IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MLO – 35.3.9.2 | | | | |
| Date: 2021-10-15 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Laurent Cariou |  |  |  | laurent.cariou@intel.com |
| Abhishek Patil |  |  |  |  |
| Gaurang Naik |  |  |  |  |

**PART 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Ad-hoc Notes** | **Resolution** |
| 4385 | Arik Klein | 35.3.9.2 | 264.59 | In case that Beacon frame or Probe Response frame is transmitted by the transmitted BSSID in the same multiple BSSID set as the first AP if the first AP corresponds to a nontransmitted BSSID, need to add a note that the location of any of the transmitted elements can be either in non-transmitted BSSID profile corresponding to the first AP (if the element is not inherited from the same element in the Beacon or the Probe Response) or is utilized from the same element that resides in the Beacon or Probe response of the transmitted BSSID (if this element is inherited). | Add the following note: "In case that Beacon frame or Probe Response frame is transmitted by the transmitted BSSID in the same multiple BSSID set as the first AP if the first AP corresponds to a nontransmitted BSSID, the location of any of the transmitted elements can be either in: - non-transmitted BSSID profile corresponding to the first AP, if the element is not inherited from the same element in the Beacon or the Probe Response - or is utilized from the same element that resides in the Beacon or Probe response of the transmitted BSSID, if this element is inherited. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – rephrase sentence regarding the case where the affected AP is a nonTxBSSID and detail the 2 possible cases, where the element in included in nonTxBSSID profile or inherited from core of the TxBSSID frame. Apply the changes marked as #4385 in this document |
| 4462 | Arik Klein | 35.3.9.2 | 264.59 | Change "affiliated to" to "affiliated with" in the following sentence: "If the Beacon frame or Probe Response frame transmitted by a first AP \*affiliated to\* an AP MLD..." | The revised sentence shall be "If the Beacon frame or Probe Response frame transmitted by a first AP \*affiliated with\* an AP MLD..." | Volunteers: ​Gaurang Naik, Xiaofeng Wang | accept |
| 4463 | Arik Klein | 35.3.9.2 | 264.59 | Incorrect language: the following sentence is passive-context, thus use "is transmitted" rather "transmitted" | The correct sentence shaould be "If the Beacon frame or Probe Response frame \*is\* transmitted by a first AP affiliated to an AP MLD, or \*is\* transmitted by the transmitted BSSID in the same multiple BSSID set as the first AP if the first AP corresponds to a nontransmitted BSSID, any of the following elements is included for the first AP | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter. Apply the changes marked as #4463 in this document |
| 4464 | Arik Klein | 35.3.9.2 | 265.09 | Change "affiliated to" to "affiliated with" in the following sentence: "Then, if another AP is \*affiliated to\* the same AP MLD" | The revised sentence shall be "Then, if another AP is \*affiliated with\* the same AP MLD" | Volunteers: ​Gaurang Naik, Xiaofeng Wang | accept |
| 5035 | Gaurang Naik | 35.3.9.2 | 265.26 | The spec currently has no mechanism that an AP of an AP MLD can use to signal the unavailability, due to channel switching, of another AP affiliated with the same AP MLD to unassociated clients. If an unassociated non-AP MLD requests the complete profile of an AP that is performing channel switch, the reporting AP must notify the non-AP about the reported AP's unavailability. Otherwise, the non-AP may send an Association Request frame on the unavailable link, which can create regulatory concerns if the unavailibilty is because of radar detection or similar conditions. | Include the Max Channel Switch Time element in the ML and non-ML Probe Response frames in the Per-STA Profile subelements corresponding to an AP that is performing channel switch. | Volunteers: Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter. Apply the resolution suggested by commenter in CID4065. Apply the changes marked as #5035 in this document |
| 5036 | Gaurang Naik | 35.3.9.2 | 265.26 | A STA affiliated with a non-AP MLD is allowed to send the Association Request and/or Probe Request frame on any link that the AP MLD supports. If the AP on one of the links is performing channel switch, the other APs must signal the unavailability of that AP in the Beacon frames to inform the non-AP MLDs performing passive scanning to not send a Probe Request or an Association Request frame on the unavailable link. Otherwise, the non-AP may send an Association Request/Probe Request frame on the unavailable link, which can create regulatory concerns if the unavailability is due to radar detection or similar conditions. | Include the Max Channel Switch Time element in the Beacon frames in the Per-STA Profile subelements corresponding to an AP that is performing channel switch. | Volunteers: Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter. Apply the resolution suggested by commenter in CID4065. Apply the changes marked as #5036 in this document |
| 4065 | Abhishek Patil | 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. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter. Apply the changes marked as #4065 in this document. |
