IEEE P802.11  
Wireless LANs

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| LB275 CR for ML Reconfiguration part 4 | | | | |
| Date: September 23, 2023 | | | | |
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Abstract

This submission proposes resolutions for following 27 CIDs received for TGbe LB275:

19415 19416 19417 19418 19419 19420 19451 19459 19421 19468

19768 19769 19936 19937 19938 19939 19940 20007 20027 20028

20029 20030 20031 20034 20036 20037

CIDs run in r3:

19468 19768 19769 19936 19937 19938 19940 20027

20029 20030 20031 20034 20036 20037

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: updates based on offline feedback.
* Rev 2: updates based on offline feedback. Removed CID 20035.
* Rev 3: updates during the TGbe call.
* Rev 4: Revision for CID 20028, 20007 and 19459. Added related CIDs 20032, 20033, 20035 and 20070. Changes are tagged with CID tag highlighted in blue.
* Rev 5: Revision to CID 20070 and 20007. 3 CIDs to run SP (20070, 20007, 20035)

***TGbe editor: The baseline for this document is 11be D4.1.***

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** | **Commenter** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 19415 | Guogang Huang | 35.3.6.4 | 515.61 | If considering more than one link is added, there is no inheritence rule defined for the Reconfiguration ML element. suggest to use the Basic Multi-link element intead for the link addition. | As in comment. | Revised  The inheritance concept can be applied to the Per-STA Profile subelements included in the Link reconfiguration Request/Response frames. Proposed text to apply inheritance when more than one link is added.  TGbe editor, please make the changes tagged by CID #19415 in 11-23/1542r3. |
| 19416 | Guogang Huang | 35.3.6.4 | 516.50 | Obviously, this sentence is not correct. Please correct the sentence to state which element in the Reassociation Reqeust frame is included for the link addition. | As in comment. | Revised  Revised the text to provide further clarification.  TGbe editor, please make the changes tagged by CID #19416 in 11-23/1542r3. |
| 19417 | Guogang Huang | 35.3.6.4 | 517.14 | Currently, the OCI element also can be included within the Reassociation Request/Response frame. No need to add a new OCI element subfield within the Link Reconfiguration Request frame. | As in comment. | Revised  The OCI element is included to verify the current operating channel information for link reconfiguration, as it is done for some other frames in the baseline spec including SA Query Request and WNM Sleep Mode Request. The OCI element does not need to be included in a reported STA, since it is only needed in management frame if OCVC is enabled. Added text to clarify this.  TGbe editor, please make the changes tagged by CID #19417 in 11-23/1542r3. |
| 19418 | Guogang Huang | 35.3.6.4 | 518.01 | Sugest to use the FTE to carry the group key info for each added link. Thus it can be regarded as a part of the Reassociation Response frame. Otherwise, it's hard to parse the Link Reconfiguration Response frame. | As in comment. | Rejected  FTE is defined for Fast BSS Transition. FTE includes a MIC value (which can be up to 32 bytes long) and includes 32 bytes long ANoce and SNonce which are not needed for add link operation. So, it does not make sense to use FTE to carry group key for add link case. Also FTE is not included in the reported STA, as per current text. Hence it will not be part of the STA Profile anyway. |
| 19419 | Guogang Huang | 9.6.35.13 | 0.00 | All the info for the link addition can be found in the current Reassociation Request/Response frame. What we need to do is to define which field or element is present when the frame body of the Reassociation Request/Response is carried within the Link Reconfiguration Request/Response frame. Currently, the format of Link Reconfiguration Request/Response frame is a mess. | As in comment. | Rejected  For the Link Reconfiguration Request/Response frame, text already captures what fields and elements are included in the STA Profile field of the Per-STA Profile subelement. There is no technical issue with the format of the Link Reconfiguration Request/Response frame. |
| 19420 | Guogang Huang | 9.6.35.14 | 323.49 | The Reconfiguration ML element is used for signalling the info on added links in the Link Reconfiguration Request frame. But the Basic ML element is used for signalling the info on added links in the Link Reconfiguration Response frame. Is there any technical reason for this inconsistence? If no, please use the Basic ML element instead for the link addition in the Link Reconfiguration Request frame. | As in comment. | Rejected  In the Link Reconfiguration Request frame, the Reconfiguration ML element is used to signal the reconfiguration operation type (add link or delete link). Basic ML element does not define the reconfiguration operation type, hence can’t be used. The Link Reconfiguration Response frame provides the result of link reconfiguration operation indexed based on the Link ID and reuses Basic ML element to provide AP STA profile information for add links. There is no need to indicate add/delete link operation in the response, hence the Reconfiguration ML element is not used. |
| 19451 | ZHI MAO | 9.2.4.7.10 | 0.00 | It is not right direction to use the Reconfiguration ML element to signal the info on links which are requested to be added. Because too much info could be updated during the link addition. Strongly suggest to use the Basic Multi-link element intead for the link addition. | As in comment. | Rejected  In the Link Reconfiguration Request frame, the Reconfiguration ML element is used to signal the reconfiguration operation type (add link or delete link). Basic ML element does not define the reconfiguration operation type, hence can’t be used. |
