IEEE P802.11
Wireless LANs

|  |
| --- |
| 11be D5.0 CR for Miscellaneous CIDs |
| Date: 2024-02-15 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel |  |  | po-kai.huang@intel.com |
|  |  |  |  |  |

Abstract

This submission proposes resolutions for the following CIDs:

22010, 22027, 22164, 22228, 22220, 22232, 22233, 22319, 22012, 22201,

22009, 22338, 22401, 22325, 22172, 22034, 22173, 22174, 22175, 22304,

22305, 22169, 22170, 22157, 22250, 22343, 22014

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision for CID 22232
* Rev 2: Add CID 22009
* Rev 3: Add CID 22343. Add CID 22014. Revise CID 22027.
* Rev 4: Further revision of CID 22027 based on the discussion with Binita.
* Rev 5: Revision based on the discussion during the teleconference call.

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 D5.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D5.0 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** |
| 22010 | Mark Hamilton | 4.5.3.2 | 69.24 | Need to fix up the NOTE in 4.5.3.2 to apply to MLDs | Add updates to the NOTE in the baseline (added in REVme D4.1, just after the lettered list), as follows: "NOTE—A nonmobility based transition from a BSS to the same BSS (same AP, \_AP MLD\_, or PCP) is also supported. See 11.3.6.4." | Revised – We note that MLD has different BSS in each link. We add “or from one AP MLD to the same AP MLD” in the note.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22010 |
| 22027 | Binita Gupta |   | 513.23 | My understandig is that in 11be since association is at the MLD level, a unique AID is assigned to each non-AP MLD when ML setup is done. However, I don't see text where this is explicitly stated in clause 11.3. | Add clarification on uniqueness of AID assigment for association between peer MLDs either in this clause or in clause 11.3. | Revised –The baseline AID assignment for non-MLO only says AID is something assigned by AP.***9.4.1.8 AID field****In infrastructure BSS operation, the AID field contains a value assigned by an AP or PCP during association. The field represents the 16-bit ID of a STA.*For 11be, a corresponding sentence is in 35.3.5.1 (ML (re)setup procedure).*An AP MLD shall assign a single AID to a non-AP MLD upon successful ML setup. All the non-AP STAs affiliated with the non-AP MLD shall have the same AID as the one assigned to the non-AP MLD during ML setup.*However, generally agree that assigned shall not be used by existing non-AP MLD or non-AP STA. We do revision to align with this direction.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22027 |
| 22164 | Gaurav Patwardhan | 9.4.2.25 | 219.06 | According to D5.0 of P802.11be specification, Beacon protection is not enabled by default on EHT STAs. Because the multi-link framework contains add/delete AP operations and such, mandating beacon protection is necessary. | Enable beacon protection feature by default and not just have STAs implement/support it. Revise specification text in the following locations: Clause 4, Clause 9 - Extended Capabilities field, 11.52 Beacon frame protection procedures, 35.3.5.2 ML Security. | Rejected –Beacon protection is already mandated when using RSN. See the following in 12.12.3 Security constraints for EHT.*An EHT non-AP STA and EHT AP shall have dot11BeaconProtectionEnabled set to 1 when using RSN.* |
| 22228 | Stephen McCann | 4.3.5.2 | 63.17 | The new text "All BSSs created by APs affiliated with an AP MLD have the same SSID and belong to the same ESS" is restrictive. It imples that the affiliated AP cannot operate as a legacy AP in a different ESS from that of the MLD. | Delete the cited text. | Rejected – Maintaining connection to two APs with the same upper MAC for different ESSs does not seem to be feasible. Note that this difficult is also described in 4.5.3.2 Mobility types. Hence, it does not seem to be a straightforward effort to enable MLD between APs in different ESS, which is sort of an enhanced version of transition. *A third type of transition is STA movement from a BSS in one ESS to a BSS in a different ESS. Maintenance of upper layer connections during transition between ESSs cannot be guaranteed by IEEE Std 802.11; disruption of service is likely to occur.* |
| 22220 | Stephen McCann | 11.21.2.2 | 397.37 | There are several places where "MLD (for MLO)" occurs. This appears to be redundant. When is an MLD not going to be used for MLO? | Change "MLD (for MLO)" to "MLD" and also at the following places: P397L42, P397L48, P397L57, P397L61, P398L3 and P398L14 | Revised - The relevant context for all the instances is “for a given non-AP STA (for non-MLO) or non-AP MLD (for MLO)”. (for non-MLO) and (for MLO) are added to clarify the two different scenarios as suggested in the previous CR. However, it is indeed true that MLD is always for MLO. We do the reivison following the document page number rather than pdf page number.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22220 |
