IEEE P802.11
Wireless LANs

|  |
| --- |
| 11be D2.0 CR for 4.3 and 4.5 Part I |
| Date: 2022-08-01 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel |  |  |  |

Abstract

This submission proposes resolutions for the following CIDs:

10269, 10516, 10517, 10518, 13527, 13528, 13521, 13289, 12766, 13290,

11708, 12251, 12252, 13524, 10270, 10271, 10272, 10273, 10274, 10275,

12253, 12254, 12255, 10590, 11918, 11085, 13291,

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Add green tag from Alfred.
* Rev 2: Revision based on the comments from Abhi.
* Rev 3: Add 3 CIDs (10590, 11918, 11085) related to the existing document

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 D2.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D2.0 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** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 10269 | Michael Montemurro | 4.3.21.24 | 56.42 | The changes to the sentence in this draft does not make sense in this clause. Also the MLD Max idle period subclause should follow this clause. | Revert all cited changes to this paragraph.Add the following sentence at the end of the cited paragraph: MLD max idle period is described in 4.3.21.3.Move subclause 4.3.21.24 after 4.3.21.2. | Revised –We add additional description for MLO at the end.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10269 |
| 10516 | Abhishek Patil | 4.3.21.23 | 56.54 | For MLO, WNM Sleep means that all STAs of a non-AP MLD are not listening for every DTIM beacon frame on their respective links. Replace "STAs affiliated with a non-AP MLD" with 'all STAs affiliated with a non-AP MLD" | As in comment | Accepted -  |
| 10517 | Abhishek Patil | 4.3.21.23 | 56.56 | The term non-MLO is used at several location in the spec. Add a definition for this term. | As in comment | Rejected – Non-HE, non-GLK, non-STBC have been defined in the spec without specific definition. Non-MLO simply means non-multi-link operation.  |
| 10518 | Abhishek Patil | 4.3.21.24 | 57.11 | Spec is lacking details on relationship between DS/ESS/SSID for an AP MLD | Add text to clause 4.3.5.2 or create a new subclause to explain that all APs affiliated with the same AP MLD have the same SSID and are connected to the same DS and belong to the same ESS. | Revised –We add one sentence in 4.3.5.2.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10518 |
| 13527 | Mark Hamilton | 4.3.21.24 | 57.10 | Ambiguity. Does "on any link" mean that no frames were received when considering all the links (so no link had a frame receipt), or does it mean on any given link there is a nonreceipt of frames? | Clarify the text. | Revised – The intention is no frames were received on at least one of the setup link(s).We revise the sentence along this line.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13527 |
| 13528 | Mark Hamilton | 4.3.21.2 | 56.42 | Odd wording | Change "When association is not for an MLD association" to "For an association that is not an MLD association". Similarly at the end of the sentence inside the parentheses. | Revised – We simply say “For non-MLO”.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13528 |
| 13521 | Mark Hamilton | 4.5.3.2 | 57.46 | Grammar and word usage. | Change as follows:A non-AP MLD movement from one AP MLD in one ESS, where each non-AP STA affiliated with the non-AP MLD [delete "being"] \_is\_ in one BSS and different non-AP STAs affiliated with the non-AP MLD [delete "being"] \_are\_ in different BSSs, to another AP MLD within the same ESS, where each non-AP STA affiliated with the non-AP MLD [delete "being in"] \_is a member of\_ another BSS and different non-AP STAs affiliated with the non-AP MLD [delete "being in"] \_are members of\_ different BSSs.\*A non-AP MLD movement from one AP MLD in one ESS, where each non-AP STA affiliated with the non-AP MLD [delete "being"] \_is\_ in one BSS and different non-AP STAs affiliated with the non-AP MLD [delete "being"] \_are\_ in different BSSs, to another BSS within the same ESS and [delete "being"] \_thereby becoming\_ a non-AP STA, where the MLD MAC address of the non-AP MLD is the same as the MAC address of the non-AP STA.\*A non-AP STA movement from one BSS in one ESS to an AP MLD within the same ESS and [delete "being"] \_thereby becoming\_ a non-AP MLD, where each non-AP STA affiliated with the non-AP MLD [delete "be"] \_is\_ in another BSS, different non-AP STAs affiliated with the non-AP MLD [delete "being"] \_are\_ in different BSSs and the MAC address of the non-AP STA is the same as the MLD MAC address of the non-AP MLD. | Revised – Agree in principle with the editorial suggestion. “STAs within a BSS” is used in the baseline. We use “within” rather than “a member of”. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13521 |
| 13289 | Binita Gupta | 4.5.3.2 | 57.46 | Text for BSS-transition between AP MLDs reads broken and could be simplified. The text "where each non-AP STA affiliated with the non-AP MLD being in one BSS and different non-AP STAs affiliated with the non-AP MLD being in different BSSs," is not needed because that is per definition of MLD association. Suggest to simplify by reducing text and removing the broken flow in the sentence. | Change second bullet as follows "A non-AP MLD movement from one AP MLD in one ESS to another AP MLD within the same ESS, where each non-AP STA affiliated with the non-AP MLD has transitioned to another BSS after the movement and different non-AP STAs affiliated with the non-AP MLD are in different BSSs." | Revised – Agree in principle to revise the description. We note that it is possible that the number of affiliated non-AP STAs of a non-AP MLD may change. Hence, it is not correct to say that each non-AP STA affiliated with the non-AP MLD has transitioned. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13521 |
| 12766 | Romain GUIGNARD | 4.5.3.2 | 57.46 | Clarification of the BSS-transition paragraph could be helpful. For instance the part "where each non-AP STA affiliated with the non-AP MLD being in one BSS and different non-AP STAs affiliated with the non-AP MLD being in different BSSs" is not clear. | As in comment | Revised – Agree in principle to revise the description. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13521 |
| 13290 | Binita Gupta | 4.5.3.3 | 57.52 | Text for BSS transition of non-AP MLD from an AP MLD to a BSS reads broken and can be rephrased to simplify. The text "where each non-AP STA affiliated with the non-AP MLD being in one BSS and different non-AP STAs affiliated with the non-AP MLD being in different BSSs" is not needed as this is per definition of MLD association. | Simplify as follows: "A non-AP MLD movement from an AP MLD in one ESS to another BSS within the same ESS as a non-AP STA,where the MLD MAC address of the non-AP MLD is the same as the MAC address of the non-AP STA." | Revised – Agree in principle to revise the description.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13521 |
| 11708 | Gaurav Patwardhan | 4.5.3.2 | 57.48 | "Being in one BSS" is incorrect.In this entire sublcause there are multiple instances of this. Replace with a more appropriate phrase which uses pre-defined terms like co-located, etc. | as in comment | Revised – “STAs within a BSS” is used in the baseline. We change “being” to “within”TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13521 |
| 12251 | Stephen McCann | 4.5.3.2 | 57.47 | I think the phrase "non-AP STAs affiliated with the non-AP MLD" does not require the non-AP at the start. It is redundant. | Change all occurrences of "non-AP STAs affiliated with the non-AP MLD" to "STAs affiliated with the non-AP MLD" | Rejected – Only non-AP STAs affiliated with a non-AP MLD. AP can not affiliate with a non-AP MLD. |
| 12252 | Stephen McCann | 4.5.3.2 | 57.54 | This phrase "and being a non-AP STA" is redundant. I think It's obvious. | Remove the phrase "...and being a non-AP STA" from the end of the cited line | Rejected – We note that it is important to clarify the entity when we describe roaming scenario from MLD to legacy AP. This is the reason why we specify “being a non-AP STA” when connects to legacy AP. MLD entity can not be used to connect legacy STA entity. |