| 19459 | Yuchen Guo | 9.6.35.13 | 321.56 | There is no any reason to use the Reconfiguration ML element to signal the info on the links which are request to be added. We should use the Basic Multi-link element instead. Thus we can reuse the inheritance rules defined for the Basic Multi-link element if more than one link is requested to be added. | As in comment. | Revised  In the Link Reconfiguration Request frame, the Reconfiguration ML element is used to signal the reconfiguration operation type (add link or delete link). Basic ML element does not define the reconfiguration operation type, hence can’t be used. The inheritance is a generic concept and can be applied between different Per-STA Profile subelements. Text is added to capture inheritance rules for Link Reconfiguration Request/Response frames.  TGbe editor, please make the changes tagged by CID #19459 in 11-23/1542r4. |
| 19421 | Guogang Huang | 9.6.35.14 | 323.01 | These Status Codes are kind of repeat. There is a Status Code field in the Reassociation Response frame for each added link. Please remove Status Code from the Status Code list field for the added link. . | As in comment. | Rejected  The Status Code is needed to indicate the status for every add and delete link operation. Only for successfully added link, there will also be a Status Code in the STA Profile field of Basic ML element which will also be set to success, but not for other link reconfiguration operation. |
| 19468 | Stephen McCann | 35.3.6.4 | 516.15 | The two paragraphs are almost identical and can be re-arranged into one simpler statement. | Submitter will provide a submission | Revised  The text is revised to remove the common part in the two paragraphs.  TGbe editor, please make the changes tagged by CID #19468 in 11-23/1542r3. |
| 19768 | Abhishek Patil | 35.3.6.4 | 516.04 | What is the purpose of including 'MLD Capabilities And Operations' field when a non-AP MLD requests adding a link? The subfields of the 'MLD Capabilities And Operations' field apply to MLD level and since ML reconfiguration is a link-level operation, the MLD-level parameters would not change. Once ML reconfig 1:1 add/remove is successfully completed, then the Basic ML IE will reflect the updated status (i.e., updated value of Max Num Simultaneous Link field etc). | Delete the second sentence in this paragraph. | Revised  The add link operation is updating the entire ML setup for the non-AP MLD, hence this is considered an MLD level operation. Similar to ML setup via the (Re)Association Req/Resp, a non-AP MLD should be able to provide its latest 'MLD Capabilities And Operations' when it performs modifications to ML setup as a result of add link, hence that field is included for add link case. Added a NOTE to clarify this part. |
| 19769 | Abhishek Patil | 35.3.6.4 | 518.60 | What does "(if it exists)" apply to? If ML reconfig is removing all links of an ML setup, then it is equivalent to disassociation. Then why not simply disassociate. | Delete "(if it exists)". | Revised  TGbe editor, please delete "(if it exists)" from P528L64 and P525L16/17 in D4.1. |
| 19936 | Rubayet Shafin | 35.3.6.4 | 515.37 | The first paragraph should be moved to 35.3.6.1 | as in comment. | Revised  Agree in principle. Moved the paragraph as per the suggestion. As a result the NOTE1 is now moved to after the first paragraph in 35.3.6.4.  TGbe editor, please make the changes tagged by CID #19936 in 11-23/1542r3. |
| 19937 | Rubayet Shafin | 35.3.6.3 | 515.17 | This paragraph is a repetition of the paragraph in 518 line 59. | merge the two paragraphs | Rejected  The two paragraphs capture different events which result in a TID not being mapped to existing setup links and behavior as a result. Hence, the two paragraphs are distinct and not a repetition. |
| 19938 | Rubayet Shafin | 35.3.6.4 | 518.59 | This paragraph is a repetition of the paragraph in 515 line 17. | merge the two paragraphs | Rejected  The two paragraphs capture different events which result in a TID not being mapped to existing setup links and behavior as a result. Hence, the two paragraphs are distinct and not a repetition. |
| 19939 | Rubayet Shafin | 35.3.6.5 | 519.19 | The Complete Profile of the intended link needs to be provided in order for the non-AP MLD to make informed decision on whether to abide by the recommendation or not. | Set the Complete Profile subfield to 1 for the link that the AP MLD recommends to be added. | Rejected  The non-AP MLD gets the profile information for the affiliated APs of its associated AP MLD as part of the ML discovery. Hence, STA profile information does not need to be provided again. This is similar to the behavior in ﻿35.3.23 (BSS transition management for MLDs) where Basic ML element in the BTM does not include complete profile for a recommended AP. |
| 19940 | Rubayet Shafin | 35.3.6.4 | 517.08 | Need to clarify the setting of the Link ID subfield in the two Per-STA Profile subelements for this switching case. | as in comment. | Rejected  The Link ID setting for delete link and add link cases are specified clearly in the existing text, which are used for the switch link case. Hence, it will be redundant to add more text for this. |
| 20027 | Binita Gupta | 35.3.6.4 | 515.35 | ML Reconfiguration consists of multiple operations as described in clause 35.3.6. Operations in clause 35.3.6.4 relate to Link Reconfiguration. Suggest to rename the title to 'Link Reconfiguration to the ML Setup" to better distinguish this specific operation from the overall ML Reconfiguration | Rename title to "Link Reconfiguration to the ML Setup" | Revised  Agree in principle. Also, using this CID for some clarifications and bug fixes raised by members.  TGbe editor, please make the changes tagged by CID #20027 in 11-23/1542r3. |