| 22232 | Robert Stacey | 3.2 | 60.19 | "geolocation" is not a property of the device. According to a dictionary (google search) it is "the process or technique of identifying the geographical location of a person or device by means of digital information processed via the internet." The capitalization and plural on basic service set is not necessary. An AP might be running multiple BSSs, but that is not relevant to the definition. All that is relevant is that it is operating one. If the intent is to create a class of device on which we attach requirements, then consider the creating a definition based on those reduced requirements. | Change the definition to "A class of AP that is typically mobile, i.e., operates while changing its location, and that supports a reduced set of capabilities; NSS < 2, etc." | Revised –The commenter is commenting on the definition of mobile AP. We note that there is a definition of geolocation according to the IEEE definition as shown below. Hence, it is clear that the meaning is the location of the AP is changed. Further discussed with the commenter, the commenter then indicates why we do not just use location rather than geolocation. Agree that location is actually more general. Also agree that it is confusing to have plural for the BSS Of an AP. ***mobile access point (AP):*** *[mobile AP] An AP that is capable of keeping its Basic Service Set(s) (BSS(es)) operational while its geolocation is changed.****geolocation:*** *A location within an earth-centric frame of reference.*TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22232 |
| 22233 | Robert Stacey | 3.2 | 60.27 | In the MLD definition, "can operate" implies capability (duplicating the first part of the sentence). | Change the definition to read "A logical entity that is capable of supporting more than one affiliated station (STA), that operates using one or more affiliated STAs, and that provides the medium access control (MAC) data service through a single MAC service access point (MAC SAP) to the logical link control (LLC)." | Rejected – The commenter is commenting on the definition of MLD. We note that the first part of the sentence is about “support” and the second part is about “operate”. These two terms have different meanings, so it is not a duplicate. It emphasize that a MLD that support two links may choose to operate with only one link either temporarly or due to AP MLD configuration. ***multi-link device:*** *[MLD] A logical entity that is capable of supporting more than one affiliated station (STA) and can operate using one or more affiliated STAs, and that presents one medium access control (MAC) data service and a single MAC service access point (MAC SAP) to the logical link control (LLC) sublayer.* |
| 22319 | Alfred Asterjadhi | 3.2 | 57.48 | [Liuming Lu] a Per-STA Profile subelement of the Basic Multi-Link element may include a profile of an AP or non-AP STA. | Suggest to change "Per-STA Profile subelement of the Basic Multi-Link element" to "Per-STA Profile subelement of the Basic Multi-Link element that includes a profile of an AP ". | Revised - The commenter comments the following definition. We note that per-STA profile subelement is not an element, so we simply break it into two portions. ***reported access point (AP):*** *[reported AP] An AP that is identified in an element such as a Neighbor Report element, a Reduced Neighbor Report element, or Per-STA Profile subelement of the Basic Multi-Link element.*TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22319 |
| 22012 | Mark Hamilton | 3.1 | 58.60 | A STA cannot be an AP. It is contained within an AP. | Change the definition of affiliated AP to "An access point (AP) that contains an affiliated station (STA) and the corresponding multi-link device (MLD) is an AP MLD." Change the definition of affiliated station to start with "A STA, which can be \_contained in\_ an access point (AP) or \_can be\_ a non-access point (non-AP) STA ..." | Rejected – We note that simplying searching “STA is an AP” in revme D5.0 provides 21 instances. There are also numerous descriptions in the normative texts relying on this convention. Although agreeing with the commenter due to the formal definition, suggest the commenter to discuss this in revme to see if we can have the convention that “STA is an AP” implies the STA contained in the AP, which seems to be already there in the current baseline, or a global change in the baseline is also needed for this specific change. |
| 22201 | John Wullert | 1.4 | 49.09 | While this text says that the term "STA" implies a device that is not affiliated with an MLD, the document also includes a specific defintion of "non-MLD non-AP STA" (page 60, line 64). In some cases (e.g., page 585, line 36), the phrase "non-AP STA" is used to refer to either a STA affiliated with an MLD or one that it not. | Add a note here that indicates "When required for clarity, the phrase 'non-MLD non-AP STA' is used when referring to non-AP STAs that are not affiliated with an MLD. | Revised – We simply revise to clarify the intent rather than adding additional note.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22201 |
