IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MLO – 35.3.4.2 | | | | |
| Date: 2020-07-0 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Laurent Cariou |  |  |  | laurent.cariou@intel.com |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Assignee** | **Resolution** | **Ad-hoc Notes** |
| 7455 | Thomas Derham | 35.3.4.2 | 0.00 | The note in this subclause seems to be misleading, since the A1=bcast requirement in 6 GHz applies to active scan, yet the ML probe request is not used in active scan context. | Remove the note and replace with a mandatory requirement to send ML probe requests to bcast address in 6 GHz, unless there is a strong need to allow unicast | Laurent Cariou | Reject – A1=Bcast requirement is not only for active scanning. We however discovered that things in baseline and 11ax are a bit misleading, and comments should be submitted to REVmd to clarify the intent. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 6195 | Michael Montemurro | 35.3.4.2 | 251.55 | Presumably ML stands for Multi-Link. Expand it out at least once. | Change "ML probe request" to "Multi-Link (ML) probe request" at cited location. | Laurent Cariou | Revised – Change “ML probe” to “Multi-Link probe” throughout the spec. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 8046 | Yuchen Guo | 35.3.4.2 | 251.55 | Currently in ML probe request, the information of the transmitting link is always solicited. However, in some cases, the information of the transmitting link may not be needed, e.g., the STA may only want to update some information of other links. The current text in this subclause fails to provide this functionality. | The commenter will bring a contribution to resolve it. | Laurent Cariou | Rejected – this was discussed during CC34 and the TBD related to that addition has been removed as a resolution to this comment. The resolution for this CID assumes that the resolution in CC34 applies to CC36. | Volunteers: Jason Guo, Xiaofei Wang, Gaurang Naik |
| 4254 | Alfred Asterjadhi | 35.3.4.2 | 251.57 | Add a sentence that specifies under what rules a STA sends probe requests in different bands (citing baseline 11.smth, and 26.smt for 6GHz). | As in comment. | Laurent Cariou | Revised – add a reference to 11.1.4.3.8 which defines probing outside the context of active scanning. Apply the changes marked as #4254 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 4042 | Abhishek Patil | 35.3.4.2 | 251.58 | A1 is set to broadcast address during active scanning. Since ML probe is a directed probe and sent outside the context of active scanning, A1 must not be set to broadcast address. Furthermore, setting A1 to an individual address ensure the ML probe request frame is ACK-ed. | As in comment | Laurent Cariou | Reject – See 11.1.4.3.8, it is possible to set A1 to broadcast outside the context of active scanning. The 2 options are therefore possible. If a STA prefers to get an Ack to the probe request, then it will set A1 to individual address. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 6264 | Ming Gan | 35.3.4.2 | 251.58 | What does it mean by "outside the context of active scanning", how does the non-AP MLD get the info, like BSSID of the other AP, does that follow discovery phase? Please specify it. | as in the comment | Laurent Cariou | Revised – add a reference to 11.1.4.3.8 which defines probing outside the context of active scanning.  The BSSID has been received already in a previous beacon/probe response from the AP or in the RNR of a previous beacon/probe response from another AP, prior to sending the ML probe.  Apply the changes marked as #6264 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5973 | Liwen Chu | 35.3.4.2 | 251.59 | The AP is already discovered through scanning. ML Probe Request is used to discover the AP1 affiliared with the AP2 identified by RA or ADDR 3. | As in comment | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #5973 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 4253 | Alfred Asterjadhi | 35.3.4.2 | 251.61 | probe requests with A1 set to the MAC address of the AP are not sent as part of scanning. Add a note to clarify the distinction between them and directed probes. | As in comment. | Laurent Cariou | Revised – agree with the commenter. Add a reference to the relevant subclause (outside the context of active scanning). Apply the changes marked as #4253 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 8333 | Zhiqiang Han | 35.3.4.2 | 251.62 | In the latter case, Address 3 field also set to the BSSID of the AP, please add it. | Please clarify it | Laurent Cariou | Reject – we originally had the mention of A3 field set to BSSID, but it got removed in previous comment collection, in order to match with how it is currently described in baseline. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 6196 | Michael Montemurro | 35.3.4.2 | 252.07 | APs are affiliated "with an AP MLD, not to an AP MLD. | Change "AP affiliated to" to "AP affiliated with" at 252.7, 264.58, 265.26, 277.36, 277.39, 277.22  Change "STA affiliated to" to "STA affiliated with" at 105.52, 106.26, 106.55, 107.27, 161.13, 162.3, 162.5, 162.54, 277.40 | Laurent Cariou | Revised – change “affiliated to” to “affiliated with” throughout the subclause 35.3.4.2. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5604 | John Wullert | 35.3.4.2 | 252.08 | The phrase "is a requested AP" gives the impression that there is only one, as opposed to the idea that the AP is included in the set of requested APs | Revise requirements into two statements: "If the Multi-Link element in the Probe Request frame does not include any per-STA profiles, all APs affiliated with the AP MLD are requested APs. If the Multi-Link element in the Probe Request frame includes one or more per-STA profiles, only APs affiliated with the AP MLD whose Link IDs are equal to the value of the Link ID field in one of the per STA Profile subelements are requested APs." | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #5604 in this document | Volunteers: Xiaofei Wang, Gaurang Naik |
| 4043 | Abhishek Patil | 35.3.4.2 | 252.10 | Which variant of Multi-Link element is this referring to? | In the two bullets, replace "Multi-Link element" with "Probe Request variant of Multi-Link element" | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #4043 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5972 | Liwen Chu | 35.3.4.2 | 252.10 | The first bullet says that the ML IE doesn't include any Per STA Profile. The second bullst sanys that the Link ID is in Pre STA Profile. They are contradictory. | Address the inconsistence. | Laurent Cariou | Revised – those are not contradictory, but 2 possible ways to identify requested APs. Modify the sentence to clarify the meaning. Apply the changes marked as #5972 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5974 | Liwen Chu | 35.3.4.2 | 252.10 | the type of ML IE should be accurate | As in comment | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #5974 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 6265 | Ming Gan | 35.3.4.2 | 252.15 | Change "complete information" to "complete or partial information" | as in the comment | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #6265 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5050 | Gaurang Naik | 35.3.4.2 | 252.23 | Replace "requested AP(s) of the AP MLD" with "requested AP(s) affiliated with the AP MLD" | As in comment | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #5050 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5910 | Li-Hsiang Sun | 35.3.4.2 | 252.30 | What is the procedure that triggers a non-AP to send a ML probe request for a specific element? Is the identity of changed element derived from the change sequence counter? | add the detection mechanism in 35.3.4.3 | Laurent Cariou | Rejected – this subclause defines the procedure to send/receive ML probes. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5975 | Liwen Chu | 35.3.4.2 | 252.30 | clarify that the Probe Request in this paragraph is ML Probe Request frame. | As in comment | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #5975 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 4044 | Abhishek Patil | 35.3.4.2 | 252.52 | An earlier paragraph in this subclause defines what is an ML probe response | Delete "which is a Probe Request frame". Change the text to "... shall respond with an ML probe response that includes a ..." | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #4044 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5605 | John Wullert | 35.3.4.2 | 252.52 | This paragraph includes a second definition of ML Probe Response. Given that it is defined above (starting on line 18), it is not required here. Note that the two defintions are not identical and should be checked for consistency. | Remove in-line definition of ML Probe Response. If necessary, add reference to rules in 11.1.4.3.4 to defintion on line 18. | Laurent Cariou | Revised – agree with the commenter. Apply the changes marked as #5605 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5976 | Liwen Chu | 35.3.4.2 | 252.59 | "...for each of the APs that are affiliated to the same AP MLD..." This text is problematic. A non-AP MLD can request different elements for different links. | As in comment | Laurent Cariou | Revised – agree with the commenter. Modify both sentences in the paragraph so that it talks only about a particular requested AP. Apply the changes marked as #5976 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 4378 | Arik Klein | 35.3.4.2 | 253.04 | "If an AP that is operating in the 2.4 GHz band or the 5 GHz band that is part of an AP MLD receives an MLD probe request frame requesting complete information and responds with an MLD probe response frame (per 11.1.4.3.4 (Criteria for sending a response)), the Address 1 field of the Probe Response frame \*may be set to the broadcast address\*" - it is not aligned with the strict rule of 802.11REVmd section 11.1.4.3.9 - "A non-FILS STA that transmits a Probe Response frame shall set the Address 1 field to the address of the STA that generated the probe request" | should be either explained (in a separate note) why the Address1 may be set to broadcast address in the Probe Response frame or be modified to align with the rule in 802.11REVmd section 11.1.4.3.9 to use unicast address. | Laurent Cariou | Revised – the commenter identified an issue in baseline in 11.1.4.3.9, which does not align with other parts of the specification in 11ax for instance. A submission to REVme is encouraged to fix that issue. In the meantime, in 11be, we can clarify that in that case, the rules defined for a FILS STA are ignored. Apply the changes marked as #4378 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5361 | Jay Yang | 35.3.4.2 | 253.05 | the Address 1 field of the Probe Response frame may be set to the broadcast address unless the AP is not including its actual SSID in the SSID element of its Beacon frames. what's the "actual SSID" here? there is no such concept in baseline. | if it means hidden SSID, we can replace it with hidden SSID directly. Otherwise, please clarify it. | Laurent Cariou | Rejected – it is indeed meant for the concept identified as “hidden SSID”, but not described in 802.11, and this way of writting the spec for such concept has been used in baseline. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 7359 | Stephen McCann | 35.3.4.2 | 253.07 | typo "in 6 GHz" | Change "in 6 GHz" to "in the 6 GHz band". Also make the same change at P144L52 (2nd column of table only), P313L1 and P601L57. | Laurent Cariou | Revised – agree with the commenter. Apply the changes in this subclause. The name in other locations needs to be discussed separately. Apply the changes marked as #7359 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 6197 | Michael Montemurro | 35.3.4.2 | 253.10 | This requirement makes no sense and needs to be reworded. "None of the non-AP STAs of a non-AP MLD shall send an ML probe request to an AP of the AP MLD in the corresponding link if any non-AP STA of the same non-AP MLD has already received a ML probe response including complete information from any of the AP of the AP MLD in any link, since the MLME-SCAN.request primitive with ScanType parameter indicating an active scan was issued." | I actually attempted to fix this but the behavior is too badly broken. First of all, ML Probe Request should be issued by the non-AP MLD by calling the SCAN.request primitive on an affiliated STA. In that way, you can restrict the non-AP MLD from issuing a scan request primitive concurrently on multiple affiated STA links to the same AP MLD simultaneously. Secondly, SCAN.request primitive should be modified to add a new ActivseScanType value of ML. In that way, its much easier to define unique behavior.  The commentor is willing to collaborate on a contribution to address this issue. | Laurent Cariou | Revised – since this sentence was written, ML probing has been characterized as not being part of active scanning. Such restrictions are therefore not needed. Remove the sentence. Apply the changes marked as #6197 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5977 | Liwen Chu | 35.3.4.2 | 253.11 | The first praragraph of the subclause mentioned that ML Probe Request is ontside the context of active scanning. The text here mentioned that "...MLME-SCAN.request primitive with ScanType parameter indicating an active scan was issued." Clarify it. | As in comment | Laurent Cariou | Revised – since this sentence was written, ML probing has been characterized as not being part of active scanning. Such restrictions are therefore not needed. Remove the sentence. Apply the changes marked as #5977 in this document. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5210 | Huizhao Wang | 35.4.3.1 | 251.25 | What is the difference of this paragraph vs. the one above? | Remove this paragraph |  | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |  |
| 5211 | Huizhao Wang | 35.4.3.1 | 251.60 | According to the baseline, if the Address 3 is not wildcard BSSID, then the probe req is intended for the particular AP indicated by the Address 3. So, to simplify the ML probe request, the Address 1 shall be set to the BSSID as well (there is no case need to have it set to broadcast address) | Remove the broadcast address from set to Address1 field. |  | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |  |