| 13524 | Mark Hamilton | 4.5.3.2 | 37.52 | The transition from MLO to legacy (or vice versa) as described in 4.5.3.2 is limited to transitioning to "another BSS" within the same ESS. So, this elimitates changing to/from MLO/legacy while remaining on the same AP MLD/affiliated AP. This seems like an unnecessary restriction. The non-AP STA/MLD should be able to reassociate from an AP MLD to one of the affiliated APs (into legacy mode), or from an affiliated AP to the AP MLD. | The change doesn't really belong here, as this subclause of 4 is trying to introduce the concepts of mobility and "real" transitions. However, the discussion at the end of the penultimate paragraph of 4.5.3.4 does not seem to include reassociation from an AP MLD to an affiliated AP, or vice versa. I'm not sure how much (if any) state information can be retained during such a transition, so 11.3.6.4 (c) should be clarified appropriately (whatever is appropriate), and 11.3.6.5 (q) and (q1) should also be clarified appropriately. | Revised – The described behavior theoretically is not prevented by the texts. The only limitation is that the MLD MAC address of the non-AP MLD to be the same as the MAC address of the non- AP STA. Also note that it is possible to reassociate to the same MLD even the second bullet say “another” as well.It is also possible to reassociate to the same AP in the baseline even the sentence below says “another”. *A STA movement from one BSS in one ESS to another BSS within the same ESS.*If the debate becomes whether above operations can be called “movement”, then it is indeed correct that we have to look at the texts in 11.3. Finally, note that 11.3.6.4 Non-AP, non-AP MLD, and non-PCP STA reassociation initiation procedures, focus only on the new target, and discuss whether the old target is the same as the new target. In that sense, in all the cases, when the old target and new target are different, states are simply deleted. *In the case of reassociation to a different AP, AP MLD, or PCP (the CurrentAPAddress parameter isnot the new AP’s or PCP’s MAC address or the new AP MLD’s MAC address), all the states, agreements and allocations listed above are deleted or reset to initial values.*Finally, for 11.3.6.5 (q) and (q1), if the new target is AP, then 11.3.6.5 (q) applies. If the new target is AP MLD, then 11.3.6.5 (q1) applies. We revise 11.3.6.5 (q) and 11.3.6.5 (q1) to clarify this.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 13524 |
| 10270 | Michael Montemurro | 4.5.3.3 | 58.32 | In the baseline, the term "STA association procedures" is used about 11 times. This text appears to define new terms "STA association procedures". Either we need to define these terms and fix the baseline, or restructure the text to describe MLD association differently - and move the definition to clause 3. | Change"For a non-GLK STA that is not affiliated with an MLD, the act of becoming associated with an AP invokes the association service (STA association), which provides the STA to AP mapping to the DS. For a non-AP MLD, the act of becoming associated with an AP MLD invokes the association service (MLD association, see 11.3 (STA authenticationAuthentication and association)), which provides the non-AP MLD to AP MLD mapping to the DS. How the information provided by the association service is stored and managed within the DS is not specified by this standard."to"For a non-GLK STA, the act of becoming associated with an AP invokes the association service, which provides the STA to AP mapping to the DS. For a non-AP MLD, the act of becoming associated with an AP MLD invokes the association service (see 11.3 (Authentication and association)), which provides the non-AP MLD to AP MLD mapping to the DS. How the information provided by the association service is stored and managed within the DS is not specified by this standard. | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 10271 | Michael Montemurro | 4.5.3.3 | 58.28 | The cited paragraph is not needed. | Delete "Association between two STAs is called STA association. Association between a non-AP MLD and an AP MLD is called MLD association." | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 10272 | Michael Montemurro | 4.5.3.3 | 58.43 | "between two STAs or multiple IEEE 802.11 links between two MLDs." | Delete "Association between two STAs is called STA association. Association between a non-AP MLD and an AP MLD is called MLD association."between two STAs or multiple IEEE 802.11 links between two MLDs."Add the following sentence after the first sentence: "For MLO, the IEEE 802.1X control port determines when to allow data traffic across all links between MLDs." | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 10273 | Michael Montemurro | 4.5.3.3 | 58.65 | To be consistent with the previous sentence, change "an MLD association" to "a non-AP MLD association" and ad a comma after completed. | At 58.64, Change "Once a non-AP STA association is completed, a non-AP STA..."to"Once an association is completed for a non-AP STA, the non-AP STA...""Similarly, once an MLD association is completed a non-AP MLD can make full use of the DS (via the AP MLD) to communicate."to"Similarly, once an association is completed for a non-AP MLD, the non-AP MLD can make full use of the DS to communicate." | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 10274 | Michael Montemurro | 4.5.3.3 | 59.01 | The text is repetitive and just confuses the reader. | At cited location, change"STA association is always initiated by the non-AP STA, not the AP. MLD association is always initiated by the non-AP MLD, not the AP MLD."to"Association is always initiated by a non-AP STA or non-AP MLD." | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 10275 | Michael Montemurro | 4.5.3.3 | 59.09 | The text just verbose and confusing | Change the text from:"A non-AP STA or a non-AP MLD learns what APs or AP MLDs, respectively, are present and what operational capabilities are available from each of those APs or AP MLDs and APs affiliated with each AP MLD, respectively, and then invokes the association service to establish an STA or an MLD association, respectively.."to"A non-AP STA or a non-AP MLD discovers what APs or AP MLDs are present and what operational capabilities are available, respectively, and then invokes the association service to establish an association." | Revised – We revise the STA association and MLD association correspondingly. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 12253 | Stephen McCann | 4.5.3.3 | 58.27 | The use of the term "STA association" will lead to issues with legacy baseline text. For example within clause 11.3.1, the sentence at P307L14 should discuss "STA association", which it does not. It is going to be difficult to change every occurrence of "association" into either "STA association" or "MLD association" and I recommend that this be avoided. | Rename "STA association" to "association" throughout the draft. | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 12254 | Stephen McCann | 4.5.3.3 | 58.63 | "a non-AP STA association" has not been defined and I think this is a normal "STA association". | Change "non-AP STA association" to "STA association". | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 12255 | Stephen McCann | 4.5.3.4 | 59.56 | The term "association" does not exist anymore (see P58L63). It needs to be expanded. | Change "established association" to "established STA or MLD association". | Revised – STA association or MLD association are created to quickly differentiate the difference for association between STAs or association between MLDs. The definition is specifically like that. For all the cases that we need the differentiation, it is possible to:1. Use MLO or non-MLO2. Use association between STAs or association between MLDs.It is also true that we do not specifically define MLD authentication or MLD disauthentication or STA authentication or STA disauthentication. If we need to specifically define all these terms, then creating all these new terms may not be so useful. We revise globally to simply use above options rather than creating new terms to better integrate with the baseline. TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 10590 | Abhishek Patil | 11.21.13 | 330.20 | The phrase "association is for MLD" is not clear. | Use phrase like: "When association is between two MLDs ..." and on line 24: "... association is between an AP and a non-AP, in which either is not affiliated with an MLD ..." | Revised – We simply use for non-MLO or for MLO.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 11918 | Alfred Asterjadhi | 11.21.13 | 330.20 | What does it mean "when association is for an MLD association"? Replace with "When the association is between two MLDs". And replace "is not for an MLD associatin" with "is not between two MLDs". | As in comment. | Revised – We simply use for non-MLO or for MLO.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 11085 | Po-Kai Huang |   | 0.00 | Reference for MLD association needs to include 4.5.3.3. | For every instance of "MLD assocaition ( see XXX)", if the reference is not 4.5.3.3, revise as "MLD assocaition (see 4.5.3.3 and XXX)" | Revised – We simply use for non-MLO or for MLO.TGbe editor to make the changes shown in 11-22/1236r3 under all headings that include CID 10270 |
| 13291 | Binita Gupta | 4.5.3.4 | 58.01 | ESS-transition text should also cover non-AP MLD movement across ESSs. Updated text to add this. | As in comment. | Rejected – Based on the current spec, there is no protocol to define ESS-transition since the state can not be maintained. If there is no defined protocol, then there is a question why we even add this description for MLD. Suggest not to update the description.  |

