to adopt resolutions proposed in 11-22/1709r6 as baseline for supporting ML reconfiguration add and delete link operations. It also proposes enhancement for an AP MLD to recommend which link(s) to add to ML setup to individual non-AP MLD(s).

Specifically, it proposes following:

* Defines new protected EHT action frames for Link Reconfiguration Request/Response messages to support seamlessly adding link(s) to the ML setup of a non-AP MLD and/or deleting link(s) from the ML setup of a non-AP MLD without requiring (Re)association between the peer MLDs. The addition and deletion of link(s) to the multi-link setup of a non-AP MLD is initiated by that non-AP MLD.
* Reconfiguration ML element is enhanced to support seamless add/delete link(s) to ML setup.
* A new capability bit ‘Link Reconfiguration Operation Support’ is defined to indicate the support for seamless link reconfiguration for add/delete link(s).
* A single Link Reconfiguration Request frame can indicate both addition and deletion of links to the ML setup for a non-AP MLD. The AP MLD may accept the request partially or fully and it indicates the resulting status accordingly in the Link Reconfiguration Response frame.
* The Link Reconfiguration Response provides GTK/IGTK/BIGTK for any newly added links to the ML setup. The MLO KDEs for GTK/IGTK/BIGTK are sent in the response frame. No additional message exchanges are needed to establish group keys for the newly added links.
* A new Link Reconfiguration Notify frame is defined for the AP MLD to recommend which links to add and/or delete to the ML setup of an associated non-AP MLD.

**9.4.2.312.2.3 Common Info field of the Basic Multi-Link element**

***TGbe editor: Please update Figure 9-1002l as shown below (#15985):***

The format of the MLD Capabilities and Operations subfield is defined in Figure 9-1002l (MLD Capabilities and Operations subfield format(#14054)).

 B0 B3 B4 B5 B6 B7 B11 B12 B13 B14 B15

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MaximumNumber Of Simultaneous Links | SRS Support | TID-To-LinkMapping Negotiation Support | FrequencySeparation For STR/AP MLD Type Indication | AAR Support | Link Reconfiguration Operation Support | Reserved |

Bits: 4 1 2 5 1 1 2

**Figure 9-1002l—MLD Capabilities and Operations subfield format(#14054)**

The subfields of the MLD Capabilities and Operations subfield are defined in [Table 9-401i (Subfields of the](file:///C%3A%5CUsers%5Cbinitagupta%5COneDrive%20-%20Facebook%5CDocuments%5CWork%20Projects%5CIEEE%20802.11%5CTGbe%5CD2.0%20Review%5CD2.2%20docs%5CTGbe_Cl_09.doc#bookmark157) [MLD Capabilities and Operations field)](file:///C%3A%5CUsers%5Cbinitagupta%5COneDrive%20-%20Facebook%5CDocuments%5CWork%20Projects%5CIEEE%20802.11%5CTGbe%5CD2.0%20Review%5CD2.2%20docs%5CTGbe_Cl_09.doc#bookmark157).

***TGbe editor: Please add a new row to the Table 9-401i as shown below (#15985):***

 **Table 9-401i—Subfields of the MLD Capabilities and Operations subfield**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| … | … | … |
| Link Reconfiguration Operation Support | Indicates support for multi-link reconfiguration operations for adding a link and deleting a link to the ML setup of a non-AP MLD and support for recommendation for multi-link reconfiguration to the ML setup of a non-AP MLD. | Set to 1 if dot11EHTLinkReconfigurationOperationActivated equal to true Set to 0 otherwise.See 35.3.6.3 (Multi-link reconfiguration for adding or deleting links to ML setup) |
|  |

***TGbe editor: Please update this subclause as shown below (#15985):***

* + - 1. **.4 Reconfiguration Multi-Link element**

The Reconfiguration Multi-Link element is used to announce an ML reconfiguration operation by the AP MLD (see 35.3.6.2 (Adding affiliated APs) and 35.3.6.3 (Removing affiliated APs)). This element is also used to initiate multi-link reconfiguration operation for adding or deleting links to its existing ML setup by the non-AP MLD (see 35.3.6.4 (Multi-link reconfiguration to the ML setup)) and to provide recommendation for multi-link reconfiguration by the AP MLD to its associated non-AP MLD(s) (see 35.3.6.5 (AP MLD recommendation for multi-link reconfiguration)).

The format of the Presence Bitmap subfield of the Reconfiguration Multi-Link element is defined in [Figure 9-1002u (Presence Bitmap subfield of the Reconfiguration Multi-Link element format)](#bookmark165).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B11 |
|  | MLD MAC Address Present | EML Capabilities Present | MLD Capabilities and Operations Present | Reserved |
| Bits | 1 | 1 | 1 | 9 |

**Figure 9-1002u—Presence Bitmap subfield of the Reconfiguration Multi-Link element format**

The MLD MAC Address Present subfield is set to 1 if the MLD MAC Address field is present in the Common Info field. Otherwise, the subfield is set to 0.The EML Capabilities Present subfield is set to 1 if the EML Capabilities subfield is present in the Common
Info field. Otherwise, the EML Capabilities Present subfield is set to 0.