1. **Introduction**
2. **Proposed spec text**
   * + 1. **Use of ML probe request and response(#2583)(#3360)**

(#2583)(#3360)(#1187)An ML probe request is a Probe Request frame that is sent as a Non-scanning probe request transmission (#6264, #4254, #4253) (see 11.1.4.3.8 (Non-scanning probe request transmission)) and that is used to discover APs of an AP MLD (#5973):

* + - * + (#1045)(#1187)(#1673)(#2150)with the Address 1 field set to the broadcast address and the Address 3 field set to the BSSID of an AP, or with the Address 1 field set to the BSSID of an AP’s BSS.
        + (#6262)(#6237)(#6238)with the MLD ID subfield (if present) set to the MLD ID that identifies the targeted AP MLD with which the requested AP(s) are affiliated.
        + (#1808)(#2124)(#3217)and that includes a (#6701)Probe Request Multi-Link element defined in 9.4.2.312.3 (Probe Request Multi-Link element(#6701)).

(#6262)(#6237)(#6238)If either the Address 1 field or the Address 3 field of the ML probe request is set to the MAC address of the AP affiliated with an AP MLD that corresponds to the nontransmitted BSSID, then the MLD ID subfield shall not be present in the Probe Request Multi-Link element of the ML probe request and the AP MLD is the targeted AP MLD.

(#6262)(#6237)(#6238)If either the Address 1 field or the Address 3 field of the ML probe request is set to the MAC address of the responding AP that operates on the same link where the ML probe request is sent, then the MLD ID subfield shall be present in the Probe Request Multi-Link element of the ML probe request and the targeted AP MLD is identified by the MLD ID subfield.

(#1046)(#2151)(#2583)(#3360)(#1675)An ML probe request allows a non-AP STA affiliated with a non-AP MLD to request an AP affiliated with an AP MLD to include the complete or partial set of capabilities, parameters and operation elements of (#6262)(#6237)(#6238)the AP(s) affiliated with the targeted AP MLD in the response frame. (#5604, #5972)

(#5604, #4043, #5972, #5974)If the Probe Request variant Multi-Link element in the Multi-Link probe request does not include any per-STA profile, then all APs affiliated with the same AP MLD as the AP identified in the Address 1 or Address 3 field of the Multi-Link probe request are requested APs.

(#5604, #4043, #5972, #5974)If the Probe Request variant Multi-Link element in the Multi-Link probe request includes one or more per-STA profiles, then only APs affiliated with the same AP MLD as the AP identified in the Address 1 or Address 3 field of the Multi-Link probe request and whose link ID is equal to the value in the Link ID field in a Per-STA Profile in the Probe Request variant Multi-Link element in the Multi-Link probe request are requested APs.

(6265) (#5737)(#1744)(#1047)The complete profile and partial profile of a requested AP are defined in [35.3.2.2 (Advertisement of](#bookmark9) [complete or partial per-link information(#1859))](#bookmark9).

(#5737)(#2416)The partial profile of a requested AP sent by a reporting AP consists of one or more elements that are requested in the (Extended) Request element carried in the ML probe request.