**Discussion: None**

***TGbe editor: Change 4.3.21.2 BSS max idle period management* *as follows (track change on):***

**4.3.21 Wireless network management**

**4.3.21.2 BSS max idle period management**

***Change as follows:***

For non-MLO(#13528), BSS max idle period manage- ment enables an AP to indicate a time period during which the AP does not disassociate a STA due to nonre- ceipt of frames from the STA. This supports improved STA power saving and AP resource man- agement. MLD max idle period management is described in [4.3.21.24 (MLD max idle period management](#bookmark0)).(#10269)

***TGbe editor: Change 4.3.21.23 WNM sleep mode as follows (track change on):***

**4.3.21.23 WNM sleep mode**

***Change as follows:***

WNM sleep mode is an extended power save mode ~~for non-AP STAs~~ in which a non-AP STA or all(#10516) STAs affil- iated with a non-AP MLD need not listen for every DTIM Beacon frame, and need not perform GTK/IGTK/ BIGTK updates. For non-MLO, WNM sleep mode enables a non-AP STA to signal to an AP that it might sleep for a specified length of time. For MLO, WNM sleep mode enables a STA affiliated with the non-AP MLD to signal to an AP affiliated with the AP MLD that all the STAs affiliated with the non-AP MLD might sleep for a specified length of time. This enables a non-AP STA or a non-AP MLD to reduce power consumption and remain associated while the non-AP STA or the non-AP MLD has no traffic to send to or receive from the AP or AP MLD.

***TGbe editor: Move 4.3.21.24 MLD max idle period management to be after 4.3.21.2 BSS max idle period management*: (#10269)**

***TGbe editor: Change 4.3.21.24 MLD max idle period management as follows (track change on):***

***Insert the following new subclause at the end of subclause 4.3.21 (Wireless network manage- ment):***

**4.3.21.24 MLD max idle period management**

For MLO, MLD max idle period management service enables an AP MLD to indicate a time period during which the AP MLD does not disassociate a non-AP MLD due to nonreceipt of frames from the non-AP MLD on at least one of the setup link(s).(#13527) This supports improved power saving at the non-AP MLD and resource manage- ment at the AP MLD.

***TGbe editor: Change 4.3.5.2 Extended service set (ESS): the large coverage network as follows (track change on):***

**4.3.5.2 Extended service set (ESS): the large coverage network**(M12)The DS and infrastructure BSSs allow IEEE Std 802.11 to create a wireless network of arbitrary size
and complexity. IEEE Std 802.11 refers to this type of network as the ESS. An ESS is the union of the
infrastructure BSSs with the same SSID connected by a single DS. All BSSs in an ESS have the same SSID. All BSSs created by APs affiliated with an AP MLD have the same SSID and belong to the same ESS.(#10518) The ESS does not include the DS.

***TGbe editor: Change 4.5.3.2 Mobility types* *as follows (track change on):***

**4.5.3.2 Mobility types**

***Change the first paragraph as follows:***

The three transition types of significance to this standard that describe the mobility of STAs or MLDs within a network are as follows:

* + - * 1. ***No-transition:*** In this type, two subclasses that are usually indistinguishable are identified:

Static—no motion.