| 22009 | Mark Hamilton | 11.3.1 | 374.12 | Do we still need these two qualifications, in subclause 11.3.1? 1) Haven't we "cleaned-up" so that the meaning of "STA" is always clear and correct now? 2) The architecture defines "SME" to be the entity that manages the MLD, already, across the entire draft. | Delete subclause 11.3.1. | Revised – Agree in principle with the commenter since we already have similar texts in 1.4. We also update the texts in 1.4 to capture descriptions in 11.3.1 and not in 1.4 so there is no missing context afters deleting 1.4.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22009 |
| 22338 | Alfred Asterjadhi | 11.21.14 | 401.05 | [Xiandong Dong] "STA affiliated with a non-AP MLD" should be "non-AP STA affiliated with a non-AP MLD". | As in comment | Accepted -  |
| 22401 | Kazuto Yano | 11.2.3.14 | 370.38 | "transmitted by the transmitted BSSID" should be modified to "transmitted by the AP corresponding to the transmitted BSSID". | As in comment. | Accepted -  |
| 22325 | Alfred Asterjadhi | 13.5.3 | 0.00 | [Takuhiro Sato] Figure 13-6 is slightly unclear (the parameters' text is overlapping with the arrows). |   | Revised –TGbe editor to adjust the arrows in Figure 13-6 so that it does not overlap with the texts. |
| 22172 | Gaurav Patwardhan | 35.3.5.1 | 515.60 | Intent is not clear; rewrite as follows for better readbility "For each setup link, a mapping between the non-AP STA affiliated with the non-AP MLD and the AP affiliated with the AP MLD, is not provided to the DS." | as in comment | Accepted -  |
| 22034 | Joseph Levy | 35.3.5.1 | 515.57 | Why is it necessary to state that the DS is not notified about affiliated STA and affiliated AP link mapping. It is clear that a DS is only informed during the association process, which for MLO is the association of the non-AP MLD and the AP MLD. The setup process used to setup the links is not related to the association (the establishment of a SAP to SAP link). The links referred to in the link setup process are PHY links (RF links). There is no need to discuss the set up of these PHY links as it has nothing to do with the DS enabling the exchange of MSDUs via the associated MLDS. Also the concept of a non-AP STA affiliated with a non-AP MLD having an associated state makes no sense. Associated state relate to MAC SAP to MAC SAP state of the MLDs not the affiliated STAs or affiliated APs as these entities do not have MAC SAPs, and therefore can not have an association... | Delete the Paragraph. | Rejected – Describing the “associated state” is needed to reuse all the baseline non-MLO texts which always use non-AP STA and associated AP.Clarifying that the DS mapping is not there is then needed to make sure that there is no misunderstanding that a DS mapping is provided under associated state. |
| 22173 | Gaurav Patwardhan | 35.3.5.1 | 515.22 | It is not always a true condition. | Change to "..the ML (re)setup is successful subject to additional rules described in this subclause." | Rejected – If the link used to exchange (re)association request/response is accepted, then there is at least one link and the ML setup is successful.*If the link on which the (Re)Association Request frame was received is accepted by the AP MLD, the ML (re)setup is successful.* |
| 22174 | Gaurav Patwardhan | 35.3.5.1 | 513.58 | Change 'the AP MLD' to 'an AP MLD' | as in comment | Rejected – The AP MLD refers to the AP MLD in the earlier sentence.*A non-AP MLD may initiate an ML (re)setup with an AP MLD to (re)set up one or more links with the AP MLD. When a non-AP MLD initiates an ML (re)setup with an AP MLD, the non-AP MLD shall transmit a (Re)Association Request frame through a non-AP STA that is affiliated with the non-AP MLD and is operating on a link that is expected to be part of the ML (re)setup.* |
| 22175 | Gaurav Patwardhan | 35.3.5.1 | 513.36 | The expectation of the link being part of ML (re)setup is on the non-AP MLD's side, not AP MLD. | Change "...operating on a link that expected to be..." to "…operating on a link that it expects to be..." | Revised –Agree in principle with the commenter.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22175 |
| 22304 | Alfred Asterjadhi | 35.3.5.1 | 516.36 | [Liuming Lu] The description of "The link(s) that are requested for resetup..." is incomplete. | Suggest to change "NOTE 5—The link(s) that are requested for resetup..." to "NOTE 5—The link(s) that are requested for resetup by a non-AP MLD.." | Revised –Agree in principle with the commenter.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22304 |
| 22305 | Alfred Asterjadhi | 35.3.5.1 | 515.62 | [Liuming Lu] The description of "..that are accepted and the requested link(s) that are rejected.." is incomplete. | Suggest to change "..that are accepted and the requested link(s) that are rejected.." to "..that are accepted and/or the requested link(s) that are rejected.." | Accepted -  |