(#5737)(#2416)If a STA affiliated with a non-AP MLD sends an ML probe request to an AP to retrieve partial profile for AP(s) affiliated with the (#6262)(#6237)(#6238)targeted AP MLD, the STA shall include the (Extended) Request element in the frame body of the ML probe request and/or a Per-STA Profile subelement in a (#6701)Probe Request Multi-Link element carried in the ML probe request (#5975). In this case, the Complete Profile subfield of the STA Control field in the Per-STA Profile subelement shall be set to 0. (#5737)The (Extended) Request element carried in the per-STA profile corresponding to the requested AP that requests the same partial profile as the AP can be inherited from the (Extended) Request element in the frame body,

subject to the rules defined in [35.3.2.3.2 (Inheritance in the per-STA profile of Probe Request Multi-Link](#bookmark14) [element(#2416)(#6700))](#bookmark14).

(#5737)(#2416)An ML probe request allows a non-AP STA to request an AP to include the complete profile of all APs affiliated with the (#6262)(#6237)(#6238)targeted AP MLD if the Probe Request frame does not include the (Extended) Request element in the frame body and the (#6701)Probe Request Multi-Link element in the Probe Request frame does not include any per-STA profile.

(#5737)(#2416)An ML probe request allows a non-AP STA to request an AP to include the same requested partial profile for all APs affiliated with the (#6262)(#6237)(#6238)targeted AP MLD if the Probe Request frame includes the (Extended) Request element in frame body and the (#6701)Probe Request Multi-Link element in the Probe Request frame does not include any per-STA profile.

(#1155)(#1414)(#2581)(#3367)(#3359)(#2859)An ML probe response is a Probe Response frame:

* + - * + that is transmitted in response to receiving an ML probe request
        + and that includes (#6700)Basic Multi-Link element which can carry complete or partial per-STA profile(s), based on the soliciting request, for each of the requested AP(s) (#5050) affiliaited with the (#6262)(#6237)(#6238)targeted AP MLD.

(#5976)(#5737)(#2416)(#2583)(#3360)(#1422)If an AP that is affiliated with an AP MLD receives an ML probe request from a non-AP STA affiliated with a non-AP MLD requesting complete profile for a requested AP, possibly among other requests for other requested APs, it shall respond with an ML probe response(#4044, #5605) that includes a (#6700)Basic Multi-Link element with (#2419)a per-STA profile with complete profile for the requested AP, subject to the rules defined in 11.1.4.3.4 (Criteria for sending a response)(#1048). (#5737)If it receives an ML probe request from a non-AP STA affiliated with a non-AP MLD requesting partial profile for a requested AP, possibly among other requests for other requested APs, it shall respond with an ML probe response that includes a (#6700)Basic Multi-Link element with (#2419)a per-STA profile with at least the elements requested from the (Extended) Request element for the requested AP, unless the elements requested are not part of the complete profile for the requested AP and subject to the rules defined in 11.1.4.3.4 (Criteria for sending a response)(#1048).

(#5737)(#2583)(#3360)(#1423)If an AP that is affiliated with an AP MLD receives an ML probe request with the Address 1 field set to the BSSID of the AP and responds with an ML probe response (per 11.1.4.3.4 (Criteria for sending a response)), the Address 1 field of the Probe Response frame shall be set to the address of the STA that sent the ML probe request. (#4378).

If an AP that is affiliated with an AP MLD receives an ML probe request with the Address 1 field set to the broadcast address and the Address 3 field set to the BSSID of the AP and responds with an ML probe response (per 11.1.4.3.4 (Criteria for sending a response)), the Address 1 field of the Probe Response frame may be set to the broadcast address unless the AP is not including its actual SSID in the SSID element of its Beacon frames, disregarding the addressing rules defined for a FILS STA in 11.1.4.3.9 (Contents of a probe response) if the AP is a FILS STA. (#4378).

(#1049)(#1926)(#2421)(#2592)(#2858)(#7359)NOTE—An AP operating in the 6 GHz band might already set the Address 1 field of the Probe Response frame to broadcast address as defined in 26.17.2.3.2 (AP behavior for fast passive scanning).

(#5977, #6197)

**35.3.3 Multi-link device addressing**

(…existing texts…)

(#8227)For an individually addressed frame sent on a link between two MLDs, the following applies:

* (#8230)(#1158)the value of the Address 2 (TA) field (if present) in the MAC header of the frame  
  that is not a Probe Response frame (#4253) shall be the MAC address of the transmitting STA affiliated with the MLD corresponding to that link  
  except for(#2474) the Individual/Group bit, which is set to 1 when the TA field value is a bandwidth  
  signaling TA and set to 0 otherwise.
* if the transmitting AP affiliated with the MLD corresponding to that link is not a member of a multiple BSSID set or the transmitting AP affiliated with the MLD corresponding to that link is a member of a multiple BSSID set and corresponds to a transmitted BSSID, the value of the Address 2 (TA) field in the MAC header of the Probe Response frame shall be the MAC address of the transmitting AP (#4253)
* if the transmitting AP affiliated with the MLD corresponding to that link is a member of a multiple BSSID set and corresponds to a nontransmitted BSSID, the value of the Address 2 (TA) field in the MAC header of the Probe Response frame shall be transmitted BSSID in the same multiple BSSID set (see 11.1.4.3.4 (Criteria for sending a response)) (#4253)