Local movement—movement within the PHY range of the communicating STAs, i.e., movement within a basic service area (BSA).

* + - * 1. ***BSS-transition:*** This type is defined for a STA or an MLD as follows:
* ~~a~~A STA movement from one BSS in one ESS to another BSS within the same ESS.
* A non-AP MLD movement from one AP MLD in one ESS, where each non-AP STA affiliated with the non-AP MLD is within one BSS and different non-AP STAs affiliated with the non-AP MLD are within different BSSs, to another AP MLD within the same ESS, where each non-AP STA affiliated with the non-AP MLD is within another BSS and different non-AP STAs affiliated with the non-AP MLD are within different BSSs. (#13521)
* A non-AP MLD movement from one AP MLD in one ESS, where each non-AP STA affiliated with the non-AP MLD is within one BSS and different non-AP STAs affiliated with the non-AP MLD are within different BSSs, to another BSS within the same ESS and becoming a non-AP STA, where the MLD MAC address of the non-AP MLD is the same as the MAC address of the non- AP STA. (#13521)
* A non-AP STA movement from one BSS in one ESS to an AP MLD within the same ESS and becoming a non-AP MLD, where each non-AP STA affiliated with the non-AP MLD is within another BSS, different non-AP STAs affiliated with the non-AP MLD are within(#11708) different BSSs and the MAC address of the non-AP STA is the same as the MLD MAC address of the non-AP MLD. (#13521)

A fast BSS transition is a BSS transition that establishes the state necessary for data connectivity before the reassociation rather than after the reassociation.

(…existing texts ….)

* + - * 1. ***ESS-transition:*** This type is defined as STA movement from a BSS in one ESS to a BSS in a different ESS. This case is supported only in the sense that the STA might move. Maintenance of upper-layer connections cannot be guaranteed by IEEE Std 802.11; in fact, disruption of service is likely to occur.

***Move the following third paragraph as the first paragraph of this subclause:***

The different association services support the different categories of mobility.

***TGbe editor: Change 11.3.6.5 AP, AP MLD, or PCP reassociation receipt procedures***

***as follows (track change on):***

**11.3.6.5 AP, AP MLD, or PCP reassociation receipt procedures**

(…existing texts ….)

***Change the remaining paragraphs of the subclause as follows:***

The following procedure shall be used by an AP or PCP u~~U~~pon receipt of a Reassociation Request frame from a STA ~~the AP or PCP shall use the following procedure~~ or by an AP affiliated with an AP MLD upon receipt of a Reassociation Request frame with Basic Multi-Link element from a non-AP STA affiliated with a non-AP MLD:

(…existing texts ….)

* + - * 1. If the ResultCode in the MLME-REASSOCIATE.response primitive is SUCCESS and the CurrentAPAddress parameter in the MLME-REASSOCIATION.indication primitive is not this AP’s or PCP’s MAC address(#13524), all the states, agreements and allocations pertaining to the associating STA and listed in both numbered lists in [11.3.6.4 (Non-AP,](#bookmark5) [non-AP MLD, and non-PCP STA reassociation initiation procedures)](#bookmark5) item c) are deleted or reset to initial values.

q1) If the ResultCode in the MLME-REASSOCIATE.response primitive is SUCCESS and the CurrentAPAddress parameter in the MLME-REASSOCIATION.indication primitive is not this AP MLD’s MLD MAC address(#13524), all the states, agreements and allocations pertaining to the associating non-AP MLD and listed in both numbered lists in [11.3.6.4](#bookmark5) [(Non-AP, non-AP MLD, and non-PCP STA reassociation initiation procedures](#bookmark5)) item c) are deleted or reset to initial values.

***TGbe editor: Change 4.5.3.3 Association as follows (track change on):***

**4.5.3.3 Association**

***Change the first three paragraphs as follows:***

To deliver an MSDU within an ESS via the DS, the DS needs to know which AP or AP MLD within the ESS to deliver the MSDU, so that the MSDU might ultimately be delivered to the addressed IEEE 802.11 non- AP STA or non-AP MLD. This information is provided to the DS by the concept of association. Association is necessary, but not sufficient, to support BSS-transition mobility. Association is sufficient to support no- transition mobility. Association is one of the services in the DSS.

Before a non-AP STA or a non-AP MLD is allowed to ~~send~~deliver an MSDU via an AP or an AP MLD, respectively, it first becomes associated with the AP or the AP MLD, respectively.

(#10270)

For a non-GLK STA that is not affiliated with an MLD, the act of becoming associated with an AP invokes the association service , which provides the STA to AP mapping to the DS. For a non-AP MLD, the act of becoming associated with an AP MLD invokes the association service ( see 11.3 (STA authenticationAuthentication and association)), which provides the non-AP MLD to AP MLD mapping to the DS. How the information provided by the association service is stored and managed within the DS is not specified by this standard.(#10270)

***Change the fifth paragraph as follows:***

Within a robust security network (RSN), association is handled differently. In an RSNA, the IEEE 802.1X Port determines when to allow data traffic across an IEEE 802.11 link between two STAs or multiple IEEE 802.11 links between two MLDs. A single IEEE 802.1X Port maps to one association, and each association maps to an IEEE 802.1X Port. An IEEE 802.1X Port consists of an IEEE 802.1X Controlled Port and an IEEE 802.1X Uncontrolled Port. The IEEE 802.1X Controlled Port is blocked from passing general data traffic between two STAs or between two MLDs until an IEEE 802.1X authentication procedure completes successfully over the IEEE 802.1X Uncontrolled Port. Once the AKM completes successfully, data protection is enabled to prevent unauthorized access, and the IEEE 802.1X Controlled Port unblocks to allow protected data traffic. IEEE 802.1X Supplicants and Authenticators exchange protocol information via the IEEE 802.1X Uncontrolled Port. It is expected that most other protocol exchanges use the IEEE 802.1X Controlled Ports. However, a given protocol might need to bypass the authorization function and make use of the IEEE 802.1X Uncontrolled Port.