| 22169 | Gaurav Patwardhan | 35.3.5.2 | 516.25 | Remove the word "across". Its grammatically incorrect. | as in comment | Accepted -  |
| 22170 | Gaurav Patwardhan | 35.3.5.2 | 516.20 | Change "… on the link…" to "… on that link …" to make a clear reference to the specific link | as in comment | Revised – Agree in principle with the commenter.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22170 |
| 22157 | Abhishek Patil | 35.3.5.4 | 519.57 | The sentence "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." is long and hard to understand. | Simplify the sentence so that the intended meaning is clearly conveyed. Replace the sentence with the following: " The Status Code field included in the STA Profile subfield of the Per-STA Profile subelement shall be set to: - a nonzero value other than 130 if the link corresponding to the Per-STA Profile is not accepted by the AP MLD as part of the ML (re)setup (see Table 9-80 (Status codes)). - 130 if the link corresponding to the Per-STA profile is not accepted only because the link where the (Re)Association Request frame is received is not accepted by the AP MLD as part of the ML (re)setup. - 0 if the link corresponding to the Per-STA Profile is accepted by the AP MLD as part of the ML (re)setup and the link where the (Re)Association Request frame is received is accepted by the AP MLD as part of the ML (re)setup. " | Revised – We already have the following general description.*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 failure cause if the link is not accepted.*The sentence is about the setting of a specific status code. We try to revise by putting the if condition upfront.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22157 |
| 22250 | Robert Stacey | 10 | 335.01 | Submitted on behalf of Po-Kai. 11be has added many important status codes and a lot of discussions have been around how to make sure a status code is used only for its designed purpose rather than misued in scencarios like multi-link setup, multi-link reconfiguration and so on. From the interop perspective, a misued status code creates confusion on the peer and potentially degrade performance. However, the current spec does not have a clear statement on the general rules and various status codes are not defined to satisfy this requirement in consistent manners. | Add texts "a status code defined in 9.4.1.9 (Status Code field) shall only be used if the corresponding condition described in meaning column of the status code is met. " Ideally, we should have this in clause 9, but since clause 9 is only about format. Create a new subclause in clause 10 called Usage of Status code to have this general rules. Also note that existing spec has similar sentences for various status codes, and the proposed text is a general statement that will now apply for every status code rather than having one sentence for every status code. | Revised – We add the requirement to 9.1.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22250 |
| 22343 | Alfred Asterjadhi | 35.3.14.1 | 559.55 | [Thomas Derham] QoS Map Configure frame is a QoS Action frame used to send updated QoS Map to a STA containing DSCP-to-UP mapping table. The DSCP-to-UP mapping is implemented above the MAC SAP, therefore the frame should be handled at the MLD layer. | Add QoS Map Configure frame to the list of frames that are "intended for an MLD" | Revised – Agree in principle with the commenter. We also update the relevant texts for QoS Map configure. TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22343 |
| 22014 | Mark Hamilton | 11.3.6.4 | 387.21 | Since the AP MLD MAC address can be the same as one of the affiliated AP's MAC address, 11.3.6.4(c), second paragraph, can be in effect even if the reassociation is changing the non-AP device's type to/from MLO and non-MLO. Is it correct and expected behavior that these rules for the states/agreements/allocations not affected by reassociation still apply when the non-AP device changes its MLO-ness? Note in particular that the agreements will need to be shared/transferred between the AP MLD's upper MAC and the afilliated AP's upper MAC (as appropriated/needed in the implmeentation) when this persistence of state occurs. Or, is it easier to say that this second paragraph of 11.3.6.4(c) only applies if the addresses match (current text) \_and\_ if the non-AP STA does not transition its MLO/non-MLO status? | At P386.59, after "in the CurrentAPAddress parameter", add ", and the reassociating non-AP MLD is not changing from a non-AP STA, nor is the reassociating non-AP STA changing from a non-AP MLO" At P387.41, after "the new AP MLD's MAC address", add, "or the reassociating non-AP STA or MLD is changing to or from MLD operating mode". | Revised – Agree in principle with the commenter. We note that deleting parameters should not have exception, so we just keep the existing texts.Keeping the parameters is the major source of problems, so we simply revise texts related to that part.TGbe editor to make the changes shown in 11-24/0296r5 under all headings that include CID 22014 |