| 5037 | Gaurang Naik | 35.3.9.2 | 264.57 | The Association Response frame is allowed to carry the Max Channel Switch Time element in the Per-STA Profile of an AP affiliated with an AP MLD if the Association Request frame is received between the last Beacon frame on the initial operating class/channel and the first Beacon frame on the target operating class/channel. The spec is unclear on the value carried in the Switch Time field of the Max Channel Switch Time element. | Clarify that the value carried in the Switch Time field of the Max Channel Switch Time element included in the Association Response frames reflects the time remaining for the AP to send the first Beacon on the new operating class/channel. | Volunteers: Gaurang Naik, Xiaofeng Wang | Revised – the sentence seems already clear on this point: saying that the Max Channel Switch Time element is included to indicate the time at which the AP will start beaconing. The Note included with CID4065 complements the explanation. Apply the changes marked as #5037 in this document. |
| 5038 | Gaurang Naik | 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. | Volunteers: Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter in principle. Just use the same statement as in baseline to clarifty that the switch time indicate the time at which the AP will start beaconing on the new channel, unless it is unable to do so. Apply the changes marked as #5038 in this document. |
| 5062 | Gaurang Naik | 35.3.9.2 | 265.16 | The timing fields in the Channel Switch Announcement element and other elements shall be applied in reference to the most recent TBTT and BI indicated in the corresponding element(s) of the first AP. The computation of these timing fields is not clear. | Clarify how the timing fields in the elements are computed by providing an example figure and description. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Reject – there is already a figure and description to clarify this. |
| 5218 | Huizhao Wang | 35.3.9.2 | 264.56 | Adding the Channel Switch related IEs everywhere is not efficient and error prone. Instead, "other APs" can just simply flag the AP affiliated to the same AP MLD is under going channel switch, and the non-AP MLD STA who see this indication can wake up another non-AP MLD STA affiliated to the same non-AP MLD and on the same link of AP of the AP MLD, to listen to Beacons, Channel Switch Announcement, and other mgmt frames carries the channel switch related IEs to conduct the channel switch operation. | Remove the text requiring Channel Switch related IEs are carried everywhere, and just add a flag to indicate which corresponding AP is under going Channel change. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Reject – this has been debated in the 11be task group. Seeing how unfrequent such channel switch happen, the overhead was not considered as an issue. On the other hand, it was considered very important to make sure that all STAs would be aware of all the parameters of the switch in a simple, accurate and fast manner. |
| 5308 | Jarkko Kneckt | 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. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Rejected – the spirit is to keep current channel switch protocol unchanged and to only deal with the impact/changes related to multi-link. With current protocol, the AP parameters will be advertised in the first beacon that is transmitted on the new channel. |
| 5690 | kaiying Lu | 35.3.9.2 | 264.59 | Change 'transmitted by a first AP' to 'is transmitted by a first AP'. Change 'or transmitted by the transmitted BSSID' to 'or is transmitted by the transmitted BSSID' | As in comment | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter, apply the changes marked as #5690 in this document |
| 5691 | kaiying Lu | 35.3.9.2 | 264.59 | Add 'and if' before 'any of the following elements is included for the first AP:' | As in comment | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter, apply the changes marked as #5691 in this document |
| 5838 | Lei Wang | 35.3.9.2 | 264.59 | The paragraph in line 59 page 264 needs some grammar fixes. See the proposed changes. | Suggest the following changes in the paragraph in line 59 page 264: If the Beacon frame or Probe Response frame transmitted by a first AP affiliated to an AP MLD, or transmitted by the transmitted BSSID in the same multiple BSSID set as the first AP if the first AP corresponds to a nontransmitted BSSID, includes any of the following elements is included for the first AP: | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter, apply the changes marked as #5838 in this document |
| 5925 | Li-Hsiang Sun | 35.3.9.2 | 264.59 | "If the Beacon frame or Probe Response frame transmitted by a first AP affiliated to an AP MLD, or transmitted by the transmitted BSSID in the same multiple BSSID set as the first AP if the first AP corresponds to a nontransmitted BSSID, any of the following elements is included for the first AP:" the half sentence is very long and difficult to read especially when there are 2 "if"s and very far next page follows a "then" | change to "If the Beacon frame or Probe Response frame transmitted by a first AP affiliated to an AP MLD, or transmitted by the transmitted BSSID in the same multiple BSSID set as the first AP because the first AP corresponds to a nontransmitted BSSID, any of the following elements is included for the first AP:"  Make the same change from "if" to "because" on p265.12 | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter, apply the changes marked as #5925 in this document |