***Change the seventh, eighth, and ninth paragraphs as follows:***

At any given instant, a non-AP STA is associated with no more than one AP, and a non-AP MLD is associated with no more than one AP MLD. This allows the DS to determine a unique answer to the questions, “Which AP is serving non-AP STA X?” and “Which AP MLD is serving non-AP MLD X?” Once ~~an~~a association is completed between a non-AP STA and an AP, a non-AP STA can make full use of a DS (via the AP) to communicate. Similarly, once an association is completed between a non-AP MLD and an AP MLD, a non-AP MLD can make full use of a DS (via the AP MLD) to communicate. Association between a non-AP STA and an AP is always initiated by the non-AP STA, not the AP. Association between a non-AP MLD and an AP MLD is always initiated by the non-AP MLD, not the AP MLD. (#10270)

An AP or an AP MLD might be associated with many non-AP STAs or non-AP MLDs, respectively, at the same time.

A non-AP STA or a non-AP MLD learns what APs or AP MLDs, respectively, are present and what opera- tional capabilities are available from each of those APs or AP MLDs and APs affiliated with each AP MLD, respectively, and then invokes the association service to establish an association with an AP or an AP MLD, respec- tively. A FILS STA is able to discover, authenticate and associate with the AP with a reduced number of frame transmissions. For details of how a STA learns about what APs are present, see 11.1.4 (Acquiring syn- chronization, scanning).(#10270)

**4.5.3.4 Reassociation**

***Change the first paragraph as follows:***

Association is sufficient for no-transition MSDU delivery between IEEE 802.11 STAs or MLDs. Additional functionality is needed to support BSS-transition mobility. The additional required functionality is provided by the reassociation service. Reassociation is one of the services in the DSS.

***Change and split the second paragraph as follows:***

The reassociation service (see 11.3.6 (Association, reassociation, and disassociation)) is invoked to “move”:

* a current association (see [4.5.3.3 (Association](#bookmark1)) and 11.3 (STA authenticationAuthentication and association)) of a non-AP STA with an AP from the AP to the same AP or another AP or
* a current association (see [4.5.3.3 (Association](#bookmark1)) and 11.3 (STA authenticationAuthentication and association)) of a non-AP MLD with an AP MLD from the AP MLD to the same AP MLD or another AP MLD or
* a current association of a non-AP STA with an AP to an association of a non-AP MLD with an AP MLD, where the MAC address of the non-AP STA is the same as the MLD MAC address of the non-AP MLD or
* a current association of a non-AP MLD with an AP MLD to an association of a non-AP STA with an AP, where the MLD MAC address of the non-AP MLD is the same as the MAC address of the non-AP STA. (#10270)

In an ESS with a DS, the reassociation service informs the DS of the current mapping between AP and non- AP STA or between AP MLD and non-AP MLD ~~as the STA moves from BSS to BSS within the ESS~~. For a general link in an IEEE 802.1Q network, the reassociation service informs higher layer services how the link is reconfigured, commonly, with which BSS the GLK non-AP STA is a member of. The higher layer services will then destroy, disable, or maintain the existing Internal Sublayer Service SAPs, create or enable new Internal Sublayer Service SAPs, inform the GLK convergence function of the reconfigured general link mapping of the Internal Sublayer Service SAPs, and inform the network routing protocol of the updated general link. The GLK AP and GLK non-AP STA each then establish or maintain a service\_access\_point\_identifier for the reconfigured general link, for their respective MS SAPs. Reassociation also enables changing association attributes of an established association while the non-AP STA or non-AP MLD remains associated with the same AP or the same AP MLD, respectively. Reassociation is always initiated by the non-AP STA or the non-AP MLD.

***Change the last paragraph as follows:***

Only the fast BSS transition facility can move an RSNA during reassociation. Therefore, if FT is not used, the old RSNA is deleted and a new RSNA is constructed.

**4.5.3.5 Disassociation**

***Change the second paragraph as follows:***

For a non-GLK STA that is not affiliated with an MLD, the act of becoming disassociated invokes the disassociation service, which voids any existing non-AP STA to AP mapping known to the DS, for the disassociating non-AP STA. For a non-AP MLD, the act of becoming disassociated invokes the disassociation service, which voids any existing non-AP MLD to AP MLD mapping known to the DS, for the disassociating non-AP MLD (see 35.3.5.3 (Multi-link tear down procedure)).

***Change the fourth, fifth, and sixth paragraphs as follows:***

The disassociation service can be invoked by either party in an association between a non-AP STA and an AP (see [4.5.3.3 (Association)](#bookmark1)) or an association between a non-AP MLD and an AP MLD. Disassociation is a notification, not a request. Disassociation cannot be refused by the receiving STA or the receiving MLD except when management frame protection is negotiated and the message integrity check fails.(#10270)

An AP or an AP MLD can disassociate non-AP STAs or non-AP MLDs, respectively, to enable the AP or the AP MLD to be removed from a network for service or for other reasons.

STAs or MLDs attempt to disassociate when they leave a network. However, the MAC protocol does not depend on STAs or MLDs invoking the disassociation service. (MAC management is designed to accommodate loss of communication with an associated STA or an associated MLD.)

**6.3.7.2 MLME-ASSOCIATE.request**

**6.3.7.2.1 Function**

***Change the first paragraph as follows:***

This primitive requests association with a specified peer MAC entity that is within an AP or an AP MLD.

**6.3.7.2.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-ASSOCIATE.request(

...

EHTCapabilities, MultiLink, Recommended Link, TID-To-Link Mapping, VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| ListenInterval | Integer |  0 | For non-MLO, specifies how often the STA awakens and listens for the next Beacon frame, if it enters power save mode For MLO, specifies how often at least one STA affiliated with the MLD awakens and lis- tens for the next Beacon frame, if all STAs affiliated with the MLD enter power save mode (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the local MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| Recommended Link | Link ID subfield | 0–15 | Indicates a value that uniquely identifies the link upon which the Association Request frame can be transmitted by a non-AP STA affiliated with a non-AP MLD. This parameter is present if dot11- MultiLinkActivated is true and is absent otherwise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. (#10270)Otherwise it is not present. |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.7.2.3 When generated**

***Change the first paragraph as follows:***

This primitive is generated by the SME when a STA wishes to establish association with an AP or PCP, or when a non-AP MLD wishes to establish association with an AP MLD.