The MLD Capabilities and Operations Present subfield is set to 1 if the MLD Capabilities and Operations
subfield is present in the Common Info field. Otherwise, the MLD Capabilities and Operations Present subfield is set to 0.

The format of the Common Info field of the Reconfiguration Multi-Link element is defined in Figure 9-1002v (Common Info field of the Reconfiguration Multi-Link element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Common Info Length | MLD MAC Address | EML Capabilities | MLD Capabilities and Operations |
| Octets | 1 | 0 or 6 | 0 or 2 | 0 or 2 |

**Figure 9-1002v—Common Info field of the Reconfiguration Multi-Link element format**

The Common Info Length subfield indicates the number of octets in the Common Info field, including one octet for the Common Info Length subfield.

The MLD MAC Address subfield specifies the MAC Address of the MLD with which the STA transmitting the Reconfiguration Multi-Link element is affiliated.

The EML Capabilities subfield has the same definition as the EML Capabilities subfield of the Common Info field of the Basic Multi-Link element (see Figure 9-1002j— EML Capabilities subfield format).

The MLD Capabilities and Operations subfield has the same definition as the MLD Capabilities and Operations subfield of the Common Info field of the Basic Multi-Link element (see Figure 9-1002k—MLD Capabilities and Operations subfield format).One or more Per-STA Profile subelements are included in the list of subelements in the Link Info field (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)).

Each Per-STA Profile subelement starts with a STA Control field, followed by a variable number of fields and elements, as defined in Figure 9-1002w (Per-STA Profile subelement for the Reconfiguration Multi-Link element).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subelement ID | Length | STA Control | STA Info | STA Profile |

 Octets: 1 1 2 variable variable

**Figure 9-1002w—Per-STA Profile subelement for the Reconfiguration Multi-Link element**

The format of the STA Control field is defined in [Figure 9-1002x (STA Control field format for the Recon-figuration Multi-Link element)](#bookmark168).

B0 B3 B4 B5 B6 B7 B10 B11 B12 B13 B15

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Link ID | Complete Profile | STA MACAddress Present | AP Removal Timer Present | Operation Update Type | Operation Parameters Present | NSTR Bitmap Size | Reserved |

Bits: 4 1 1 1 4 1 1 3

**Figure 9-1002x—STA Control field format for the Reconfiguration Multi-Link element**

The Link ID subfield is as defined in 9.4.1.75 (Link ID Info field). In a Reconfiguration Multi-Link element transmitted by an AP MLD the Link ID subfield specifies a value that uniquely identifies the link that the reported AP is operating on. In a Reconfiguration Multi-Link element transmitted by a non-AP MLD the Link ID subfield specifies the link for which a reconfiguration operation is indicated.

The Complete Profile subfield is set to 1 when the Per-STA Profile subelement carries the complete profile as defined in 35.3.6.4 (Multi-link reconfiguration to the ML setup), otherwise this subfield is set to 0.

The STA MAC Address Present subfield indicates the presence of the STA MAC Address subfield in the STA Info field and is set to 1 if the STA MAC Address subfield is present in the STA Info field; otherwise (#17664)the STA MAC Address Present subfield is set to 0.

The AP Removal Timer Present subfield is set to 1 to indicate the presence of the AP Removal Timer sub-field in the STA Info field, otherwise it is set to 0.

The Operation Update Type subfield is set to indicate the type of multi-link operation update for the link indicated by the Link ID subfield as per Table 9-401k (Operation Update Type subfield encoding).

Table 9-401k Operation Update Type subfield encoding

|  |  |
| --- | --- |
| **Value** | **Name** |
| 0 |  AP Removal (#16433) |
| 1 | Operation Parameter Update (#16433) |
| 2 | Add Link |
| 3 | Delete Link |
| 4 – 15 | Reserved |

The Operation Parameters Present subfield is set 1 to indicate the presence of the Operation Parameters sub-field in the STA Info field; (#17653)and otherwise is set to 0.

The NSTR Bitmap Size subfield indicates the size of the NSTR Indication Bitmap subfield (if present) in the STA Info field and is set to 1 if the length of the corresponding NSTR Indication Bitmap subfield is equal to 2 octets and is set to 0 if the length of the corresponding NSTR Indication Bitmap subfield is equal to 1 octet. This field is reserved if the NSTR Indication Bitmap subfield is not included in the STA Info field.

The STA Info field consists of fields whose presence is indicated by the subfields of the STA Control field (#17665)(#15954).