| 20028 | Binita Gupta | 35.3.6.4 | 515.56 | Revise \*ï»¿ML reconfiguration to its ML setup...\* --> \*link reconfiguration to its ML setup...\* to be specific and distinguish from generic ML reconfiguration terminology. | As per comment | Revised  Agree in principle and revised text. Also, using this CID to clarify following:   * text indicating that non-AP MLD may perform link reconfiguration after receiving BTM. * text related to content of STA Profile for Link Reconfig Request and Response frame.   TGbe editor, please make the changes tagged by CID #20028 in 11-23/1542r4. |
| 20029 | Binita Gupta | 35.3.6.4 | 516.07 | Add the otherwise part for setting the ï»¿MLD Capabilities And Operations Present subfield to 0. | Add following text at the end of the paragraph: "ï»¿Otherwise, the non-AP MLD shall set the MLD Capabilities And Operations Present subfield to 0." | Revised  TGbe editor, please make the changes tagged by CID #20029 in 11-23/1542r3. |
| 20030 | Binita Gupta | 35.3.6.4 | 516.44 | Revise text related to NSTR Indication Bitmap to indicate that for the add link case the bitmap field is only included when the non-AP MLD has any NSTR link pairs to report. | Revise text as per comment. | Revised  This was addressed by CID #19051 in D4.0. Using this CID to fix some not applicable leftover text.  TGbe editor, please make the changes tagged by CID #20030 in 11-23/1542r3. |
| 20031 | Binita Gupta | 35.3.6.4 | 517.06 | Missing 'multiple' before '\*ML reconfiguration operations\* | Revise NOTE as "ï»¿A single Link Reconfiguration Request frame can indicate multiple link reconfiguration operations,..." | Revised  TGbe editor, please make the changes tagged by CID #20031 in 11-23/1542r3. |
| 20034 | Binita Gupta | 35.3.6.4 | 517.51 | Replace 'link ID' with 'Link ID' throughout this and the next paragraph, to accurately represent the subfield name. | As per comment | Rejected  Other clauses use ‘link ID’ when generically referring to the link identifier. In the current context, that is the case as well. Hence, no need to change to ‘Link ID’, since it is not referring to explicit subfield name in the context. |
| 20036 | Binita Gupta | 35.3.6.5 | 519.01 | ML Reconfiguration consists of multiple operations as described in clause 35.3.6. Operations in clause 35.3.6.5 relates to AP MLD recommendation for Link Reconfiguration. Suggest to rename the title to "AP MLD recommendation for Link Reconfiguration" to better distinguish this specific operation from the overall ML Reconfiguration | Rename title to "AP MLD recommendation for Link Reconfiguration" | Revised  TGbe editor, please make the changes tagged by CID #20036 in 11-23/1542r3. |
| 20037 | Binita Gupta | 35.3.6.5 | 519.08 | Revise to improve readability. | Change to "...ï»¿to the non-AP MLD to \*add to or delete from\* its ML setup" | Revised  TGbe editor, please make the changes tagged by CID #20037 in 11-23/1542r3. |
| 20070 | Li-Hsiang Sun | 35.3.6.4 | 517.16 | The signaling link for Link Reconfiguration Request/Response frame is a link which is already setup, It is not clear why additional OCI verification is needed.  On the contrary, it seems OCI is needed for the newly added link | add a note on why OCI for an existing link is needed, and why new link OCI elements are not needed | Revised  The OCI verification is done for the Link Reconfiguration Request/Response, since these messages establish group keys for the added link (see 12.2.9 ﻿Requirements for Operating Channel Validation). Further security analysis on OCI verification would be required for any changes to be done. The OCI element is not needed for added links because OCI is done for the operating channel where the non-AP MLD is operating. Added text to indicate that the OCI element is not included for the reported STAs.  TGbe editor, please make the changes tagged by CID #20070 in 11-23/1542r5. |
| 20032 | Binita Gupta | 35.3.6.4 | 517.06 | Text needs to specify whether a non-AP MLD is allowed to indicate deletion of the current link and any associated behavior. | Clarify non-AP MLD behavior related to indicating deletion for the current link. | Revised  Existing spec text does not limit indicating deletion of the current link. Added text to clarify when the AP MLD and the non-AP MLD consider link to be deleted and added.  TGbe editor, please make the changes tagged by CID #20032 in 11-23/1542r4. |
| 20033 | Binita Gupta | 35.3.6.4 | 517.06 | Text need to specify whether a non-AP MLD is allowed to specify both delete link and add link operation for the non-AP STA operating on current link e.g. to switch current link to another link and associated behavior of the new added link e.g. power save mode of the switched link. | Clarify non-AP MLD behavior as per the comment. | Revised  Existing spec text does not limit indicating delete link and add link operations for the current link. Added text to clarify when the AP MLD and the non-AP MLD consider link to be deleted and added. Also, current text defines that the power state of an added link is in power save and doze state. This also applies when the delete+add link is specified for the non-AP STA operating on current link.  TGbe editor, please make the changes tagged by CID #20032 in 11-23/1542r4. |
| 20007 | Binita Gupta | 9.4.1.9 | 196.45 | Add a new Status Code to explicitly indicate a rejection reason when an AP MLD rejects an add link operation to the ML setup as described in clause 35.3.6.4. | Add new status code DENIED\_ADD\_LINK\_TO\_ML\_SETUP | Revised  Added new status code to indicate failure related to add link operation.  TGbe editor, please make the changes tagged by CID #20007 in 11-23/1542r5. |