**6.3.7.2.4 Effect of receipt**

***Change the first paragraph as follows:***

This primitive initiates an association procedure. In the case that a response is received from the responder STA or responder MLD, the MLME subsequently issues an MLME-ASSOCIATE.confirm primitive that reflects the results.

**6.3.7.3 MLME-ASSOCIATE.confirm**

**6.3.7.3.1 Function**

***Change the first paragraph as follows:***

This primitive reports the results of an association attempt with a specified peer MAC entity that is in an AP or PCP, or in an AP MLD.

**6.3.7.3.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-ASSOCIATE.confirm(

...

EHTCapabilities, EHTOperation, MultiLink,

TID-To-Link Mapping, VendorSpecificInfo)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeri od | As defined in BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | For non-MLO, indicates the BSS max idle period parameters of the AP or PCP; For MLO, indicates the MLD max idle period parameter of the AP MLD. This parameter is present if dot11WirelessManagementImple mented is true and is not present otherwise. (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| EHTOperation | EHT Operation element | As defined in 9.4.2.311 (EHT Operation element) | Provides additional information for operating the EHT BSS. This parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| MultiLink | Basic Multi- Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the peer MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivate d is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to- link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificIn fo | A set of elements | As defined in 9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.7.3.3 When generated**

***Change the first paragraph as follows:***

This primitive is generated by the MLME as a result of an MLME-ASSOCIATE.request primitive or receipt of an Association Response frame from the peer MAC entity to associate with a specified peer MAC entity that is in an AP or PCP, or in an AP MLD.

**6.3.7.4 MLME-ASSOCIATE.indication**

**6.3.7.4.1 Function**

***Change the first paragraph as follows:***

This primitive indicates that a specific peer MAC entity is requesting association with the local MAC entity, which is in an AP or PCP, or in an AP MLD.

**6.3.7.4.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-ASSOCIATE.indication(

...

EHTCapabilities, MultiLink,

TID-To-Link Mapping,

VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| ListenInterval | Integer |  0 | For MLO, specifies how often the STA awakens and listens for the next Beacon frame, if it enters power save mode.For non-MLO, specifies how often at least one STA affiliated with the MLD awakens and listens for the next Beacon frame, if all STAs affiliated with the MLD enter power save mode (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabili- ties element that are supported by the peer STA. The parameter is present if dot11EH- TOptionImplemented is true and the EHT Capabilities element is present in the Associa- tion Request frame received from the STA; otherwise not present. |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the peer MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.7.5 MLME-ASSOCIATE.response**

**6.3.7.5.1 Function**

***Change the first paragraph as follows:***

This primitive is used to send a response to a specific peer MAC entity that requested an association with the STA that issued this primitive, which is in an AP or PCP, or a response to a specific peer MAC entity that requested an association with the AP MLD that issued this primitive.

**6.3.7.5.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows:

MLME-ASSOCIATE.response(

...

EHTCapabilities, EHTOperation, MultiLink,

TID-To-Link Mapping, VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | For non-MLO, indicates the BSS max idle period parameters of the AP or PCP For MLO, indicate the MLD max idle period parameter of the AP MLD. This parameter is present if dot11WirelessManagementImplemented is true or dot11S1GOptionImplemented is true; otherwise not present. (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| EHTOperation | EHT Operation element | As defined in 9.4.2.311 (EHT Operation element) | Provides additional information for operating the EHT BSS. This parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the local MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.7.5.3 When generated**

***Change the first paragraph as follows:***

This primitive is generated by the SME of a STA that is in an AP or PCP as a response to an MLME-ASSO- CIATE.indication primitive, or by the SME of an AP MLD as a response to an MLME-ASSOCIATE.indi- cation primitive.

**6.3.8 Reassociate**

**6.3.8.1 Introduction**

***Change the first paragraph as follows:***

The following primitives describe how a STA becomes associated with another AP or PCP, or how a non-AP MLD becomes associated with another AP MLD.

**6.3.8.2 MLME-REASSOCIATE.request**

**6.3.8.2.1 Function**

***Change the first paragraph as follows:***

This primitive requests a change in association to a specified new peer MAC entity that is in an AP or PCP, or in an AP MLD.

**6.3.8.2.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-REASSOCIATE.request(

...

EHTCapabilities, MultiLink, Recommended Link, TID-To-Link Mapping, VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| ListenInterval | Integer |  0 | For non-MLO, specifies how often the STA awakens and listens for the next Beacon frame, if it enters power save mode.For MLO, specifies how often at least one STA affili- ated with the MLD awakens and listens for the next Beacon frame, if all STAs affili- ated with the MLD enter power save mode. (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the local MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| Recommended Link | Link ID subfield | 0–15 | Indicates a value that uniquely identifies the link upon which the Reassociation Request frame can be transmitted by a non- AP STA affiliated with a non-AP MLD. This parameter is present if dot11Multi- LinkActivated is true and is absent other- wise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.8.2.3 When generated**

***Change the first paragraph as follows:***

This primitive is generated by the SME for a STA to change association to a specified new peer MAC entity that is in an AP or PCP, or in an AP MLD.

**6.3.8.2.4 Effect of receipt**

***Change the first paragraph as follows:***

This primitive initiates a reassociation procedure. In the case that a response is received from the responder STA or MLD, the MLME subsequently issues an MLME-REASSOCIATE.confirm primitive that reflects the results.

**6.3.8.3 MLME-REASSOCIATE.confirm**

**6.3.8.3.1 Function**

***Change the first paragraph as follows:***

This primitive reports the results of a reassociation attempt with a specified peer MAC entity that is in an AP or PCP, or in an AP MLD.

**6.3.8.3.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-REASSOCIATE.confirm(

...

EHTCapabilities, EHTOperation, MultiLink,

TID-To-Link Mapping, VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | For non-MLO, indicates the BSS max idle period parameters of the AP or PCP For MLO, indicate the MLD max idle period parameter of the AP MLD. This parameter is present if dot11WirelessManagementImplemented is true or dot11S1GOptionImplemented is true; otherwise not present. (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| EHTOperation | EHT Operation element | As defined in 9.4.2.311 (EHT Operation element) | Provides additional information for operating the EHT BSS. This parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi- Link element | As defined in 9.4.2.312 (Multi- Link element) | Indicates the Multi-Link parameters of the peer MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID- To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificInfo | A set of elements | As defined in 9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.8.3.3 When generated**

***Change the first paragraph as follows:***

This primitive is generated by the MLME as a result of an MLME-REASSOCIATE.request primitive to reassociate with a specified peer MAC entity that is in an AP or PCP, or in an AP MLD.