The format of the STA Info field is defined in Figure 9-1002y (STA Info field format for the Reconfiguration Multi-Link element).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| STA Info Length | STA MAC Address | AP Removal Timer | Operation Parameters | NSTR Indication Bitmap |

 Octets: 1 0 or 6 0 or 2 0 or 3 (#15481) 0 or 1 or 2

**Figure 9-1002y—STA Info field format for the Reconfiguration Multi-Link element**

The STA Info Length subfield indicates the number of octets in the STA Info field, including one octet for the STA Info Length subfield.

The STA MAC Address subfield of the STA Info field carries the MAC address of the (#15369)STA that operates on or can operate on the link identified by the Link ID subfield and is affiliated with the same MLD as the STA that transmitted the Reconfiguration Multi-Link element.

The AP Removal Timer subfield indicates the number of TBTTs of the AP corresponding to the Per-STA Profile subelement until the AP is removed.

NOTE—In an NSTR mobile AP MLD, the TSF timer of the AP operating on the nonprimary link is the same as the AP operating on (#17668)the primary link and only the AP on the primary link is transmitting beacons (see 35.3.19 (NSTR mobile AP MLD operation)), so the AP Removal Timer subfield indicates the number of TBTTs corresponding to the AP operating on the primary link until the AP specified in the Per-STA Profile subelement is removed.

*<…existing text for Operation Parameters subfield…>*

*<…existing text for Operation Parameters subfield…>*

The NSTR Indication Bitmap subfield indicates NSTR link pairs for the non-AP MLD. Each bit B*j*() in the NSTR Indication Bitmap subfield included in the Per-STA Profile subelement with Link ID subfield equal to *i* (where 0 ≤ *i* <15) is set to 1 if the link pair corresponding to link IDs equal to <*i,* *j>* is an NSTR link pair; otherwise bit B*j* is set to 0. Bit B*i* in the NSTR Indication Bitmap subfield included in the Per-STA Profile subelement with Link ID subfield value equal to *i* is reserved. The NSTR Indication Bitmap subfield is not included in the Reconfiguration Multi-Link element transmitted by an AP MLD.

If the Complete Profile subfield is set to 1, the STA Profile field includes the complete profile for the STA identified by the STA MAC Address as defined in 35.3.6.4 (Multi-link reconfiguration to the ML setup)). If the Complete Profile subfield is set to 0, the STA Profile field is not included.

The Vendor Specific subelements have the same format as their corresponding elements (see 9.4.2.25 (Vendor Specific element)). Zero or more Vendor Specific subelements are included in the list of optional subelements in the Link Info field.

* + 1. **Protected EHT Action frame details**
			1. **Protected EHT Action field**

***TGbe editor: Please add the following rows to the end of Table 9-623c and change the reserved range (#15985):***

**Table 9-623c—Protected EHT Action field values**

|  |  |  |
| --- | --- | --- |
| **Value** | **Meaning** | **Time priority** |
| 10 | Link Reconfiguration Notify | No |
| 11 | Link Reconfiguration Request | No |
| 12 | Link Reconfiguration Response | No |
| 13-255 |  |  |

***TGbe editor: Please add following three new subclauses as shown below (#15985):*9.6.35.10 Link Reconfiguration Notify frame format**

The Link Reconfiguration Notify frame is used by an AP MLD to recommend addition and/or deletion of link(s) to the multi-link setup of its associated non-AP MLD(s).

The Link Reconfiguration Notify frame is an Action frame of category Protected EHT. The Action field of a Link Reconfiguration Notify frame contains the information shown in Table 9-6**yy1** (Link Reconfiguration Notify frame Action field format).

|  |
| --- |
| Table 9-6yy1—Link Reconfiguration Notify frame Action field format |
| Order | Information |
| 1 | Category  |
| 2 | Protected EHT Action |
| 3 | Dialog Token |
| 4 | Reconfiguration Multi-Link element (see 9.4.2.312.4 (Reconfiguration Multi-Link element)) |

The Category field is defined in Table 9-79 (Category values) and is set to Protected EHT.

The Protected EHT Action field is defined in 9.6.35.1 (Protected EHT Action field).

The Dialog Token field is a nonzero value chosen by the transmitting AP MLD to identify a notify/request/response sequence.

One Reconfiguration Multi-Link element is included as defined in 9.4.2.312.4 (Reconfiguration Multi-Link element).

9.6.35.11 Link Reconfiguration Request frame format

The Link Reconfiguration Request frame is used by a non-AP MLD to request addition or deletion of links to its multi-link setup.

The Link Reconfiguration Request frame is an Action frame of category Protected EHT. The Action field of a Link Reconfiguration Request frame contains the information shown in Table 9-6yy2 (Link Reconfiguration Request frame Action field format).

|  |
| --- |
| Table 9-6yy2—Link Reconfiguration Request frame Action field format |
| Order | Information |
| 1 | Category  |
| 2 | Protected EHT Action |
| 3 | Dialog Token |
| 4 | Reconfiguration Multi-Link element (see 9.4.2.312.4 (Reconfiguration Multi-Link element)) |
| 5 | OCI element (see 9.4.2.236 (OCI element))(optional) |

The Category field is defined in Table 9-79 (Category values) and is set to Protected EHT.