**Discussion:**

**Proposal:**

*TGbe editor: Modify Clause 4.5.3.2 as follows (track change on):*

* + - 1. **Mobility types**

## *Change the first paragraph as follows:*

The three transition types of significance to this standard that describe the mobility of non-GLK 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:

(non-MLO to non-MLO): ~~a~~A STA movement from one BSS in one ESS to another BSS within the same ESS.

(MLO to MLO): 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 affili- ated 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 dif- ferent non-AP STAs affiliated with the non-AP MLD are within different BSSs.

(MLO to non-MLO): 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.

(non-MLO to MLO): 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 different BSSs and the MAC address of the non-AP STA is the same as the MLD MAC address of the non-AP MLD.

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

NOTE—A nonmobility based transition from a BSS to the same BSS (same AP or PCP) or from one AP MLD to the same AP MLD(#22010) is also supported. See 11.3.6.4 (Non-AP STA, non-AP MLD, and non-PCP STA reassociation initiation procedures) .

(#22010)

(#6575)A third type of transition is STA movement from a BSS in one ESS to a BSS in a different ESS or a non-AP MLD movement from an AP MLD in one ESS to another AP MLD in a different ESS. (#22010) Maintenance of upper layer connections during transition between ESSs cannot be guaranteed by IEEE Std 802.11; disruption of service is likely to occur.

*TGbe editor: Modify Clause 3.2 as follows (track change on):*

**mobile access point (AP):** [mobile AP] An AP that is capable of keeping its Basic Service Set (BSS) operational while its location(#22232) is changed.

**reported access point (AP):** [reported AP] An AP that is ~~described~~identified in an element such as a Neighbor Report element or ~~or~~, a Reduced Neighbor Report element, or an AP that is identified in a Per-STA Profile subelement of the Basic Multi-Link element.(#22319)

*TGbe editor: Modify Clause 1.4 as follows (track change on):*

**1.4 Word Usage**

***Insert the following paragraph at the end of the subclause:***

Reference in this standard to “STA” without further specification of being affiliated with an MLD or not being affiliated with an MLD means a “STA” that is not affiliated with a multi-link device (MLD).(#22201) Reference to “AP” means an “AP” that is not affiliated with an MLD unless specified otherwise. When referring to MLD management (for example, authentication, deauthentication, (re)association, disassociation, or 4-way handshake between MLDs)(#22009), the “SME” is the entity that manages the MLD. A peer MAC entity can be within a STA that is not affiliated with an MLD or an MLD depending on the context. A PeerSTAAddress can be the MAC address of a STA that is not affiliated with an MLD or an MLD MAC address depending on the context.

*TGbe editor: Modify Clause 11.3.1 as follows (track change on):*

**(#22009)** (#22009) (#22009)

*TGbe editor: Modify Clause 11.21.14 as follows (track change on):*

**11.21.14 Proxy ARP service**

(…existing texts….)

When an AP affiliated with an AP MLD receives an IPv4 ARP request from one associated STA, or from a non-AP(#22338) STA affiliated with a non-AP MLD that is associated with the AP MLD, or from the DS, with a target IPv4 address that corresponds to a second associated STA, the AP shall insert the second STA MAC address as the Sender’s MAC Address in the ARP response packet. When an AP MLD receives an IPv4 ARP request from a STA associated with an affiliated AP, or from one associated non-AP MLD via any affiliated AP, or from the DS, with a target IPv4 address that corresponds to a second associated non-AP MLD, the AP MLD that decides to form a proxy ARP response shall insert the MLD MAC address of the second non-AP MLD as the Sender’s MAC Address in the ARP response packet.

(…existing texts….)

*TGbe editor: Modify Clause 11.21.2.2 as follows (track change on):*

**11.21.2.2 Transition event request and report**

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

The Transition Event report provides information on the previous transition events for a given non-AP STA (for non-MLO) or non-AP MLD(#22220). The Transition Event request and report are only permitted in the infrastructure BSS.

Each STA supporting the Transition Event shall log up to the last five Transition events occurring since the STA (for non-MLO) or the MLD(#22220), with which the STA is affiliated, associated to the ESS. A STA may log more than five of the most recent Transition events.

Upon receipt of an Event Request frame containing an Event Request element including a Transition Event request, the non-AP STA shall respond with an Event Report frame that includes available Event Report elements within the ESS of which the transmitting STA (for non-MLO) or the MLD(#22220), with which the transmitting STA is affiliated, is a member for the Transition event type.

*TGbe editor: Modify Clause 11.21.2.3 as follows (track change on):*

**11.21.2.3 RSNA event request and report**

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

The RSNA Event Report provides authentication events for a given non-AP STA (for non-MLO) or non-AP MLD(#22220). The RSNA Event Request and Report are only permitted in an infrastructure BSS.

Each STA supporting the RSNA Event shall log up to the last five RSNA events occurring since the STA (for non-MLO) or the MLD(#22220), with which the STA is affiliated, associated to the ESS. A STA may log more than five of the most recent RSNA events.

Upon receipt of an Event Request frame containing an Event Request element including an RSNA Event request, the non-AP STA shall respond with an Event Report frame that includes available Event Report elements within the ESS of which the transmitting STA (for non-MLO) or the MLD(#22220), with which the transmitting STA is affiliated, is a member for the RSNA event type.