(…existing texts…)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** | **Ad-hoc Notes** |
| 5306 | 35.3.4 | 251.12 | An asociated non-AP MLD should be able to scan AP parameters by using robust information query frame and to get a robust unicast response or integrity protected broadcast response | Please add a mechanism for associated STAs to perform secure discovery | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. | Volunteer: Gaurang Naik |
| 6202 | 35.3.4 | 251.12 | Besides active scanning, STA discovery procedures make use of other protocols such as ANQP. Presumably there would be a few requirements, such as the HESSID and the ANQP information should be the same across all APs affiliated with an AP MLD. | Add a new sub-clause to mention ANQP discovery procedures.  The commenter is willing to collaborate on a contribution that addresses this comment. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. | Volunteer: Gaurang Naik |
| 6631 | 35.3.4 | 251.12 | It is not clear how the client interprets the SSID from discovery AP MLD. Clearly, non-AP MLD has to see one SSID from AP MLD. Otherwise, the interpretation about mobility has confusions. | Specify that all APs in the AP MLD has the same SSID. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. | Volunteer: Gaurang Naik |
| 5324 | 35.3.4.1 | 251.33 | The RNR element should signal whether a reported AP sends beacon on high transmission rates, lets say higher than 12 Mbit/s or 24 mbit/s. This helps STA to optimize scanning of the AP and helps to determine the reported BSS range. | Please add a bit to the RNR to signal whether the reported AP sends Beacons in transmission rate that is smaller or equal to 24 Mbit/s. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. | Volunteers: Xiaofei Wang, Gaurang Naik |
| 5038 | 35.3.9.2 | 264.57 | If the target operating class/channel selected by an AP performing a channel switch is a DFS channel, there can be a scenario where the AP detects a radar on the new channel and must switch the channel again. This will make the channel announced in the Channel Switch Announcement element invalid. The spec must provide a method to notify the non-AP MLDs about the new channel switch. | Clarify that if an AP affiliated with an AP MLD performs a channel switch and announces the channel switch through a (Extended) Channel Switch Announcement element and (optionally) Max Channel Switch Time element, if a second channel switch occurs within the time indicated in the Switch Time field of the Max Channel Switch Time element, the AP must announce this channel switch on all other links in the Beacon and Probe Response frames by including another (Extended) Channel Switch Announcement element and an (optional) Max Channel Switch Time element. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. | Volunteers: Gaurang Naik, Xiaofeng Wang |
| 5308 | 35.3.9.2 | 264.65 | When an AP switches channel, the new AP parameters in the new channel should be signaled to associated non-AP MLDs. This allows associated AP MLDs to prepare for the coming AP channel swtich. | Please allow affiliated APs to add the new channel of the AP and the AP parmeter values after the channel switch to their ML elements' Per-STA profiles. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |  |
| 4065 | 35.3.9 | 265.29 | If the selected (new) channel is a DFS channel, an AP is required, per regulatory rules, to assess the conditions on the channel (to ensure radar operation is not in progress) before it resumes the BSS operation to the new channel. Such checks may take long period and the AP can signal unavailability via the Max Channel Switch Time element. An unassociated non-AP MLD can send probe request or (re)association request frame on any link. To prevent an unassociated non-AP MLD from transmitting a Probe Request frame or (Re)Association Request frame on the affected link (while the AP is unavailable), the reporting AP(s) affiliated with the AP MLD must include the Max Channel Switch Time element in the Beacon and Probe Response frame that it transmits. The value carried in the Max Channel Switch Time element should be adjusted (reasonable accuracy) to reflect the expected time when the affected AP will resume beaconing on the new channel. | Update NOTE 2 to append the following sentence end the end: "AP affiliated with the AP MLD operating on other link includes the Max Channel Switch Time element (when advertised by the affected AP) in its Beacon and Probe Response frame until the affected AP resumes BSS operation on the new channel. The value carried in the Switch Time field must be reasonably accurate to provide an estimated time of the first Beacon in the new channel." Alternatively, a new paragraph describing this behavior as normative text must be added. | Revised – Max channel switch time element is now included. No further actions are needed for this CID. |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 5323 | 9.4.2.36 | 120.30 | The Neighbor Report element does not provide good tools to assist on candidate AP scanning. The candidate AP may transmit beacons/discovery frames in multiple ways: 1.Higher MCSs 2. non-HT Duplicate PPDUs in 6 GHz with larger BW; 3. ER SU format The scanning STA should have information to select the scanning mode for the candidate AP MLD / AP. | Please add information to assist on scanning of the candidate APs / affilaited APs of the AP MLDs. For instance, the transmitted Beacon and other discovery frames type should be included to the Neighbor Report information. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |
| 5325 | 9.4.2.170 | 123.21 | The RNR element should signal whether AP sends beacon in non-HT PPDU format. This helps STA to optimize scanning of the AP and helps to determine whether AP optimizes its range. | Please add a bit to signal whether AP sends Beacons on non-HT PPDU or Non-HT Duplicate PPDU. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |
| 5326 | 9.4.2.170 | 123.21 | It may be good to clarify whether AP receives PPDUs on any supported format from non-associated STAs. This may help the scannig STA to select PPDU type and TX BW to ensure correct delivery of the frames to the AP. | Please add a bit to the RNR to signal whether the reported AP receives frames from non-associated STAs on any PPDU format it supports. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |
| 5327 | 9.4.2.170 | 123.21 | Low Power Indoor (LPI) AP in the 6 GHz band may transmit Beacons on larger than 20 MHz BW. To maximize the range from which the scanning STA is able to receive these Beacon frames, the scanning STA should have out-of-band infromation to use wider than 20MHz RX BW. | Please add a bit to the RNR to signal whether the reported AP transmits Beacons on wider than 20 MHz BW. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 6392 | Muhammad Kumail Haider | 10.29.4 | 181.61 | "affiliated to" --> "affiliated with" | as in comment | Revised – agree with the commenter. The proposed change has already been made and appears in D1.4. No further actions needed for this CID. |
| 8183 | Yunbo Li | 10.29.4 | 181.52 | "it might transmit Data frame of the AC only if the corresponding TIDs are mapped to that link in the direction of the RD responder to the RD initiator" It doesn't require two TIDs of this AC mapping to that link. | Change "the corresponding TIDs" to "at least one of the corresponding TIDs" | Accept |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 5667 | Julien Sevin | 35,3,4,5 | 254.31 | Add a section for describing active passive scanning for a non-AP EHT STA | As in comment | Rejected – no specific requirement in 11be for active scanning. No need for such section. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 5918 | Li-Hsiang Sun | 35.3.4.5 | 254.37 | The agreement in 21/0435r2 only supports non-FILS MLD, a STA probably should not include ML element and FILS request Parameters element at the same time | Clarify that if including ML element, dot11FILSActivated is set to false | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |
| 6201 | Michael Montemurro | 35.3.4.5 | 354.52 | I believe the requirements in the clause apply to active scanning using Probe Requests and non ML Probe Requests. | Change "If a non-AP EHT STA is sending a Probe Request frame:" to "A non-AP EHT STA shall initiate an active scan by calling the MLME-SCAN.request primitive with the ScanType parameter set to ACTIVE and the ActiveScanType set to FRAME to issue a Probe Request. An non-AP MLD shall initiate an ML Probe Request on an affiliated STA by calling the MLME-SCAN.request primitive with the ScanType parameter set to ACTIVE and the ActiveScanType set to ML.  If a non-AP EHT STA is transmitting a Probe Request frame:"  Note that Clause 6.3.2.2. needs to be modified to add an ML value for ActiveScanType and ensure that this parameter is included for EHT STAs. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |
| 5328 | Jarkko Kneckt | 35.3.4.6 | 254.46 | The associated non-AP MLDs needs to have integrity protected and encrypted mechanism to query affiliated APs and AP MLD parameters. The current mechanism where unicast (ML) probe request and Probe Response are not protected cannot ensure information integrity and causes privacy violations to the requesting and responding STAs/MLDs. | Please add unicast ML Query Request and ML Query Response signaling to enable associated STAs and non-AP MLDs to query associated AP parameters with encryption and integrity protection. | Rejected – the group didn’t reach consensus on a set of changes that would satisfy the commenter. |
| 6488 | Osama Aboulmagd | 35.3.5.1 | 251.34 | What does a collocated AP set mean? Is there a definition? | It is fine if there is a definition. If not then a definition needs to be added | Rejected – there is such definition |
|  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 4277 | Alfred Asterjadhi | 35.3.9.2 | 264.56 | Transmit Power related rules need to be amended as well (especially for 320 MHz) and called out. | As in comment. | Revised – agree with the commenter. Apply the changes marked as #4277 in this document |