The Protected EHT Action field is defined in 9.6.35.1 (Protected EHT Action field).

The Dialog Token field is set to a nonzero value chosen by the non-AP MLD sending the Link Reconfiguration Request frame.

One Reconfiguration Multi-Link element is included as defined in 9.4.2.312.4 (Reconfiguration Multi-Link element).

One OCI element field is optionally present and contains an OCI element as defined in 9.4.2.236 (OCI element).

9.6.35.12 Link Reconfiguration Response frame format

The Link Reconfiguration Response frame is sent by an AP MLD in response to a Link Reconfiguration Request frame received from a non-AP MLD to accept or reject request for adding and/or deleting links to the multi-link setup of the non-AP MLD.

The Link Reconfiguration Response frame is an Action frame of category Protected EHT. The Action field of a Link Reconfiguration Response frame contains the information shown in Table 9-6yy3 (Link Reconfiguration Response frame Action field format).

|  |
| --- |
| Table 9-6yy3—Link Reconfiguration Response frame Action field format |
| Order | Information |
| 1 | Category  |
| 2 | Protected EHT Action |
| 3 | Dialog Token |
| 4 | Count  |
| 5 | Reconfiguration Status List |
| 6 | Group Key Data (optional) |
| 7 | OCI element (see 9.4.2.236 (OCI element)) (optional) |
| 8 | Basic Multi-Link element (see 9.4.2.312.2 Basic Multi-Link element) (optional)  |

The Category field is defined in Table 9-79 (Category values) and is set to Protected EHT.

The Protected EHT Action field is defined in 9.6.35.1 (Protected EHT Action field).

The Dialog Token field is set to the value of the Dialog Token field from the corresponding Link Reconfiguration Request frame.

The Count subfield is set to the number of Reconfiguration Status duple in the Reconfiguration Status List subfield.

The Reconfiguration Status List subfield contains one or more Reconfiguration Status duple as shown in Figure 9-1205.

|  |  |
| --- | --- |
| Link ID Info | Status |

 Octets: 1 2

 Figure 9-1205 – Reconfiguration Status duple format

The format of the Link ID Info subfield is defined in Figure 9-1002i (Link ID Info subfield format). The Link ID subfield of the Link ID Info subfield indicates the link identifier of the AP which is indicated for addition or deletion to existing multi-link setup in the corresponding Link Reconfiguration Request frame.

The Status subfield indicates the status of the link reconfiguration operation for the link corresponding to the Link ID subfield, as indicated in Table 9-78 (Status codes) and following the rules defined in 35.3.6.4 (Multi-link reconfiguration to the ML setup).

The Group Key Data subfield is optionally present and contains group keys for the links successfully added (Status value equal to SUCCESS) to the multi-link setup. It is formatted as per Figure 9-1206. This subfield is not included if no link addition requested in the corresponding Link Reconfiguration Request frame is indicated as SUCCESS in the Link Reconfiguration Response frame.

|  |  |
| --- | --- |
| Key Data Length | Key Data |

Octets: 2 variable

Figure 9-1206 – Group Key Data subfield format

The Key Data Length subfield is the length of the Key Data subfield.

The Key Data subfield contains one or more MLO KDEs for group keys corresponding to added links. For each added link, an MLO GTK KDE is included as defined in Figure 12-36a (MLO GTK KDE format), an MLO IGTK KDE is included as defined in Figure 12-42a (MLO IGTK KDE) and an MLO BIGTK KDE is included as defined in Figure 12-48a (MLO BIGTK KDE).

Note: The MLO KDE format is link specific and includes Link ID.

One OCI element subfield is optionally present if the Group Key Data subfield is included and contains an OCI element as defined in 9.4.2.236 (OCI element).

One Basic Multi-Link element is included to provide Per-STA Profile information for one or more APs corresponding to the successfully added links to the ML setup of the non-AP MLD, if at least one link addition was accepted by the AP MLD. Otherwise, Basic Multi-Link element is not included.

**35.3.6 Multi-Link reconfiguration**

**35.3.6.1 General**

***TGbe editor: Please update first paragraph in this subclause as follows (#15985):***

*Multi-link (ML) reconfiguration* 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. The ML reconfiguration also defines procedure for adding and deleting links dynamically to the multi-link setup of a non-AP MLD without requiring (Re)association between the peer MLDs and for AP MLD to recommend multi-link reconfiguration to the ML setup of its associated non-AP MLD(s).