*TGbe editor: Modify Clause 11.2.3.14 as follows (track change on):*

**11.2.3.14 TIM Broadcast**

***Change NOTE 4 as follows:***

NOTE 4—Modification of an element means that at least one field in the element is changed, although not all fields in an element can be changed (e.g., the fields that advertise the basic MCS sets in HT Operation, VHT Operation, and HE Operation elements do not change). Inclusion of an element means that the element is included in a Beacon frame. The insertion of an element means that the element was not present in the previous Beacon frame, is present in the current Beacon frame, and will be carried in the next Beacon frame. Inclusion/modification of an element for a nontransmitted BSSID is done in a Beacon frame transmitted by the AP corresponding to the(#22401) transmitted BSSID either by including/modifying the element in the nontransmitted BSSID profile of the Multiple BSSID element or by including/modifying the element for the transmitted BSSID if that element is inherited for the nontransmitted BSSID (see 11.1.3.8.4 Inheritance of element values).

*TGbe editor: Modify Clause 35.3.5.1 as follows (track change on):*

**35.3.5.1 ML (re)setup procedure**

(…existing texts…)

A non-AP MLD may initiate an ML (re)setup with an AP MLD to (re)set up one or more links with the AP MLD. When a non-AP MLD initiates an ML (re)setup with an AP MLD, the non-AP MLD shall transmit a (Re)Association Request frame through a non-AP STA that is affiliated with the non-AP MLD and is operating on a link that the non-AP MLD expects to be part of the ML (re)setup.(#22175)

(…existing texts…)

In the (Re)Association Response frame, the AP MLD shall indicate the requested link(s) that are accepted and/or 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,](#_bookmark28) [Authentication, and FT Action frame exchanges between two MLDs)](#_bookmark28). The AP MLD 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.

(…existing texts…)

NOTE 5—The link(s) that are requested for resetup by a non-AP MLD are independent of the existing setup link(s) between the non-AP MLD and the associated AP MLD.(#22304) The capability and operation parameters of each requested link during ML resetup are independent of the capability and operation parameters of each existing setup link with an associated AP MLD.

(…existing texts…)

An AP MLD shall assign a single AID to a non-AP MLD upon successful ML setup. The assigned single AID shall not be used by any existing associated non-AP MLD or any existing non-MLD non-AP STA associated with any AP affiliated with the AP MLD.(#22027) All the non-AP STAs affiliated with the non-AP MLD shall have the same AID as the one assigned to the non-AP MLD during ML setup.

An AP affiliated with an AP MLD shall not assign, to a non-AP MLD, an AID value that is less than 2n where n is the maximum of the value carried in the MaxBSSID Indicator (n) field of the Multiple BSSID element, corresponding to each link that is accepted as part of the ML (re)setup, if at least one of the APs affiliated with the AP MLD belongs to a multiple BSSID set.

(…existing texts…)

For each setup link, the corresponding non-AP STA affiliated with the non-AP MLD is in the same associated state as the non-AP MLD and is associated with the corresponding AP affiliated with the AP MLD. For each setup link, a mapping between the non-AP STA affiliated with the non-AP MLD and the AP affiliated with the AP MLD is not provided to the DS.(#22172)

(…existing texts…)

*TGbe editor: Modify Clause 35.3.5.2 as follows (track change on):*

**35.3.5.2 ML security**

After a successful ML (re)setup between a non-AP MLD and an AP MLD, a PMKSA and a PTKSA are established between the non-AP MLD and the AP MLD. In addition, a GTKSA, an IGTKSA if management frame protection is enabled, and a BIGTKSA if beacon protection is enabled, are established between the non-AP MLD and the AP MLD for each setup link (see Clause 12 (Security)). The PTKSA is used for cryptographic encapsulation and decapsulation of individually addressed MPDUs across all setup links and the GTKSA of a link is used for cryptographic encapsulation and decapsulation of group addressed MPDUs on that(#22170) link as described in 12.5.2.3 (CCMP cryptographic encapsulation), 12.5.4.3 (GCMP cryptographic encapsulation), 12.5.2.4 (CCMP decapsulation), and 12.5.4.4 (GCMP decapsulation). If management frame protection is enabled, the IGTKSA of a link is used to provide integrity protection for group addressed robust Management frames (#22169)on that(#22170) link as described in 12.6.19 (Protection of robust Management frames). When beacon protection is enabled, the BIGTKSA of a link is used to provide integrity protection for Beacon frames on that(#22170) link as described in 12.6.23 (Protection of Beacon frames).