| 5989 | Liwen Chu | 35.3.9.2 | 265.09 | change another AP, the other AP in the paragraph to second AP. | As in comment | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Reject – there are multiple other APs, so it is better to keep language as is. |
| 6099 | Marcos Martinez Vazquez | 35.3.9.2 | 265.15 | The paragraph says that AP1 that belongs to AP-MLD announces a CSA, ECSA, Quiet Time, ... and it refrences to its TBTT timing. Then the AP2 that also is part of AP-MLD, in the Basic variant MLD element announces that AP1 is going to perform this operation, but instead of referencing it with its own TBTT it keeps the reference to AP1 TBTT.  Is the AP1 TBTT also announced in Basic variant MLD in AP2's beacons? If it is announced, is it needed the same accuracy for TBTT from AP1 in AP2's beacon? If it is not announced, how an STA listening in AP2's as primary link but not listening to AP1's should know when CSA, ECSA,... will happen? Shall it listen to beacons on both links? |  | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Reject – The commenter fails to identify an issue and is mainly asking questions. the TBTT offset is provided in the RNR. |
| 6209 | Michael Montemurro | 35.3.9.2 | 264.59 | As I am trying to parse clause 39.3.9.2, it looks to me as if the "first AP" refers to the AP that is advertising Channel Switch, etc. If so, calling it the "first AP is very confusing". | This entire subclause is a mess. The commenter is willing to collaborate on a contribution to update the sub-clause to describe the required behavior. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, reformulate the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #6209 in this document. |
| 6298 | Ming Gan | 35.3.9.2 | 264.59 | Could this subclause be rephrased by follow the style of discovery part? Now it is first AP, then second AP. It is not easily to follow it. For example, an AP will inlcude the CSA, eCSA.. of other APs when some conditions are met... | Please rephrase this subclause | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding.Apply the changes marked as #6298 in this document. |
| 6299 | Ming Gan | 35.3.9.2 | 265.09 | Regarding "another AP is affiliated to the same AP MLD", However, sometimes it is the other AP, sometimes it transmitted BSSID, then trasnmit the info of the first AP. It is not easily to follow it | Please rephrase this paragraph | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding.Apply the changes marked as #6299 in this document. |
| 6491 | Osama Aboulmagd | 35.3.9.2 | 264.59 | How do we know the first affiliated AP and the second affiliated AP, etc.? are they ranked | Clarify | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP and split the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #6491 in this document. |
| 6492 | Osama Aboulmagd | 35.3.9.3 | 264.61 | The term "following elements is included for the first AP" is this a normative text? | Need to replace "is" with Shall, should, or may as appropriate | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – apply the changes marked as #6492 in this document |
| 6671 | Rajat Pushkarna | 35.3.9.2 | 264.59 | "first AP affiliated to an AP MLD", does it mean it only applies to the first AP of the AP MLD and not to others. A little confusing and not stated clearly here. | Replace with "AP" instead of 'first' or 'second' etc. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #6671 in this document. |
| 7373 | Stephen McCann | 35.3.9.2 | 264.59 | What is a "first AP"? Does it matter that these procedures are applied to the first AP? | Change all occurances of "first AP" to "AP". | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #7373 in this document. |
| 7374 | Stephen McCann | 35.3.9.2 | 265.10 | The text "the other AP" implies that there are only 2 APs affiliated to the MLD. | Change "the other AP" to "another AP" | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #7374 in this document. |
| 7443 | Thomas Derham | 35.3.9.2 | 0.00 | CSA mechanisms (used with or without MLDs) might be unprotected (e.g. in unprotected beacon frame, or probe response) which makes STA vulnerable to DoS attack. 11be should provide protection against such attacks | Mandate use of Beacon Protection and/or do not require STA to follow (E)CSA in unprotected frames and/or provide alternative secure mechanism | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter. It is a good idea to mandate beacon protection, not only for the reason identified in this CID. Apply the changes marked as #7443 in this document |
| 7820 | Yiqing Li | 35.3.9.2 | 265.14 | The first AP in this bullet is unclear. Clarify the first AP in Line 9. | Change the L9, P265 as "Then, if another AP as the first AP is affiliated to the same AP MLD:" | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #7820 in this document. |
| 7854 | Yonggang Fang | 35.3.9.2 | 264.59 | Please clarify what does the 'first" refer to ? If it refers to the switch initiating AP, please change to that. | See the comment. | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – similarly to other subclauses. Remove the term first AP, and split the sentence into multiple sentences in order to ease the understanding. Apply the changes marked as #7854 in this document. |