**35.3.6.2 Adding affiliated APs(#18115)**

***TGbe editor: Please add following paragraph at the end of this subclause (#15985):***

When a non-AP MLD detects that an affiliated AP has been added to its associated AP MLD through Basic Multi-Link element or through Reduced Neighbor Report element contained in the Beacon or Probe Response frames transmitted by any of the APs affiliated with the AP MLD, the non-AP MLD may use the multi-link reconfiguration procedure as defined in 35.3.6.4 (Multi-link reconfiguration to the ML setup) to add a new link to the added affiliated AP in its multi-link setup, if it has dot11EHTLinkReconfigurationOperationActivated equal to true and the associated AP MLD has the Link Reconfiguration Operation Support subfield set to 1 in the MLD Capabilities and Operations field of the Basic Multi-Link element that it transmits.

**35.3.6.3 Removing affiliated APs(#18115)**

***TGbe editor: Please modify 5th paragraph of this subclause as shown below (#15985):***

In the Reconfiguration Multi-Link element, the EML Capabilities Present subfield and the MLD Capabilities and Operations Present subfield shall be set to 0. 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 STA Control field set as following: The Link ID subfield shall identify the AP being removed, the Complete Profile subfield shall be set to 0, the STA MAC Address Present subfield shall be set to 0, (#15991), the AP Removal Timer Present subfield shall be set to 1, and the Operation Update Type subfield shall be set to 0 (#16433). The AP Removal Timer subfield in the STA Info field shall be set to the number of TBTTs of the affiliated AP before it is removed or for the NSTR mobile AP MLD the AP Removal Timer subfield shall be set to the number of the TBTTs of the AP operating on the primary link before the affiliated AP operating on the nonprimary link is removed. The initial value of the AP Removal Timer subfield should point to a TBTT value that provides (#17937)sufficient time to announce the removal of (#17939)the affiliated AP such that all associated non-AP MLDs including the ones in power save mode have the opportunity to receive (#17940)the Reconfiguration Multi-Link element at least once before the AP is removed(#15994).

***TGbe editor: Please add following two new subclauses as shown below (#15985):***

**35.3.6.4 Multi-link reconfiguration to the ML setup**

Every EHT STA affiliated with an AP MLD or a non-AP MLD that supports multi-link reconfiguration operations for adding and deleting links to the ML setup of a non-AP MLD as described in this clause and supports recommendation for multi-link reconfiguration to the ML setup of a non-AP MLD as described in clause 35.3.6.5 (AP MLD recommendation for multi-link reconfiguration) shall set the dot11EHTLinkReconfigurationOperationActivated equal to true and shall set the Link Reconfiguration Operation Support subfield to 1 in the MLD Capabilities and Operations field of the Basic Multi-Link element and the Reconfiguration Multi-Link element that it transmits.

Note 1: The multi-link reconfiguration operations for adding a link or deleting a link to the ML setup of a non-AP MLD is performed between the two peer MLDs which are in State 4 (see Figure 11-20). For a newly added link to the ML setup, the non-AP STA and the AP operating on that link inherit state from their respective MLDs and are in State 4. For a setup link which gets deleted from the ML setup, the non-AP STA and the AP which were previously operating on that link cease to inherit state from their respective MLDs and transition to State 1 (see Figure 11-20).

A non-AP MLD in the associated state which has dot11EHTLinkReconfigurationOperationActivated equal to true may request multi-link reconfiguration to its ML setup by sending a Link Reconfiguration Request frame from an affiliated non-AP STA to the corresponding AP affiliated with the associated AP MLD which has the Link Reconfiguration Operation Support subfield set to 1 in the MLD Capabilities and Operations field of the Basic Multi-Link element that it transmits. The Link Reconfiguration Request frame shall contain a Reconfiguration Multi-Link element that includes a Per-STA Profile subelement for each affiliated non-AP STA that the non-AP MLD is requesting to add to its ML setup or delete from its ML setup. The Reconfiguration Multi-Link element shall not include any other Per-STA Profile subelements.

In the Reconfiguration Multi-Link element included in a Link Reconfiguration Request frame a non-AP MLD shall set the MLD MAC Address Present subfield to 1 and shall set the MLD MAC Address subfield in the Common Info field to its non-AP MLD MAC Address. If the non-AP MLD is requesting to add a link in the Link Reconfiguration Request frame, then the non-AP MLD shall set both the EML Capabilities Present subfield and the MLD Capabilities and Operations Present subfield to 1 in the Reconfiguration Multi-Link element and shall include the EML Capabilities subfield and the MLD Capabilities and Operations subfield in the Common Info field.