9.4.1.9 Status Code field

***TGbe editor: Please add new status codes as shown below (#20007).***

**Table 9-78—Status codes *(continued)***

|  |  |  |
| --- | --- | --- |
| **Status code** | **Name** | **Meaning** |
| <ANA> | REJECTED\_ADD\_LINK\_NOT\_IN \_RECOMMENDED\_LINK\_SET | Add link operation is rejected because the link corresponding to the add link is not part of the links recommended by the AP MLD to the non-AP MLD. |

﻿9.6.35.14 Link Reconfiguration Response frame format

…

﻿The Key Data subfield contains one or more MLO KDEs for group keys corresponding to added links. (#20027) Each MLO KDE is encapsulated ﻿using the KDE format shown in Figure 12-34 (KDE format). For each added link, an MLO GTK KDE is included as defined in Figure 12-47a (MLO GT K KDE format), an MLO IGTK KDE is included as defined in Figure 12-47b (MLO IGTK KDE format), and an MLO BIGTK KDE is included as defined in Figure 12-47c (MLO BIGTK KDE).

﻿35.3.3.4 Fields and elements not carried in a per-STA profile

…

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

﻿A STA affiliated with an MLD shall not include the FTE and the MDE for each reported STA in the reported STA’s STA Profile field of the Basic Multi-Link element carried in a (Re)Association Request frame or a (Re)Association Response frame that it transmits. Also see 13.4.2 (FT initial mobility domain association in an RSN) and 13.7 (FT reassociation). (#20070) A STA affiliated with an MLD shall not include the OCI element for a reported STA in the reported STA’s STA Profile field of the Basic Multi-Link element carried in a (Re)Association Request frame or a (Re)Association Response frame that it transmits.

***TGbe editor: Please add following new subclause 35.3.3.5.3 as shown below (#19459).***

﻿**35.3.3.5.3 Inheritance in the per-STA profile of Link Reconfiguration Request and Response**

﻿When multiple links are added using the Link Reconfiguration Request/Response frames, it is possible that multiple STAs affiliated with the same MLD ﻿have similar capabilities and operational parameters for operating on their respective links. As a result, an element which is applicable for one of the STAs for add link might have the same value as the corresponding element for another STA for add link. To reduce the frame size, when a Link Reconfiguration Request/Response frame carries complete profiles for multiple Per-STA Profile subelements for add link operation, the inheritance rules are applied across those subelements relative to the first Per-STA Profile subelement carrying the complete profile as defined bin this subclause.