1. **Introduction**
2. **Proposed spec text**

***TGbe editor: Please change “affiliated to” to “affiliated with” in subclause 35.3.10.2 Channel switching, extended channel switching, and channel quieting, as shown below (#4462, #4464)***

***TGbe editor: Please change the following subclause 35.3.10.2 Channel switching, extended channel switching, and channel quieting, as follows***

* + - 1. **Channel switching, extended channel switching, and channel quieting(#2749)**

(#1429)(#1658)(#1694)(#1754)(#2874) (#4463, #5690, #5691, #5838, #5925, #6492) (#6209, #6298, #6299, #6491,#6671, #7373, #7374, #7820, #4385) If an (affected) AP affiliated with an AP MLD includes any of the following elements for itself in the Beacon frame or Probe Response frame it transmits:

:

* + - * + Channel Switch Announcement element
        + (#2749)Extended Channel Switch Announcement element
        + Max Channel Switch Time element
        + (#2215)Quiet element corresponding to quiet intervals other than quiet intervals scheduled to protect restricted TWT service periods (see [35.7.4.2 (Quieting STAs during restricted TWT service](#bookmark55) [periods(#2215))](#bookmark55))
        + Quiet Channel element
        + (#2875)(#2911)(#1428)Then one of the following shall apply:Another AP (reporting AP) affiliated with the same AP MLD and not corresponding to a nontransmitted BSSID shall carry the corresponding element(s) in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP contained in the Basic Multi-Link element included in the Beacon frame and Probe Response frame that it transmits
        + An AP corresponding to the transmitted BSSID in the same multiple BSSID set as a nontransmitted BSSID (reporting AP) that is affiliated with the same AP MLD as the affected AP shall carry the corresponding element(s) in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP contained in the Basic Multi-Link element corresponding to the AP MLD in the nontransmitted BSSID profile corresponding to the reporting AP in the Multiple BSSID element included in the Beacon frame and Probe Response frame that it transmits.

And

* + - * + the timing fields in the Channel Switch Announcement element, the (#2749)Extended Channel Switch Announcement element, the Quiet element, and the Quiet Channel element shall be applied in reference to the most recent TBTT and BI indicated in the corresponding element(s) of the affected AP and not to the TBTT and BI of the reporting AP.