The following rules apply for each Per-STA Profile subelement corresponding to a non-AP STA which is contained in the Reconfiguration Multi-Link element included in the Link Reconfiguration Request frame:

* If the non-AP MLD is indicating to add a link, it shall set the fields in the Per-STA Profile subelement as follows:
	+ The Link ID subfield shall be set to the link identifier of the AP affiliated with the associated AP MLD that is operating on the link that the non-AP MLD is requesting to add. The Complete Profile subfield and the STA MAC Address Present subfield shall be set to 1. The AP Removal Timer Present subfield shall be set to 0. The Operation Update Type subfield shall be set to 2. The Operation Parameters Present subfield shall be set to 0. The NSTR Bitmap Size subfield shall be set to indicate the size of the NSTR Indication Bitmap subfield.
	+ The STA MAC Address subfield in the STA Info field shall be set to the STA MAC address of the non-AP STA that is indicated for operation on the link requested to be added with the AP indicated by the Link ID.
	+ The NSTR Indication Bitmap subfield in the STA Info field shall be included and shall be set to indicate STR or NSTR for each pair of links formed between the link corresponding to the Link ID and other setup links for the non-AP MLD by setting the corresponding bit in the NSTR Indication Bitmap subfield to 0 or 1.
	+ The STA Profile field shall include the complete profile for the corresponding non-AP STA identified by the STA MAC Address and shall consist of all the elements and fields that would be included in the STA Profile field for that non-AP STA in a Reassociation Request frame sent on the current link that includes the corresponding non-AP STA as a reported STA as per procedures in 35.3.3.3 (Advertisement of complete or partial per-link information), except no inheritance is applied and all the applicable elements and fields are included in the STA Profile field itself.
* If the non-AP MLD is indicating to delete an existing link, it shall set the fields in the Per-STA Profile subelement as follows:
	+ The Link ID subfield shall be set to the link identifier of the AP affiliated with the AP MLD that is operating on the link that is requested to be deleted from the ML setup. The Complete Profile subfield shall be set to 0. The STA MAC Address Present subfield shall be set to 1. The AP Removal Timer Present subfield shall be set to 0. The Operation Update Type subfield shall be set to 3. The Operation Parameters Present subfield shall be set to 0.
	+ The STA MAC Address subfield in the STA Info field shall be set to the STA MAC address of the non-AP STA operating on the link indicated by the Link ID, which is requested to be deleted.
	+ The NSTR Indication Bitmap subfield shall not be included.
	+ The STA Profile field shall not be included.

Note 2: A single Link Reconfiguration Request frame can indicate multiple link reconfiguration operations, including add link(s) and/or delete link(s). Each link reconfiguration operation is specified in a separate Per-STA Profile subelement within the Reconfiguration Multi-Link element. A non-AP MLD might indicate both delete link and add link operations for the same non-AP STA by setting the STA MAC Address subfield to the same value in the two Per-STA Profile subelements included in the Reconfiguration Multi-Link element e.g. in the case when it wants to switch the link for that non-AP STA to another affiliated AP.

If the non-AP MLD is indicating to add one or more links, it shall include an OCI element subfield in the Link Reconfiguration Request frame to provide operating channel information for the current channel where the Link Reconfiguration Request frame is being transmitted if all the following conditions are met:

* the dot11RSNAOperatingChannelValidationActivated is true for the non-AP MLD,
* the RSNE in last (Re)Association Request frame transmitted to the AP MLD indicated OCV capability, and
* the RSNE in the Beacon of the AP corresponding to the current link indicates OCV capability.

After receiving a Link Reconfiguration Request frame indicating request for adding one or more links from a non-AP STA affiliated with a non-AP MLD which indicated OCV capability in its RSNE, and if the RSNE for the affiliated AP also indicates OCV capability, an AP MLD shall validate the OCI element received in the request by ensuring that all the following are true:

* OCI element is present,
* Channel information in the OCI element matches current operating channel parameters (see 12.2.9 (Requirements for Operating Channel Validation)).

Otherwise, AP MLD shall reject the request by discarding the Link Reconfiguration Request frame.

After receiving a Link Reconfiguration Request frame from a non-AP MLD, the AP MLD shall respond with a Link Reconfiguration Response frame when no OCI element validation is required, or when OCI element validation is required and the validation is successful. An AP MLD shall not send an unsolicited Link Reconfiguration Response frame to a non-AP MLD.

If the AP MLD receives a Link Reconfiguration Request frame which indicates both delete link and add link for a given non-AP STA identified by the same STA MAC Address value in the Per-STA Profile subelements for delete and add link operations, then the AP MLD shall process the delete link operation first for that non-AP STA.

In the Link Reconfiguration Response frame, the AP MLD shall include a Reconfiguration Status duple subfield for each Link ID indicated in the Per-STA Profile subelements of the corresponding Link Reconfiguration Request frame. If the AP MLD accepts an add link request for a Link ID, the corresponding Status subfield shall be set to SUCCESS in the Reconfiguration Status duple subfield and the Status Code field included in the corresponding STA Profile subfield of the Per-STA Profile subelement in the Basic Multi-Link element for that Link ID shall indicate SUCCESS.

The AP MLD shall accept a delete link request for a Link ID and shall set the corresponding Status subfield to SUCCESS in the Reconfiguration Status duple subfield, except if it is an NSTR mobile AP MLD and the delete link request is for deleting the primary link of the NSTR mobile AP MLD in which case the AP MLD shall reject the delete link request and shall set the corresponding Status subfield to REQUEST\_DECLINED.