In a Link Reconfiguration Request frame, if the Reconfiguration ML element includes complete profile for more than one Per-STA Profile subelements for add link operation, the non-AP MLD shall apply inheritance across those Per-STA Profile subelements carrying the complete profile relative to the first Per-STA Profile subelement carrying the complete profile, as per the following rule

* The elements carried in the STA Profile field of the Per-STA Profile subelement shall be based on the elements applicable to the reported STA per ﻿﻿Table 9-64 (Reassociation Request frame body) and as defined in [35.3.3.3 (Advertisement of complete or partial per-link information)](#_bookmark14) and ﻿35.3.3.4 (Fields and elements not carried in a per-STA profile).
* The first Per-STA Profile subelement carrying the complete profile shall include complete profile for the corresponding non-AP STA in the STA Profile as defined in 35.3.6.4 (ML reconfiguration to the ML setup**)** without any inheritance applied.
* Each subsequent Per-STA Profile subelement carrying the complete profile shall include complete profile for the corresponding non-AP STA in the STA Profile as defined in 35.3.6.4 (ML reconfiguration to the ML setup**)** except it shall not include the element(s) which have the same value as the same element included in the first Per-STA Profile subelement carrying the complete profile.
* An element, identified by an Element ID and Element ID Extension (if applicable), carried in the STA Profile field of the first Per-STA Profile subelement carrying the complete profile, shall be inherited and considered part of a subsequent Per-STA Profile subelement carrying the complete profile, unless any of the following conditions are true:
  + the STA Profile field in the subsequent Per-STA Profile subelement carries the same Element ID and Element ID Extension (if applicable).
  + the STA profile field in the subsequent Per-STA Profile subelement carries a Non-Inheritance element (see 9.4.2.239 (Non-Inheritance element)) and the element is listed in the Non-Inheritance element.

In a Link Reconfiguration Response frame, if the Basic ML element includes complete profile for more than one Per-STA Profile subelements, the AP MLD shall apply inheritance across those Per-STA Profile subelements carrying the complete profile relative to the first Per-STA Profile subelement carrying the complete profile, as per the following rules:

* The elements carried in the STA Profile field of each Per-STA Profile subelement shall be based on the elements applicable to the reported STA per ﻿Table 9-65 (Reassociation Response frame body) and as defined in [35.3.3.3 (Advertisement of complete or partial per-link information)](#_bookmark14) and ﻿35.3.3.4 (Fields and elements not carried in a per-STA profile).
* The first Per-STA Profile subelement carrying the complete profile shall include complete profile for the corresponding AP in the STA Profile as defined in 35.3.6.4 (ML reconfiguration to the ML setup**)** without any inheritance applied.
* Each subsequent Per-STA Profile subelement carrying the complete profile shall include complete profile for the corresponding AP in the STA Profile as defined in 35.3.6.4 (ML reconfiguration to the ML setup**)** except it shall not include the element(s) which have the same value as the same element included in the first Per-STA Profile subelement carrying the complete profile.
* An element, identified by an Element ID and Element ID Extension (if applicable), carried in the STA Profile field of the first Per-STA Profile subelement carrying the complete profile, shall be inherited and considered part of a subsequent Per-STA Profile subelement carrying the complete profile, unless any of the following conditions are true:
  + the STA Profile field in the subsequent Per-STA Profile subelement carries the same Element ID and Element ID Extension (if applicable).
  + the STA profile field in the subsequent Per-STA Profile subelement carries a Non-Inheritance element (see 9.4.2.239 (Non-Inheritance element)) and the element is listed in the Non-Inheritance element.

## ML reconfiguration

* + - 1. **General**

*ML reconfiguration* refers to a set of procedures through which an AP MLD can add one or more affiliated APs to the AP MLD (#20015)as described in [35.3.6.2 (Adding affiliated APs)](#_bookmark30), or remove one or more affiliated APs from the AP MLD as described in [35.3.6.3 (Removing affiliated APs)](#_bookmark31). The ML reconfiguration also defines procedure for adding and deleting links dynamically to the ML setup of a non- AP MLD without requiring (re)association between the peer MLDs as described in [35.3.6.4 (ML](#_bookmark32) [reconfiguration to the ML setup)](#_bookmark32) and for AP MLD to recommend ML reconfiguration to the ML setup of its associated non-AP MLD(s) as described in [35.3.6.5 (AP MLD recommendation for ML reconfiguration)](#_bookmark33).