NOTE – The affected AP can correspond to a transmitted BSSID in a multiple BSSID set or an AP with dot11MultiBSSIDImplement equal to false. The case where the affected AP corresponds to nontransmitted BSSID in a multiple BSSID set is covered in the next paragraph.

(#4463, #5690, #5691, #5838, #5925, #6492) If an AP corresponding to the transmitted BSSID in a multiple BSSID set includes any of the following elements in the Nontransmitted BSSID profile corresponding to an affected AP in the Multiple BSSID element in the Beacon frame or Probe Response frame it transmits, or if any of these elements is inherited for the affected AP in these frames:

* + - * + Channel Switch Announcement element
        + Extended Channel Switch Announcement element
        + Max Channel Switch Time element
        + Quiet element corresponding to quiet intervals other than quiet intervals scheduled to protect restricted TWT service periods (see [35.7.4.2 (Quieting STAs during restricted TWT service](#bookmark55) [periods)](#bookmark55))
        + Quiet Channel element

And if the affected AP corresponding to a nontransmitted BSSID in the same multiple BSSID set is affiliated with an AP MLD then one of the following shall apply:

* + - * + another AP (reporting AP) affiliated with the same AP MLD and not corresponding to a nontransmitted BSSID shall carry the corresponding element(s) in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP contained in the Basic Multi-Link element included in a Beacon frame and Probe Response frame that it transmits.
        + An AP corresponding to the transmitted BSSID in the same multiple BSSID set as a nontransmitted BSSID (reporting AP) that is affiliated with the same AP MLD as the affected AP shall carry the corresponding element(s) in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP contained in the Basic Multi-Link element carried in the Nontransmitted BSSID Profile subelement in the Multiple BSSID element included in a Beacon frame and Probe Response frame that it transmits.

And

* + - * + The timing fields in the Channel Switch Announcement element, the Extended Channel Switch Announcement element, the Quiet element, and the Quiet Channel element shall be applied in reference to the most recent TBTT and BI indicated in the corresponding element(s) of the affected AP and not with respect to the TBTT and BI of the reporting AP.

If an AP affiliated with an AP MLD is switching channel, the Channel Switch Announcement element, the (#2749)Extended Channel Switch Announcement element, and the Max Channel Switch Time elements will be included in every Beacon and Probe Response frames on all links of the AP MLD from right after the time the AP includes the elements in the Beacon frame it transmits until the intended channel switch time. The Max Channel Switch Time element, if used for this channel switch, shall be included in the per-STA profile of the affected AP in every Beacon and Probe Response frames on all links of the AP MLD until the affected AP resumes BSS operation on the new channel. The value carried in the Switch Time field indicates the estimated time of the first Beacon in the new channel.

(#4065, #5035, #5036, #5037)

(#6209)

~~(#5038)If an AP affiliated with an AP MLD performs a channel switch but can not announce it on its operating channel, then the same procedure described in the previous paragraph applies for each other AP affiliated with the same AP MLD as the AP.~~

~~(#5038) NOTE — This might occur if an AP performs a second channel switch between the target time of a first channel switch and the time at which the AP will start beaconing on the new channel corresponding to the first channel switch.~~

(#2295)When an AP (affected AP) affiliated with an MLD is switching from an initial operating class/channel to a target operating class/channel at a target switch time using channel switch announcement procedure or extended channel switch announcement procedure, then:

* + - * + (#2295)another AP (reporting AP) affiliated with the AP MLD shall set the (#1430)Operating Class and Channel Number fields corresponding to the affectedAP that is reported in the Reduced Neighbor Report element in Beacon and Probe Response frames it transmits (or that the transmitted BSSID in the same multiple BSSID set as the reporting AP transmits if the reporting APcorresponds to a nontransmitted BSSID) before the target switch time to the initial operating class/channel,
        + (#2295)another AP (reporting AP) affiliated with the AP MLD shall set the (#1431)Operating Class and Channel Number fields corresponding to the affectedAP that is reported in the Reduced Neighbor Report element in Beacon and Probe Response frames it transmits (or that the transmitted BSSID in the same multiple BSSID set as the reporting AP transmits if the reporting AP corresponds to a nontransmitted BSSID) (#3320)at and after the target switch time to the target operating class/channel,
        + Between the target switch time and the time at which the AP will start beaconing in the target operating class/channel, the Neighbor AP TBTT Offset subfield for the corresponding AP in the Reduced Neighbor Report element shall be set to 255.