If the AP MLD accepts link addition for one or more links, the AP MLD shall include Group Key Data subfield in the Link Reconfiguration Response frame when using RSN. For each added link, the AP MLD shall include an MLO GTK KDE, an MLO IGTK KDE and an MLO BIGTK KDE in the Group Key Data subfield providing group keys for the added link identified by the Link ID subfield.

If the AP MLD accepts link addition for one or more links, the AP MLD shall include an OCI element subfield in the Link Reconfiguration Response frame to provide operating channel information for the current channel where the Link Reconfiguration Response frame is being transmitted if all the following conditions are met:

* the dot11RSNAOperatingChannelValidationActivated is true for the AP MLD,
* the RSNE in last (Re)Association Request frame received from the non-AP MLD indicated OCV capability, and
* the RSNE in the Beacon of the AP corresponding to the current link indicates OCV capability.

If the AP MLD accepts link addition for one or more links, it shall include in the Link Reconfiguration Response frame a Basic Multi-Link element that includes one Per-STA Profile subelement for each AP operating on the link that is accepted by the AP MLD for addition to the ML setup of the non-AP MLD. The Basic Multi-Link element shall not include any other Per-STA Profile subelements. For each Per-STA Profile subelement included in the Basic Multi-Link element, the Complete Profile subfield in the STA Control field shall be set to 1, and the STA Profile field corresponding to that AP shall be complete and consists of all the elements and fields that would be included in the STA Profile field for that AP in a Reassociation Response frame sent on the current link that includes the corresponding AP as a reported AP as per procedures in 35.3.3.3 (Advertisement of complete or partial per-link information), except no inheritance is applied and all the applicable elements and fields are included in the STA Profile field itself.

If the AP MLD rejects an add link request for a Link ID, it shall set the corresponding Status subfield in the Reconfiguration Status duple subfield to indicate an appropriate rejection status code as per Table 9-78 (Status codes).

After receiving a Link Reconfiguration Response frame which includes Group Key Data subfield, if the AP indicated OCV capability in its RSNE and the receiving non-AP STA RSNE also indicates OCV capability, the non-AP MLD shall validate the OCI element received in the response by ensuring that all the following conditions are true:

* OCI element is present,
* Channel information in the OCI element matches current operating channel parameters (see 12.2.9 (Requirements for Operating Channel Validation)).

Otherwise, the non-AP MLD shall discard the Link Reconfiguration Response frame.

If a multi-link reconfiguration operation results in one or more links being added to the ML setup of a non-AP MLD, the non-AP MLD and the AP MLD shall operate with all the TIDs mapped to the newly added links until a new TID-to-link mapping is negotiated.

The power management mode of the affiliated non-AP STA corresponding to the added link shall be in the power save mode immediately after the acknowledgement of the Link Reconfiguration Response frame, and its power state shall be in the doze state.

If a multi-link reconfiguration deletes one or more links from the ML setup of a non-AP MLD and that results in a TID not being mapped to any of the remaining setup links (if exists) in either direction for that non-AP MLD, then the non-AP MLD and the AP MLD shall operate with that TID mapped to all remaining enabled links for that direction after the deletion of the setup link, until a new TID-to-link mapping is established for that TID.

**35.3.6.5 AP MLD recommendation for multi-link reconfiguration**

An AP MLD may recommend link(s) to be added or deleted in the ML setup of an associated non-AP MLD by sending an individually addressed Link Reconfiguration Notify frame to that non-AP MLD. The Link Reconfiguration Notify frame shall contain a Reconfiguration Multi-Link element that includes one Per-STA Profile subelement for each affiliated AP that the AP MLD is recommending to the non-AP MLD to add or delete to its ML setup.

The following rules apply for each Per-STA Profile subelement contained in the Reconfiguration Multi-Link element included in the Link Reconfiguration Notify frame:

* If the AP MLD is recommending to add a link in the ML setup, it shall set the fields in the Per-STA Profile subelement as follows: the Link ID subfield shall be set to the link identifier of the AP affiliated with the AP MLD that is operating on the link that the AP MLD is recommending to add to the ML setup of the non-AP MLD. The Complete Profile subfield, the STA MAC Address Present subfield, the AP Removal Timer Present subfield and the Operation Parameters Present subfield shall be set to 0. The Operation Update Type subfield shall be set to 2.
* If the AP MLD is recommending to delete a link in the ML setup, it shall set the fields in the Per-STA Profile subelement as follows: the Link ID subfield shall be set to the link identifier of the AP affiliated with the AP MLD that is operating on the link that the AP MLD is recommending to delete in the ML setup of the non-AP MLD. The Complete Profile subfield, the STA MAC Address Present subfield, the AP Removal Timer Present subfield and the Operation Parameters Present subfield shall be set to 0. The Operation Update Type subfield shall be set to 3.

In response to a Link Reconfiguration Notify frame, a non-AP MLD may initiate multi-link reconfiguration to its ML setup by following the procedure defined in 35.3.6.4 (Multi-link reconfiguration to the ML setup).