**6.3.8.4 MLME-REASSOCIATE.indication**

**6.3.8.4.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-REASSOCIATE.indication(

...

EHTCapabilities, MultiLink,

TID-To-Link Mapping, VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| CurrentAPAddress | MAC address | Any valid individual MAC address | Specifies the address of the AP or PCP or MLD with which the peer STA is currently associated. |
| ListenInterval | Integer |  0 | For non-MLO, specifies how often the STA awakens and listens for the next Beacon frame, if it enters power save mode .For MLO, specifies how often at least one STA affili- ated with the MLD awakens and listens for the next Beacon frame, if all STAs affiliated with the MLD enter power save mode. (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capa- bilities element that are supported by the peer STA. The parameter is present if dot11EHTOptionImplemented is true and the EHT Capabilities element is present in the Reassociation Request frame received from the STA; otherwise not present. |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the peer MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**6.3.8.5 MLME-REASSOCIATE.response**

**6.3.8.5.1 Function**

***Change the first paragraph as follows:***

This primitive is used to send a response to a specific peer MAC entity that requested a reassociation with the STA that issued this primitive, which is in an AP or PCP, or in an AP MLD.

**6.3.8.5.2 Semantics of the service primitive**

***Change the primitive parameters as follows (not all existing parameters are shown):***

The primitive parameters are as follows: MLME-REASSOCIATE.response(

...

EHTCapabilities, EHTOperation, MultiLink,

TID-To-Link Mapping,

VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| BSSMaxIdlePeriod | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | For non-MLO, indicates the BSS max idle period parameters of the AP or PCP For MLO, indicates the MLD max idle period parameter of the AP MLD. This parameter is present if dot11WirelessManagementImplemented is true or dot11S1GOptionImplemented is true; otherwise not present. (#10270) |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| EHTOperation | EHT Operation element | As defined in 9.4.2.311 (EHT Operation element) | Provides additional information for operating the EHT BSS. This parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi- Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the local MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID- To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. (#10270) |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

**9.3.3.5 Association Request frame format**

***Insert three new rows to*** [***Table 9-62 (Association Request frame body(#10532))***](#bookmark67) ***in numeric order:***.

**Table 9-62—Association Request frame body(#10532)**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| <Last assigned + 1> | Multi-Link | The Basic Multi-Link element is present if dot11MultiLinkActi- vated is true (#11052)and the Association Request frame is sent to an AP affiliated with an AP MLD; otherwise it is not present. |

**Table 9-62—Association Request frame body(#10532) *(continued)***

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| <Last assigned + 2> | EHT Capabilities | The EHT Capabilities element is present if dot11EHTOptionIm- plemented is true; otherwise it is not present. |
| <Last assigned + 3> | TID-To-Link Map- ping | One or two TID-To-Link Mapping elements are present if dot11- MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and a non-AP STA affiliated with a non-AP MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present.- If two TID-To-Link Mapping elements are present then the Direction subfield in one of the TID-To-Link Mapping ele- ments is set to 0 and the Direction subfield in the other TID-To- Link Mapping element is set to 1. (#10270) |

**9.4.1.6 Listen Interval field**

***Change the first paragraph as follows:***

For non-MLO, the~~The~~ Listen Interval field is used to indicate to the AP how often an S1G STA with dot11NonTIMModeActivated equal to false or a non-S1G STA in power save mode wakes to listen to Beacon frames. It is also used to indicate to an AP the duration during which an S1G STA with dot11NonTIMModeActivated equal to true is required to transmit at least one frame that is addressed to the associated AP. This field is derived from the ListenInterval parameter when present as a parameter of an MLME primitive. The value is in units of beacon interval if dot11ShortBeaconInterval is false and in units of short beacon interval if dot11ShortBeaconInterval is true (see 11.1.3.10.2 (Generation of S1G Beacon frames)). (#10270)

For MLO, the Listen Interval field is used to indicate to the AP MLD how often at least a STA affiliated with a non-AP MLD wakes to listen to Beacon frames if all STAs affiliated with the non-AP MLD are in power save mode. This field is derived from the ListenInterval parameter when present as a parameter of an MLME primitive. The value is in units of the maximum value of beacon intervals corresponding to the links that the non-AP MLD intends to setup in the (Re)Association Request frame. (#10270)

The length of the Listen Interval field is 2 octets. The Listen Interval field is shown in Figure 9-88 (Listen Interval field format carried in a non-S1G PPDU).

***Change the second paragraph as follows:***

NOTE—The value 0 might be used by a STA that is not affiliated with an MLD or by a non-AP MLD whose all affili- ated STAs that never enters power save mode.

***Change the last paragraph as follows:***

For non-MLO, an~~An~~ AP uses the listen interval in determining the lifetime of frames that it buffers for a STA. (#10270)

For MLO, an AP MLD uses the listen interval in determining the lifetime of frames that it buffers for a non-AP MLD. (#10270)

**9.4.2.78 BSS Max Idle Period element**

***Change as follows:***

For non-MLO, the~~The~~ BSS Max Idle Period element contains the time period a non-AP STA can refrain from transmitting frames to the AP before the AP might disassociates the STA due to inactivity. (#10270)

For MLO, the BSS Max Idle Period element contains the time period a non-AP MLD can refrain from transmitting frames to the AP MLD (#10549)on any enabled link before the AP MLD might disassociate the non-AP MLD due to inactivity. (#10270)

The format of the BSS Max Idle Period element is shown in [Figure 9-522 (BSS Max Idle Period element](#bookmark110) [format)](#bookmark110).

|  |  |  |  |
| --- | --- | --- | --- |
| Element ID | Length | Max Idle Period | Idle Options |

Octets: 1 1 2 1

**Figure 9-522—BSS Max Idle Period element format**

The Element ID and Length fields are defined in [9.4.2.1 (General)](#bookmark97).