(#19936)(#20028)link﻿(#19936)in 35.3.6.4 (Link reconfiguration to the ML setup)

***TGbe editor: Please update following subclause as shown below.***

﻿35.3.6.4 (#20027) Link reconfiguration to the ML setup

(#19936)

(#19936)

A non-AP MLD in the associated state which has dot11EHTLinkReconfigurationOperationActivated equal to true may request (#20028)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 subfield of the Basic Multi-Link element that it transmits. (#20028)

(#19936)

﻿(#20028)

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 the MLD Capabilities And Operations Present subfield to 1 in the Reconfiguration Multi-Link element and shall include the MLD Capabilities And Operations subfield in the Common Info field. (#20029)Otherwise, the non-AP MLD shall set the MLD Capabilities And Operations Present subfield to 0.

A non-AP MLD that is requesting to add a link in the Link Reconfiguration Request frame and has dot11EHTEMLSROptionActivated equal to true or dot11EHTEMLMROptionActivated equal to true shall set the EML Capabilities Present subfield to 1 in the Reconfiguration Multi-Link element included in the request frame (#19768)and shall include the EML Capabilities subfield in the Common Info field. Otherwise, the non-AP MLD shall set the EML Capabilities Present subfield to 0.

(#19768) NOTE: When performing add link operation, a non-AP MLD can update its MLD level capability through the MLD Capabilities And Operations subfield and the EML Capabilities subfield included in the Link Reconfiguration Request frame.

If the EML Capabilities subfield is present in the Reconfiguration Multi-Link element included in a Link Reconfiguration Request frame, (#19468) then,

* a non-AP MLD with dot11EHTEMLSROptionActivated equal to true shall set the EMLSR Support subfield of the EML Capabilities subfield to 1. (#19104)Otherwise, the non-AP MLD shall set the EMLSR Support subfield to 0.
* a non-AP MLD with dot11EHTEMLMROptionActivated equal to true shall set the EMLMR Support subfield of the EML Capabilities subfield to 1. Otherwise, the non-AP MLD shall set the EMLMR Support subfield to 0.

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 Pro- file 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 Reconfiguration Operation Type subfield shall be set to 2. The Operation Parameters Present subfield shall be set to 0. The NSTR Bitmap Size sub- field shall be set to indicate the size of the NSTR Indication Bitmap subfield.
  + (#19051)The NSTR Indication Bitmap Present bit shall be set to 1 if at least one NSTR link pair is present for the non-AP MLD that contains the link corresponding to the link ID, otherwise, this bit shall be set to 0.
  + (#20030)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.
  + (#19051)If the NSTR Indication Bitmap Present bit is set to 1, (#19471)the NSTR Indication Bit- map 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 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 (#20028)that includes the corresponding non-AP STA as a reported STA (#20028)in the Basic Multi-Link element as (#20028)defined in [35.3.3.3 (Advertisement of complete or partial per-link information)](#_bookmark14) (#20028)and 35.3.3.4 (Fields and elements not carried in a per-STA profile), except no inheritance is applied (#19459)as defined in 35.3.3.5.1 (﻿Inheritance in the per-STA profile of Basic Multi-Link element), instead inheritance rules are applied as defined in 35.3.3.5.3 (Inheritance in the Per-STA profile of Link Reconfiguration Request and Response).
* 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 Reconfiguration Operation Type subfield shall be set to 3. The Operation Parameters Present subfield shall be set to 0. (#19051)The NSTR Indication Bitmap Present bit 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 (#20031) multiple ML 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 (#20032)in a request frame 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, in the case when it wants to switch the link for that non-AP STA to another affiliated AP.…

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 (#20028)that includes the corresponding AP as a reported AP (#20028)in the Basic Multi-Link element as (#20028)defined in 35.3.3.3 (Advertisement of complete or partial per-link information) (#20028)and 35.3.3.4 (Fields and elements not carried in a per-STA profile), except no inheritance is applied (#19459)as defined in 35.3.3.5.1 (﻿Inheritance in the per-STA profile of Basic Multi-Link element), instead inheritance rules are applied as defined in 35.3.3.5.3 (Inheritance in the Per-STA profile of Link Reconfiguration Request and Response).

…

(#20032)After sending a Link Reconfiguration Response frame to a non-AP MLD indicating SUCCESS status for a delete link operation and receiving the acknowledgement for the response frame from the non-AP MLD, the AP MLD shall consider that link to be deleted from the ML setup of the associated non-AP MLD and shall delete any information maintained for that link from the ML setup of that non-AP MLD.