35.13 EHT BSS operation

***TGbe editor: Add the following sentence in subclause 35.13 EHT BSS operation: (#7443)***

An EHT AP shall have dot11BeaconProtectionEnabled set to 1.

* + 1. **Channel switching, extended channel switching, and channel quieting**

***TGbe editor: Please change the following paragraph in subclause 35.3.10 Channel switching, extended channel switching, and channel quieting in 11be D1.31 (meaning on top of the changes incorporated based on resolutions accepted in 1562r6), as follows (#5038)***

The Max Channel Switch Time element, if used for this channel switch, shall be included in the per-STA profile of the affected AP in every Beacon and Probe Response frames on all links of the AP MLD until the affected AP resumes BSS operation on the new channel. The value carried in the Switch Time field indicates the estimated time of the first Beacon frame in the new channel unless the AP determines that it is unable to operate on the new channel.

**PART 2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Ad-hoc Notes** | **Resolution** |
| 4064 | Abhishek Patil | 35.3.9 | 264.64 | Since the 5 elements are directly included in the Beacon and Probe Response frame transmitted on other (reporting) links, these element should not cause the BSS Parameters Change Count subfield of the affected AP to increment. Add exception in clause 35.3.8 to exclude these elements. NOTE the element would still cause the Check Beacon field of the TIM frame to increment per baseline (see 11.2.3.15). | As in comment | Volunteers: ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter on the general issue. The issue is bigger than that and we need to design to cover for all the different cases (see discussion in doc 1562. Apply the changes marked as #4064 in this document |
| 5258 | Insun Jang | 35.3.9.2 | 264.56 | Non-AP MLD needs to recognize the inclusion of elements described in this subclause in Basic variant ML IE when happend | We need a flag to let non-AP MLDs know the inclusion of elements, e.g., in Capability Information field carried in Beacon | Volunteers: Namyeong Kim, ​Gaurang Naik, Xiaofeng Wang | Revised – agree with the commenter. These changes trigger a change in the Critical update flag and the STA has to retrieve this information. If these elements are included in the frame and can be retrieved by the STA immediately, the STA has to be aware of it, otherwise, the STA would always try and retrieve these elements on its own by probing. Apply the changes marked as #5258 in this document. |
| 6639 | Pooya Monajemi | 9.4.2.295b.2 | 128.60 | If a critical parameter from another AP is updated, the transmitting AP should be able to include that parameter in a beacon and prevent a probe storm by signaling that the update is included. | Add a bit that indicates that critical paraeters updated from CSN-1 are included in the ML element. |  | Revised – agree with the commenter. Apply the changes marked as #6639 in this document. |

**Discussion**

We have been defining the Critical Update Flag to allow for an early termination of beacon frame parsing on client side.

(1) We need to cover all the cases for which the Critical Update Flag has to be set to 1 to satisfy this use case:

* (a) Beacon includes an element listed in 35.3.10 for the AP or APs affiliated with same AP MLD
* (b) Beacon includes other critical updates

We need to cover for the non-transmitted BSSID case:

* Critical update flag per nonTxBSSID
* Nontransmitted BSSID Critical update flag set to 1 also to allow for fast termination if no updates (not waiting for MBSSID element that comes late in beacon frame)

(2) We need to be able to differentiate critical updates that are included in the frame (not requiring sending probe) or critical updates requiring sending probes.