The BSSMaxIdlePeriod parameter indicates the idle timeout limit, as described in 11.21.13 (BSS max idle period management) and 35.3.12.3 (MLD max idle period management). The time period is specified in units of 1000 TUs. The value of 0 is reserved. In a non-S1G STA, the Max Idle Period field is an unsigned integer that contains the value of the parameter BSSMaxIdlePeriod. In an S1G STA, the two MSBs of the Max Idle Period field contain the Unified Scaling Factor subfield and the remaining 14 bits contain the Unscaled Interval subfield (see Figure 9-89 (Listen Interval field format carried in an S1G PPDU)). In an S1G STA, the BSSMaxIdlePeriod parameter used by the MLME primitives is in units of 1000 TUs and is equal to the value of the Unscaled Interval subfield, multiplied by the scaling factor that corresponds to the

value indicated in the Unified Scaling Factor subfield. The Unified Scaling Factor subfield encoding is defined in Table 9-48 (Unified Scaling Factor subfield encoding).

The Idle Options field indicates the options associated with the BSS Idle capability. The Idle Options field is shown in [Figure 9-523 (Idle Options field format)](#bookmark111).

B0 B1 B7

Reserved

Protected Keep-Alive Required

Bits: 1 7

**Figure 9-523—Idle Options field format**

The Protected Keep-Alive Required subfield is set to 1 to indicate that only a protected frame indicates activity. The Protected Keep-Alive Required subfield is set to 0 to indicate that either an unprotected or a protected frame indicates activity.

The BSS Max Idle Period element is included in Association Request and Response frames, as described in

[9.3.3.5 (Association Request frame format)](#bookmark66) and [9.3.3.6 (Association Response frame format)](#bookmark68), and Reassociation Request and Response frames, as described in [9.3.3.7 (Reassociation Request frame format)](#bookmark70) and [9.3.3.8 (Reassociation Response frame format)](#bookmark72). The use of the BSS Max Idle Period element and frames is described in 11.21.13 (BSS max idle period management) and 35.3.12.3 (MLD max idle period management).

**11.2.3.16.3 WNM sleep mode AP operation**

***Change the last paragraph as follows:***

For non-MLO, with RSN and a valid PTK is configured for the STA: (#10270)

If ~~RSN is used with~~ management frame protection and ~~a valid PTK is configured~~is negotiated for the STA, the current GTK, IGTK, and BIGTK shall be included in the WNM Sleep Mode Response frame.

If a GTK/IGTK/BIGTK update is in progress, the pending GTK, IGTK, and BIGTK shall be included in the WNM Sleep Mode Response frame.

If ~~RSN is used without~~ management frame protection ~~and a valid PTK is configured~~is not negotiated for the STA, the current GTK shall be sent to the STA using a group key handshake (see 12.7.7 (Group key handshake)) immediately following the WNM Sleep Mode Response frame.

For MLO, with RSN and a valid PTK is configured for the non-AP MLD: (#10270)

If management frame protection is negotiated for the MLDs, the current GTK, IGTK, and BIGTK for each setup link shall be included in the WNM Sleep Mode Response frame.

If a GTK/IGTK/BIGTK update is in progress for one or more links, the pending GTK(s), IGTK(s), and BIGTK(s) for each of the affected AP(s) shall be included in the WNM Sleep Mode Response frame. A non-AP MLD identifies the corresponding link to which the GTK/IGTK/BIGTK belongs based on the value of the Link ID subfield included in the subelement of the Key Data field.

If management frame protection is not negotiated for the MLDs, the current GTK for each setup link shall be sent to the non-AP MLD using a group key handshake (see 12.7.7 (Group key handshake)) immediately following the WNM Sleep Mode Response frame.

**11.3.6.2 Non-AP STA, non-AP MLD, and non-PCP STA association initiation procedures**

(…existing texts…)

NOTE—A non-AP MLD can disassociate from the associated AP MLD to allow a non-AP STA that was affiliated with
the non-AP MLD to send an Association Request frame without Basic Multi-Link element to perform
association with an AP. (#10270)

(…existing texts…)

**11.21.13 BSS max idle period management**

***Change the first paragraph, including splitting it into the three paragraphs as follows:***

If dot11BssMaxIdlePeriod is nonzero, an AP shall include the BSS Max Idle Period element in the (Re)Association Response frame. Otherwise, the AP shall not include the BSS Max Idle Period element in the (Re)Association Response frame.

For MLO, the values carried in the BSS Max Idle Period element apply at the MLD level and the associated MLDs follow the MLD max idle period procedure defined in 35.3.12.3 (MLD max idle period management). The rest of this subclause defines the procedure for the BSS max idle period for non-MLO. (#10270)

A non-S1G STA may send protected or unprotected keepalive frames, as indicated in the Idle Options field.

***Change the now shifted seventh paragraph as follows:***

A STA may send at least one protected or unprotected keepalive frame (such as Data frame, PS-Poll frame, or Management frame) per BSSMaxIdlePeriod, as indicated in the Idle Options field. ~~When a STA transmits an~~ ~~unprotected keepalive frame, it shall use a frame that has 48-bit TA and RA fields.~~

**35.3.7.1.4 Power state after enablement**When a link becomes enabled for a STA that is affiliated with a non-AP MLD after successful association with an AP MLD with (Re)Association Request/Response frames transmitted on that link, the power management
mode of the STA, immediately after the acknowledgement of the (Re)Association Response frame, is active
mode. (#10270)

When a link becomes enabled for a STA that is affiliated with a non-AP MLD after successful
association with an AP MLD with (Re)Association Request/Response frames transmitted on another link or after successful
TID-to-link mapping negotiation with TID-To-Link Mapping Request/Response frames transmitted on
another link, the power management mode of the STA, immediately after the acknowledgement of the
(Re)Association Response frame or of the TID-To-Link Mapping Response frame, is power save mode, and
its power state is doze. (#10270)

**35.3.18 Enhanced multi-link multi-radio operation**

(…existing texts…)

When a non-AP MLD with dot11EHTEMLMROptionImplemented equal to true (re)associates with an AP
MLD, the EMLMR mode is disabled by default. If a non-AP MLD with
dot11EHTEMLMROptionImplemented equal to true intends to switch EMLMR mode after
association with an AP MLD, then a non-AP STA affiliated with the non-AP MLD shall transmit an EML Operating Mode
Notification frame with EMLMR Mode subfield equal to 1 or 0 to enable or disable EMLMR mode,
respectively. (#10270)

(…existing texts…)