(…existing texts…)

*TGbe editor: Modify Clause 35.3.5.4 as follows (track change on):*

**35.3.5.4 Basic Multi-Link element usage in the context of ML (Re)Setup, Authentication, and FT Action frame exchanges between two MLDs**

(…existing texts…)

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 failure cause (see Table 9-78 (Status Codes)) 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. If the link corresponding to a Per-STA Profile subelement is not accepted only because the link on which the (Re)Association Request frame is transmitted is not accepted, then 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\_N OT\_ACCEPTED unless the Status Code field is set to REFUSED\_REASON\_UNSPECIFIED.(#22157)

(…existing texts…)

*TGbe editor: Modify Clause 9.1 as follows (track change on):*

**9.1 General requirements**

The format of the MAC frames is specified in this clause. A STA shall properly construct a subset of the frames specified in this clause for transmission and decode a (potentially different) subset of the frames specified in this clause upon validation following reception. The particular subset of these frames that a STA constructs and decodes is determined by the functions supported by that particular STA. A STA shall validate every received frame using the frame check sequence (FCS) and to interpret certain fields from the MAC headers of all frames.

A STA shall transmit frames using only the frame formats described in Clause 9 (Frame formats).

A status code defined in 9.4.1.9 (Status Code field) shall only be used if the corresponding condition described in the meaning column of Table 9-78 (Status Codes) is met.(#22250)

*TGbe editor: Modify Clause 35.3.14.1 as follows (track change on):*

**35.3.14.1 General**

(…existing texts…)

Between an AP MLD and a non-AP MLD, the following individually addressed MMPDUs shall be intended for an MLD:

* Authentication frame that includes a Basic Multi-Link element
* (Re)Association Request/Response frame that includes a Basic Multi-Link element
* Deauthentication frame
* Disassociation frame
* Block Ack Action frame
* SA Query Action frame
* Multi-link probe request/response
* WNM Sleep Mode Request/Response frame
* TID-To-Link Mapping Request/Response/Teardown frame
* EPCS Priority Access Enable Request/Enable Response/Teardown frame
* EML Operating Mode Notification frame
* SCS Request/Response frame
* MSCS Request/Response frame
* BSS Transition Management Request/Response frame
* FT Action frame
* Link Recommendation frame
* Link Reconfiguration Notify/Request/Response frame
* QMF Policy Change frame and QMF Policy frame
* QoS Map Configure frame(#22343)

(…existing texts…)

*TGbe editor: Modify Clause 11.22.9 as follows (track change on):*

* + 1. **Interworking procedures: support for QoS mapping from external networks(#22343)**

Maintaining proper end-to-end QoS is an important factor when providing interworking service. This is because the external networks might employ different network-layer (Layer 3) QoS practices. For example, the use of a particular differentiated services code point (DSCP) for a given service might be different between different networks. To provide proper QoS over-the-air in the IEEE 802.11 infrastructure, the mapping from DSCP to UP for the corresponding network needs to be identified and made known to the STAs or non-AP MLDs. If an inconsistent mapping is used then:

* Admission control at the AP may incorrectly reject a service request, because the non-AP STA used the incorrect UP.
* Non-AP STAs or non-AP MLDs might use the incorrect value for User Priority in TSPEC and TCLAS elements.
* The user might be given a different QoS over the IEEE 802.11 network than expected, e.g., a lower

QoS might be provided than the STA expected.

Therefore, APs with dot11QosMapActivated equal true shall set the QoS Map field in the Extended Capabilities element to 1; APs with dot11QosMapActivated equal false shall set the QoS Map field in the Extended Capabilities element to 0. APs affiliated with the same AP MLD shall have dot11QosMapActivated set to the same value.

The AP’s or AP MLD’s SME causes the QoS mapping to be available to higher layer protocols or applications so they (M118)are able to set the correct priority in an MA-UNITDATA.request primitive.

For frames transmitted by an AP belonging to an admitted TS, the UP obtained from the TS’s TCLAS element shall be used instead of the UP derived from the QoS mapping. For frames transmitted by an AP belonging to an admitted TS not having a TCLAS element, the UP shall be derived from the QoS mapping.

Non-AP STAs, when dot11QosMapActivated is equal true, shall set the QoS Map field in the Extended Capabilities element to 1. Non-AP STAs affiliated with the same non-AP MLD shall have dot11QosMapActivated set to the same value. An AP receiving an Association Request frame or Reassociation Request frame or an AP MLD receiving an Association Request frame or Reassociation Request frame through its affiliated AP when the QoS Map field in the Extended Capabilities element is equal 1 shall include the QoS Map element in the corresponding Association Response frame or Reassociation Response frame as defined in 9.3.3.6 (Association Response frame format) or 9.3.3.8 (Reassociation Response frame format), respectively. Upon receiving the QoS Map element, the non-AP STA’s or non-AP MLD’s SME causes the QoS mapping to be available to higher layer protocols or applications so they are able to set the correct priority in an MA-UNITDATA.request primitive.