**35.3.3.5 Processing of Per-STA Profile subelement of Multi-Link element**

***TGbe editor: Please modify first paragraph in this subclause as shown below (#15985):***

A non-AP STA (non-AP STA 1) affiliated with a non-AP MLD shall follow the procedures (if any) that are applicable to a field carried (directly or within an element) in a Management frame received on another link, from an AP (AP 2), as if it (non-AP STA 1) had received that field in the corresponding frame transmitted by a reported AP (AP 1) operating on the same link as the non-AP STA (non-AP STA 1), if all of the following conditions are satisfied:

* The transmitting AP (AP 2) is affiliated with the same AP MLD as the reported AP (AP 1).
* The field is carried within the STA Info field or STA Profile field of a Per-STA Profile subelement of a Multi-Link element, corresponding to the reported AP (AP 1).
* The corresponding frame is received by another non-AP STA (STA 2) that is affiliated with the same non-AP MLD as the non-AP STA (STA 1).
* One of the following conditions is true:
	+ The Management frame is a Beacon frame, a Probe Response frame, a (Re)Association Response frame or a Link Reconfiguration Response frame and the transmitting AP (AP 2) does not belong to a multiple BSSID set or is the transmitted BSSID in the multiple BSSID set(#17915).
	+ The Management frame is a (Re)Association Response frame or a Link Reconfiguration Response frame, and the transmitting AP (AP 2) corresponds to a nontransmitted BSSID in a multiple BSSID set.

***TGbe editor: Please modify last paragraph in this subclause as shown below (#15985):***

An AP (AP 1) affiliated with an AP MLD shall follow the procedures (if any) that are applicable to a field carried (directly or within an element) in a (Re)Association Request frame or a Link Reconfiguration Request frame received on another link, from a non-AP STA (non-AP STA 2), as if it (AP 1) had received that field in the corresponding frame transmitted by a reported non-AP STA (non-AP STA 1) operating on the same link as the AP (AP 1), if all of the following conditions are satisfied:

* The transmitting non-AP STA (STA 2) is affiliated with the same non-AP MLD as the reported non- AP STA (STA 1).
* The corresponding frame is received by another AP (AP 2) affiliated with the same AP MLD as the AP (AP 1).
* The field is carried within the STA Info field or STA Profile field of a Per-STA Profile subelement of a Multi-Link element, corresponding to the reported non-AP STA (STA 1).

**35.3.14 Multi-link device individually addressed Management frame delivery**

**35.3.14.1 General**

 ***TGbe editor: Please modify 12th paragraph in this subclause as shown below (#15985):***

Between an AP MLD and a non-AP MLD associated with the AP MLD, the following individually addressed
MMPDUs shall be intended for an MLD:
— Authentication frame that includes a Basic Multi-Link element
— (Re)Association Request/Response frame that includes a Basic Multi-Link element
— Deauthentication frame
— Disassociation frame
— Block Ack Action frame
— SA Query Action frame
— Multi-link probe request/response
— WNM Sleep Mode Request/Response frame
— TID-To-Link Mapping Request/Response/Teardown frame
— EPCS Priority Access Enable Request/Enable Response/Teardown frame
— EML Operating Mode Notification frame
— SCS Request/Response frame
— MSCS Request/Response frame

— BSS Transition Management Request/Response frame

— Link Reconfiguration Notify/Request/Response frame

**Annex C**(normative)
**ASN.1 encoding of the MAC and PHY MIB
C.3 MIB Detail**

***TGbe editor: Please add following new MIB attribute in Annex C as shown below (#15985):***

Dot11EHTStationConfigEntry ::=
 SEQUENCE {
 dot11EHTPPEThresholdsRequired TruthValue,
 dot11TIDtoLinkMappingActivated TruthValue,
 dot11EHTEPCSPriorityAccessActivated TruthValue,
 dot11MSDTimerDuration Unsigned32,
 dot11MSDTXOPMAX Unsigned32,
 (#10198)dot11MultiLinkActivated TruthValue,
 (#13144)dot11MLDAssociationSAQueryMaximumTimeout, Unsigned32,

 dot11EHTLinkReconfigurationOperationActivated TruthValue}

dot11EHTLinkReconfigurationOperationActivated OBJECT-TYPE
 SYNTAX TruthValue
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "This is a control variable.
 It is written by an external management entity or the SME. Changes take
 effect as soon as practical in the implementation.

This attribute, when true, indicates support by the MLD for multi-link reconfiguration operations for adding and deleting link(s) to the ML setup of a non-AP MLD without requiring reassociation. If the attribute is false, the MLD does not support multi-link reconfiguration operations for adding and deleting link(s) to the ML setup of a non-AP MLD without requiring reassociation.

 DEFVAL { false }
::= { dot11EHTStationConfigEntry <Last assigned + 1> }