Proposal:

* Use BSS parameters update field.
* Increment by one if there’s a critical update to (a) alone, or (b) alone
  + If (a), no need to probe
  + If (b), need to probe
* Increment by 2 if there’s a critical update to both (a) and (b)
  + STA knows it needs to probe to get elements for (b)

***TGbe editor: Modify subclause 35.3.8 BSS parameter critical update procedure as follows: (#5258, #4064, #6639)***

* + 1. **BSS parameter critical update procedure**

If an AP affiliated with an AP MLD is not in a multiple BSSID set or the AP corresponds to a transmitted BSSID in a multiple BSSID set, the AP shall

* + - * (#1083)(#1231)include in the Beacon and Probe Response frames it transmits a BSS Parameters Change Count subfield for each of all APs affiliated with the same AP MLD as the AP.
        + (#1070)(#1201)(#1202)The BSS Parameters Change Count subfield value for each AP is initial- ized to 0, and shall be incremented (modulo 256) when a critical update occurs, within a beacon interval, to the operational parameters for that AP as defined in 11.2.3.15 (TIM Broadcast).

The field shall be incremented starting from the Beacon frame where the element(s) constituting the critical event is(are) first included.

* + - * + (#1068)The BSS Parameters Change Count subfield for each of other APs affiliated with the AP MLD shall be carried in the MLD Parameters subfield in the TBTT Information field of the Reduced Neighbor Report element corresponding to that AP. (#1067)(#1068)(#1691)The BSS Parameters Change Count subfield for the AP shall be carried in variant Multi-Link element.
      * (#1069)set the Critical Update Flag subfield of the Capability Information field (9.4.1.4 (Capability Information field)) to 1 in the Beacon and Probe Response frames it transmits until and including the next DTIM Beacon frame on the link on which the AP is operating if there is a change to the value carried in the BSS Parameters Change Count subfield of the MLD Parameters field in the Reduced Neighbor Report element for any AP affiliated with the same AP MLD as the AP or to the value carried in the BSS Parameters Change Count subfield in variant Multi- Link element. Otherwise set the Critical Update Flag subfield to 0.For each reported AP affiliated with the same AP MLD as the AP, set the All Updates Included subfield in the MLD Parameters subfield in the TBTT Information field of the Reduced Neighbor Report element corresponding to the reported AP if the updated elements that correspond to the latest critical update that generated a change to the value carried in the BSS Parameters Change Count subfield for the reported AP are included in the frame carrying the Reduced Neighbor Report

The critical Update Flag subfield shall also 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).

If an AP affiliated with an AP MLD is a nontransmitted BSSID in a multiple BSSID set, then the AP that corresponds to the transmitted BSSID in the same multiple BSSID set shall

* + - * (#1231)include in the Beacon and Probe Response frames it transmits a BSS Parameters Change Count subfield for each of all APs affiliated with the same AP MLD as the AP corresponding to the non-transmitted BSSID
        + (#1070)(#1201)(#1202)The BSS Parameters Change Count subfield value for each AP is initial- ized to 0, and shall be incremented (modulo 256) when a critical update occurs within a beacon interval to the operational parameters for that AP as defined in 11.2.3.15 (TIM Broadcast)

The field shall be incremented starting from the Beacon frame where the element(s) constituting the critical event is(are) first included.