(#20032)After sending a Link Reconfiguration Response frame to a non-AP MLD indicating SUCCESS status for an add link operation and receiving the acknowledgement for the response frame from the non-AP MLD, the AP MLD shall consider that link to be added to the ML setup of the associated non-AP MLD.

(#20032)After receiving a Link Reconfiguration Response frame indicating SUCCESS status for a delete link operation and sending an acknowledgement for the response frame, the non-AP MLD shall consider that link to be deleted from its ML setup and shall delete any information maintained for that link from its ML setup.

(#20032)After receiving a Link Reconfiguration Response frame indicating SUCCESS status for an add link operation and sending an acknowledgement for the response frame, the non-AP MLD shall consider that link to be added to its ML setup.

(#20027)If link reconfiguration to the ML setup 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 TTLM is updated according to the procedure defined in 35.3.7.2 (TTLM).

## AP MLD recommendation for (#20036) 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 (#20037)to or delete from its ML setup.

(#20027) In the Link Reconfiguration Notify frame, an AP MLD shall set the MLD MAC Address Present subfield, the EML Capabilities Present subfield and the MLD Capabilities And Operations Present subfield to 0 in the Common Info field of the Reconfiguration Multi-Link element.

﻿**35.3.23 BSS transition management for MLDs**

…

(#19799)If an AP MLD uses the BTM protocol to recommend a non-AP MLD to do (re)association with the same AP MLD with a different set of links, the non-AP MLD may follow the recommendation by either:

* (re)associating with the same AP MLD with the recommended set of links or
* initiating an ML reconfiguration negotiation (#20028)by following the procedures in [35.3.6.4 (ML reconfiguration to the ML setup)](#_bookmark32) to operate with the recommended set of setup links or
* initiating a TTLM negotiation (see [35.3.7.2.3 (Negotiation of TTLM)](#_bookmark39)) if the enabled links would match the set of recommended links.

NOTE—A non-AP EHT STA is also an HE STA and therefore has dot11BSSTransitionActivated equal to true (see 11.21.7.1 (BSS transition capability)).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 20035 | Binita Gupta | 35.3.6.4 | 518.49 | Revise "If a ML reconfiguration operation results..." to "ïf a link reconfiguration to the ML setup operation results..." to be precise in the operation being referred. Similar edit for line 59. | as per comment | Revised  Revised text as suggested. Also, using this CID to propose text related to maximum allowed setup links and related status code.  TGbe editor, please make the changes tagged by CID #20035 in 11-23/1542r5. |

Discussion:

For better management of its resources, an AP MLD that is operating on several links (e.g. >=4 links) might want to limit the maximum number of setup links a non-AP MLD is allowed to establish. It is assumed that an AP MLD which has up to 3 links will allow association on all its links.

***TGbe editor: Please update text as shown below (#20035).***

############### ------------ Start of changes for CID 20035 ------------------ #############

9.4.1.9 Status Code field

The Status Code field is used in a response Management frame to indicate the status of a requested

operation. The Status Code field is shown in Figure 9-137 (Status Code field format). The values of the

Status Code field are defined in Table 9-78 (Status codes). A Status Code value is used in a response Management frame when the condition described by that status code is met and a Status Code value is not used in a response Management frame when the condition described by that status code is not met.

**Table 9-78—Status codes *(continued)***

|  |  |  |
| --- | --- | --- |
| **Status code** | **Name** | **Meaning** |
| <ANA> | REJECTED\_MAX\_ALLOWED\_SETUP\_LINKS\_REACHED | Link request during ML (re)setup or add link operation is rejected for a link for a non-AP MLD because the number of maximum allowed setup links advertised by the AP MLD is violated at the AP MLD for that non-AP MLD if the link is accepted. |

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

The format of the Extended MLD Capabilities And Operations subfield is defined in [Figure 9-1001l](#_bookmark203) [(Extended MLD Capabilities And Operations subfield format(#19751)(#19327))](#_bookmark203).

B0 B1 B4 B5 B6. B9 B10 B15

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operation Parameter Update Support | Recommended Max Simultaneous Links | NSTR Status Update Support | Max Allowed Setup Links | Reserved |

Bits: 1 4 1 4 6

**Figure 9-1001l—Extended MLD Capabilities And Operations subfield for- mat(#19751)(#19327)**

The subfields of the Extended MLD Capabilities And Operations subfield are defined in [Table 9-404k (Sub-](#_bookmark204) [fields of the Extended MLD Capabilities And Operations subfield)](#_bookmark204).