TGbe Editor: modify paragraph 6 in 9.4.2.161 Transmit Power Envelope element as follows (#4277)

~~Local~~ Maximum Transmit Power For *X* MHz fields (where *X* = 20, 40, 80, or 160/80+80) define the local maximum transmit power limit of *X* MHz PPDUs, except for an HE TB PPDU and for an EHT TB PPDU where *X* MHz is the bandwidth of the pre-HE and pre-EHT modulated fields of the HE TB PPDU and EHT TB PPDU transmitted by a STA. Each ~~Local~~ Maximum Transmit Power For *X* MHz field is encoded as an 8-bit 2s complement signed integer in the range –64 dBm to 63 dBm with a 0.5 dB step. Setting this field to 63.5 dBm indicates 63.5 dBm or higher (i.e., no local maximum transmit power constraint).

TGbe Editor: modify Table 9-691 Transmit Power Envelope element format as follows (#4277)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Transmit Power Information | Maximum Transmit Power | Extension Maximum Transmit Power |
| Octets: | 1 | 1 | 1 | variable | variable |
| * Transmit Power Envelope element format(11ax) | | | | |  |

TGbe Editor: add Figure 9-xxx-Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2 as follows (#4277)

|  |  |
| --- | --- |
|  | Maximum Transmit Power For 320 MHz |
| Octets: | 1 |

Figure 9-xxx-Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2

TGbe Editor: add the following paragraph after the Figure 9-xxx-Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2 (#4277)

Maximum Transmit Power For 320 MHz fields define the local maximum transmit power limit of 320 MHz PPDUs, except for an EHT TB PPDU where 320 MHz is the bandwidth of the pre-EHT modulated fields of the EHT TB PPDU transmitted by a STA. The Maximum Transmit Power For 320 MHz field is encoded as an 8-bit 2s complement signed integer in the range –64 dBm to 63 dBm with a 0.5 dB step. Setting this field to 63.5 dBm indicates 63.5 dBm or higher (i.e., no local maximum transmit power constraint).