When the AP’s SME detects a change in the QoS mapping information, it shall update the non-AP STA with the new QoS Map element. It accomplishes this update by invoking the MLME-QOS-MAP.request primitive.

When the AP MLD’s SME detects a change in the QoS mapping information, it shall update the non-AP MLD with the new QoS Map element. It accomplishes this update by invoking the MLME-QOS-MAP.request primitive.

When the MAC entity at the non-AP STA receives a QoS Map Configure frame from the AP, or when the non-AP MLD receives a QoS Map Configure frame through its affiliated non-AP STA, the MLME shall issue an MLME-QOS-MAP.indication primitive to its SME.

When the non-AP STA’s SME or non-AP MLD’s SME receives the QoS Map response, it shall make the QoS Map available to higher layers so that in turn, they can invoke the MA-UNITDATA.request primitive with the correct priority.

*TGbe editor: Modify Clause 11.3.6.4 as follows (track change on):*

* + - 1. **Non-AP STA, non-AP MLD, and non-PCP STA reassociation initiation procedures**

…(existing texts)….

*Change the now-shifted sixth paragraph as follows:*

Upon receipt of an MLME-REASSOCIATE.request primitive, a non-AP STA, non-AP MLD, and non-PCP STA shall reassociate with an AP, AP MLD, or PCP, respectively, using the following procedure:

* + - * 1. If the STA (with respect to the AP or PCP) or non-AP MLD (with respect to the AP MLD) is not associated in the same ESS or the state for the new AP, AP MLD, or PCP is State 1, the MLME shall inform the SME of the failure of the reassociation by issuing an MLME-REASSOCIATE.confirm primitive, and this procedure ends.
				2. The ~~MLME~~non-AP STA shall transmit a Reassociation Request frame to the new AP or PCP, or a non-AP STA affiliated with the non-AP MLD shall transmit a Reassociation Request frame with Basic Multi-Link element in the Reassociation Request frame to an AP affiliated with the new AP MLD. The non-AP STA affiliated with a non-AP MLD may initiate the transmission of the Reassociation Request frame on the recommended link included in the MLME- REASSOCIATE.request primitive, unless specified otherwise. The RSNE contained in the MLME- ASSOCIATE.request primitive shall be included in the Reassociation Request frame. The RSNE shall specify exactly one pairwise cipher suite and exactly one AKM suite. If the MLME- REASSOCIATE.request primitive contained the EmergencyServices parameter equal to true, an Interworking element with the UESA field set to 1 shall be included in the Reassociation Request frame.
				3. If a Reassociation Response frame is received with a status code of SUCCESS, the state variable for the new AP, AP MLD, or PCP shall be set to State 4 or to State 3 if dot11RSNAActivated is true and the FT protocol is not used with respect to the new AP, AP MLD, or PCP and, unless the old AP, AP MLD, or PCP and new AP, AP MLD, or PCP, respectively, are the same, to State 2 with respect to the old AP, AP MLD, or PCP, and the MLME shall issue an MLME-REASSOCIATE.confirm primitive to inform the SME of the successful completion of the reassociation.

If the MLME-REASSOCIATION.request primitive has the new AP’s, AP MLD’s, or PCP’s MAC address in the CurrentAPAddress parameter (reassociation to the same AP, AP MLD, or PCP), the following states, agreements and allocations shall be deleted or reset to initial values:

All EDCAF state

Any block ack agreements that are not GCR agreements

Sequence number

Duplicate detection caches

Anything queued for transmission

Fragmentation and reassembly buffers

Power management mode

WNM sleep mode

TDLS agreements

TPKSAs established with any peers

TSPECs

DMG TSPECs

GLK-GCR agreement

MSCS

SCS

15a) TWT

If the reassociation is to the same AP (as described above) and the existing association is not between MLDs(#22014), the following states, agreements and allocations (if it exists) are not affected by the reassociation procedure:

Enablement/Deenablement

GDD enablement

MMSLs

GCR agreements that are not GLK-GCR agreements

DMS agreements

TFS agreements

FMS agreements

Triggered autonomous reporting agreements

FTM sessions

DMG SP and CBAP allocations

PTP TSPECs.

In the case of reassociation to a different AP, AP MLD, or PCP (the CurrentAPAddress parameter is not the new AP’s or PCP’s MAC address or the new AP MLD’s MAC address) or in the case of reassociation to an AP, where the new AP address is same as the value in the CurrentAPAddress parameter, and the existing association is between MLDs or in the case of reassociation to an AP MLD , where the new AP MLD address is same as the value in the CurrentAPAddress parameter, and the existing association is not between MLDs(#22014), all the states, agreements and allocations listed above are deleted or reset to initial values.