**Table 9-404k—Subfields of the Extended MLD Capabilities And Operations subfield**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| Max Allowed Setup Links | Indicates the maximum number of setup links which a non-AP MLD is allowed to establish with the AP MLD. | Reserved when carried in a frame that is not a Beacon frame or a broadcast Probe Response frame.  Indicates the maximum number of setup links which a non-AP MLD is allowed to establish with the AP MLD. A value of 0 indicates that the AP MLD does not advertise any such limit. Values 1 and 2 are reserved.  See 35.3.5.1 (ML (re)setup procedure) and 35.3.6.4 (ML reconfiguration to the ML setup) |

﻿**35.3.5 ML (re)setup**

﻿35.3.5.1 ML (re)setup procedure

…

﻿NOTE 1—Prior to utilizing (Re)Association Request/Response frame exchange to perform ML (re)setup with an AP

MLD, the non-AP MLD and AP MLD follow the authentication procedure between MLDs as described in 11.3 (STA

authenticationAuthentication and association).

An AP MLD that limits the maximum number of setup links which a non-AP MLD is allowed to establish to a value less than the total number of links supported by the AP MLD, shall advertise the maximum number of setup links allowed via the Max Allowed Setup Links subfield in the Extended MLD Capabilities And Operations subfield in the Basic ML element transmitted by its affiliated APs.

…

﻿In the (Re)Association Response frame, the AP MLD shall indicate the requested link(s) that are accepted

and the requested link(s) that are rejected for (re)setup and the capabilities and operational parameters of the

requested link(s) as described in 35.3.5.4 (Basic Multi-Link element usage in the context of ML (re)setup,

authentication, and FT action frame exchange between two MLDs). The AP MLD (#19244)shall do one of the following:

* ﻿accept all the links that are requested for (re)setup, or
* accept a subset of the links that are requested for (re)setup, and the subset of the links include the link on which the (Re)Association Request frame was received, or
* ﻿reject all the links that are requested for (re)setup.

If the Max Allowed Setup Links subfield is set to a value equal to or greater than 3, the AP MLD shall not accept number of requested links for the ML (re)setup greater than the value indicated in the Max Allowed Setup Links subfield, and in this case, the appropriate Status Code in the STA Profile subfield of the Per-STA Profile subelement in the (Re)Association Response frame to reject a requested link is REJECTED\_MAX\_ALLOWED\_SETUP\_LINKS\_REACHED.

#### **35.3.5.4 Basic Multi-Link element usage in the context of ML (re)setup, authentication, and**

#### **FT action frame exchange between two MLDs**

…

﻿For each Per-STA Profile subelement included in the Link Info field, the Complete Profile subfield of the STA Control field shall be set to 1 (see 35.3.3.3 (Advertisement of complete or partial per-link information)) and the Status Code field included in the STA Profile subfield of the Per-STA Profile subelement shall indicate SUCCESS if the link is accepted or the appropriate failure cause as defined in 9.4.1.9 (Status Code field) if the link is not accepted. The Status Code field in the (Re)Association Response frame body shall indicate, as defined in 9.4.1.9 (Status Code field), whether the link on which the (Re)Association Request frame is received is accepted or not. The Status Code field included in the STA Profile subfield of the Per-STA Profile subelement shall indicate

DENIED\_LINK\_ON\_WHICH\_THE\_(Re)ASSOCIATION\_REQUEST\_FRAME\_IS\_TRANSMITTED\_NOT\_ACCEPTED if the Status Code field is not set to REFUSED\_REASON\_UNSPECIFIED and the link corresponding to the Per-STA Profile subelement is not accepted only because the link on which the (Re)Association Request frame is transmitted is not accepted.

…

﻿35.3.6 ML reconfiguration

﻿35.3.6.4 ML reconfiguration to the ML setup

…

﻿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 Max Allowed Setup Links subfield is set to a value equal to or greater than 3, the AP MLD shall not accept an add link request which results in number of setup links becoming greater than the value indicated in the Max Allowed Setup Links subfield, after the number of setup links is updated to reflect delete link operation(s) (if any) in the Link Reconfiguration Request frame, and in this case, the appropriate Status Code in the Link Reconfiguration Response frame to reject an add link request is REJECTED\_MAX\_ALLOWED\_SETUP\_LINKS\_REACHED.

The AP MLD may reject an add link operation received in the Link Reconfiguration Request frame if the number of existing setup link(s) that are not requested to be deleted, plus the number of setup link(s) that are requested to be deleted, plus the number of setup link(s) that are requested to be added is greater than the value indicated in the Max Allowed Setup Links subfield.

…

If a 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 it 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 TTLM is established for that TID.

############### ------------ End of changes for CID 20035 ------------------ ############