TGbe Editor: Add the following paragraph at the end of 9.4.2.161 Transmit Power Envelope element (#4277)

The format of the Extension Maximum Transmit Power field is defined in Figure 9-xxx (Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2) if the Maximum Transmit Power Interpretation subfield is 0 or 2 and is the same as the Maximum Transmit Power field if the Maximum Transmit Power Interpretation subfield is 1 or 3, as defined in Figure 9-617b (Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 1 or 3).

The Extension Maximum Transmit Power field is included only if one of the following conditions is met:

* the AP is operating in the 5GHz or 6 GHz band, the AP is announcing a BSS operating channel width that is different than the EHT BSS operating channel width (see 35.16.1 Basic EHT BSS operation), the Maximum Transmit Power Interpretation subfield is 0 or 2 and the EHT BSS operating channel width is 320 MHz.
* the AP is operating in the 5GHz or 6 GHz band, the AP is announcing a BSS operating channel width that is different than the EHT BSS operating channel width (see 35.16.1 Basic EHT BSS operation) and the Maximum Transmit Power Interpretation subfield is 1 or 3 and the value N determined from the Maximum Transmit Power Count subfield is greated than 0.

If the Extension Maximum Transmit Power field is included and if the Maximum Transmit Power Interpretation subfield is 1 or 3, then:

* the Transmit Power Information field and the Maximum Transmit Power field are computed with the BSS operating channel width of the AP that is different than the EHT BSS operating channel width.
* the Extension Maximum Transmit Power field is computed with the EHT BSS operating channel width of the AP as follows:
  + the value of *K*, corresponding to the length in octets of the Extension Maximum Transmit Power field is set to the number of 20 MHz subchannels contained within the EHT BSS operating channel minus the number of 20 MHz subchannels contained within the BSS operating channel.
  + the Maximum Transmit PSD 1-*K* subfields correspond  
    to 20 MHz channels from lowest to highest frequency, respectively, within the EHT BSS operating channel, excluding the 20 MHz channels within the BSS operating channel.

If the Extension Maximum Transmit Power field is included and if the Maximum Transmit Power Interpretation subfield is 0 or 2, then the Maximum Transmit Power Count field is set to 3. In a Transmit Power Envelope element transmitted by an EHT AP with the Maximum Transmit Power Interpretation subfield set to 0 or 2, the Maximum Transmit Power For X MHz subfield is included (where X = 20, 40, 80, 160/80+80, or 320) if X is less than or equal to the operating channel width of the corresponding EHT BSS.

TGbe Editor: Add the following subclause 35.16.3 EHT operation with the Transmit Power Envelope element (#4277)

**35.16.3 EHT operation with the Transmit Power Envelope element**

An EHT STA follows the rules defined in 10.22.4 (Operation with the Transmit Power Envelope element) and the rules defined in this subclause.

The Extension Maximum Transmit Power field shall be included in the Transmit Power Envelope element by an AP only if one of the following conditions is met:

* the AP is operating in the 5GHz or 6 GHz band, the AP is announcing a BSS operating channel width that is different than the EHT BSS operating channel width (see 35.16.1 Basic EHT BSS operation), the Maximum Transmit Power Interpretation subfield is 0 or 2 and the EHT BSS operating channel width is 320 MHz.
* the AP is operating in the 5GHz or 6 GHz band, the AP is announcing a BSS operating channel width that is different than the EHT BSS operating channel width (see 35.16.1 Basic EHT BSS operation) and the Maximum Transmit Power Interpretation subfield is 1 or 3 and the value of *N* determined from the Maximum Transmit Power Count subfield is greater than 0.

If the Extension Maximum Transmit Power field is included and if the Maximum Transmit Power Interpretation subfield is 1 or 3, then:

* the Transmit Power Information field and the Maximum Transmit Power field shall be computed with the BSS operating channel width of the AP that is different than the EHT BSS operating channel width.
* the Extension Maximum Transmit Power field shall be computed as follows:
  + the value of *K*, corresponding to the length in octets of the Extension Maximum Transmit Power field is set to the number of 20 MHz subchannels contained within the EHT BSS operating channel minus the number of 20 MHz subchannels contained within the BSS operating channel.
  + the Maximum Transmit PSD 1-*K* subfields correspond  
    to 20 MHz channels from lowest to highest frequency, respectively, within the EHT BSS operating channel, excluding the 20 MHz channels within the BSS operating channel.

If the Extension Maximum Transmit Power field is included and if the Maximum Transmit Power Interpretation subfield is 0 or 2, then the Maximum Transmit Power Count field shall be set to 3.

In a Transmit Power Envelope element transmitted by an EHT AP with the Maximum Transmit Power Interpretation subfield set to 0 or 2, the Maximum Transmit Power For X MHz subfield shall be included (where X = 20, 40, 80, 160/80+80, or 320) if X is less than or equal to the operating channel width of the corresponding EHT BSS.

**BUG FIXES**

TGbe Editor: modify 35.3.24 BSS transition management for MLDs subclause as follows (#4277)

## BSS transition management for MLDs(#5322)

A STA affiliated with an MLD has dot11BSSTransitionActivated equal to true, following procedure defined in 11.21.7.1 (BSS transition capability).

A STA affiliated with an MLD shall follow the procedure define in 11.21.7 (BSS transition management for network load balancing), except that:

* + - * the procedure is applied between the SMEs of an AP MLD and a non-AP MLD and not between the SMEs of an AP and a STA.
      * if the Neighbor Report element of an AP includes a Basic Multi-link element in the BSS Transition Candidate List Entries field of a BSS Transition Management Query/Request or Response frame, it describes the preference for a target AP MLD candidate and not for a target BSS candidate, otherwise it describes the preference for a target BSS candidate.
      * The Preference field value of a Neighbor Report element that includes a Multi-link element describing an AP MLD provides the indication of preference for the given AP MLD, within the given list at the given time.
      * If an AP MLD intends to provide preference for a reported AP MLD without recommendation on specific affiliated APs, it shall:
        + include a Neighbor Report element for one of the APs affiliated with the AP MLD, and include a Basic Multi-link element in the Neighbor Report.
        + set to 0 all subfields of the Presence Bitmap field.
        + not include any Per-STA Profile subelement in the Basic Multi-link element.
      * If an AP MLD intends to provide preference for a reported AP MLD with only a subset of recommended affiliated APs, it shall:
        + include a Neighbor Report element for one of the recommended APs affiliated with the AP MLD, and include a Basic Multi-link element in the Neighbor Report element.
        + include a Link ID Info field in the Common Info field of the Basic Multi-link element with the field value set to that corresponding to the AP reported in the Neighbor Report element.
        + set to 0 all subfields of the Presence Bitmap field except the Link ID Info Present subfield.
        + include a Per-STA Profile subfield only for each of the other recommended affiliated APs (if any), and with all the fields set to 0 in the STA Control field, except the Link ID field. If multiple Neighbor Report elements are used to report the same AP MLD with the same recommended subset of affiliated APs, the Preference field value in these elements shall be the same. If multi- ple Neighbor Report elements are used to report the same AP MLD with different recommended subset of affiliated APs, the Preference field value in these elements may be different.
      * When an AP affiliated with an AP MLD transmits a BSS Transition Management Request frame with the Link Removal Imminent subfield set to 0 and the Disassociation Imminent field set to 1 to a non-AP MLD, the Disassociation Timer field in the BSS Transition Management Request frame shall be set to 0 or set to the number of TBTTs that will occur prior to the AP MLD disassociating the non-AP MLD.
      * When an AP affiliated with an AP MLD transmits a BSS Transition Management Request frame with the Link Removal Imminent subfield set to 0 and the BSS Termination Included field set to 1 to a non-AP MLD, the BSS termination means that the AP MLD is shutting down, and the non-AP MLD will be disassociated from the AP MLD.
      * A non-AP MLD shall ignore a BSS Transition Management Request frame with the Link Removal Imminent subfield set to 1.

NOTE—An AP MLD can use this protocol to recommend a non-AP MLD to do MLD (re)association with the same AP MLD with a different set of links.

***TGbe editor: Add the following subclause Modify subclause 35.3.14.4 Multi-link DMS procedures as shown below: (#4277)***

**35.3.14.3 Multi-link DMS procedures**

An MLD that implements DMS shall indicate its capability by setting to 1 the DMS field of the Extended Capabilities element that is transmitted by its affiliated STAs. All STAs affiliated with an MLD shall advertise the same DMS capability.

For an MLD, directed multicast service (DMS) is a service that may be provided by an AP

MLD to associated non-AP MLDs that support DMS, where the AP MLD transmits group addressed MSDUs as individually addressed A-MSDUs.

DMS procedures shall be performed at the MLD level by following the procedure defined in 11.21.16.2 (DMS procedures), except that the following shall apply:

* The DMS provider shall be an AP MLD
* The DMS recipient shall be a non-AP MLD that uses DMS.

Discussion: there is an issue when an AP is removed. We currently use directly the critical update flag in this case, and not the BSS parameters update. If there is a change in BSS parameters update together with the inclusion of the ML reconfig element, the STA can miss it. Also, if the STA misses the beacon on which there was a critical update flag, it can not determine if there had been a critical update. Everything would be easily solved if we use BSS parameters update in this case (link remove), as we do for any other update for a particular AP affiliated with an AP MLD.

**35.3.10 BSS parameter critical update procedure**

[existing text]

***TGbe editor: modify following paragraph in subclause 35.3.10 BSS parameter critical update procedure as follows:*** (#4277)

The Critical Update Flag subfield of the Capability Information field in Beacon and Probe Response  
frames shall also be set to 1 if a new affiliated AP is added to the AP MLD with which the reporting AP is  
affiliated following the procedure defined in 35.3.6.2.1 (Adding new affiliated APs).

**11.2.3.15 TIM Broadcast**

***TGbe editor: add following line in subclause 11.2.3.15 TIM Broadcast as follows:*** (#4277)

s) Inclusion of a Reconfiguration Multi-Link element by an AP affiliated with an AP MLD that will be removed following procedure defined in 35.3.6.2.2 (Removing affiliated APs)