* + - * + The BSS Parameters Change Count subfield for each of other APs affiliated with the AP MLD shall be carried in the MLD Parameters subfield in the TBTT Information field of the Reduced Neighbor Report element corresponding to that AP.
        + (#1067)(#1691)The BSS Parameters Change Count subfield for the nontransmitted BSSID shall be carried in variant Multi-Link element carried in Nontransmitted BSSID Profile subelement of the Multiple BSSID element.
      * (#1069)set the Critical Update Flag subfield of the Nontransmitted BSSID Capability element (9.4.2.71 (Nontransmitted BSSID Capability element)) for that nontransmitted BSSID in the Beacon frame(s) it transmits until and including the next DTIM Beacon frame of the nontransmitted BSSID if there is a change to the value carried in the BSS Parameters Change Count subfield of the MLD Parameters field in the Reduced Neighbor Report element for any AP affiliated with the same AP MLD as the AP corresponding to the nontransmitted BSSID or a value carried in the BSS Parameters Change Count subfield in variant Multi-Link element in the Nontransmitted BSSID Profile corresponding to the nontransmitted BSSID. Otherwise, set the Critical Update Flag subfield to 0.
      * For each reported AP affiliated with the same AP MLD as the AP corresponding to the non-transmitted BSSID, set the All Updates Included subfield to 1 in the MLD Parameters subfield in the TBTT Information field of the Reduced Neighbor Report element corresponding to the reported AP if all the updated elements that correspond to the latest critical update that generated a change to the value carried in the BSS Parameters Change Count subfield for the reported AP are included in the frame carrying the Reduced Neighbor Report, and set to 0 otherwise.
      * Set the Nontransmitted BSSIDs Critical Update Flag subfield of the Capability Information field to 1 in a Beacon and Probe Response frame it transmits if the Critical Update Flag subfield of the Nontransmitted BSSID Capability field is set to 1 in at least one nontransmitted BSSID profile in the Multiple BSSID element in the same frame. Otherwise, set the Nontransmitted BSSIDs Critical Update Flag subfield to 0. The flag is set to 1 until and including the later of the DTIM Beacon frame amongst the nontransmitted BSSIDs having the Critical Update Flag subfield of the Nontransmitted BSSID Capability field is set to 1.

(#3225)(#1069)(#1070)(#3030)(#2131)(#3240)(#3319)(#1068)A non-AP MLD shall maintain a record of the most recently received BSS Parameters Change Count subfield value for each AP in the AP MLD with which it has multi-link setup.

When a STA affiliated with a non-AP MLD receives a BSS Parameter Change Count subfield for a certain AP that is affiliated with an AP MLD with which the non-AP MLD has performed multi-link setup and the value of the BSS Parameter Change Count subfield for the AP is different from the previously received value, then the non-AP MLD shall follow one of the following mechanisms:

—The STA affiliated with the non-AP MLD that is associated with the AP attempts to receive a Beacon frame or a Probe Response frame from the AP ~~before transmitting a frame to the AP~~.

—Any STA affiliated with the non-AP MLD attempts to send a Probe Request frame to its associated AP soliciting information of the AP ~~before the STA affiliated with the non-AP MLD that is associated with the AP intends to transmit a frame other than a Probe Request frame to the AP~~

Except that if the value in the BSS Parameter Change Count subfield is equal to the most recently received value recorded by the non-AP MLD for that AP + 1 and if the All Updates Included subfield in the MLD Parameters subfield in the TBTT Information field of the Reduced Neighbor Report element corresponding to the AP is set to 1, no further action is needed from the non-AP MLD as the updated elements are included in the received frame.

Note-the Probe Request frame can be either ML probe request or a Probe Request frame that is not ML probe request.

***TGbe editor: Modify subclause 9.4.1.4 Capability Information field and 9.4.2.71 Nontransmitted BSSID Capability element as follows: (#5258, #6064)***

**9.4.1.4 Capability Information field**

***Change*** [***Figure 9-85 (Capability Information field format (non-DMG STA))***](#bookmark57) ***as follows:***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
| ESS | IBSS | Reserved | Reserved | Privacy | Short Preamble | ~~Reserved~~ Critical Update Flag | Nontransmitted BSSIDs Critical Update Flag |
| B8 | B9 | B10 | B11 | B12 | B13 | B14 | B15 |
| Spectrum Management | QoS | Short Slot Time | APSD | Radio Measurement | EPD | Reserved | Reserved |

**Figure 9-85—Capability Information field format (non-DMG STA)**

***Insert the following three paragraphs after the fourteenth paragraph (“An ERP STA sets ...”):***

The Critical Update Flag subfield is reserved except when the Capability Information field is carried in a Beacon or a Probe Response frame transmitted by an AP (#1237)affiliated with an AP MLD.

(#1237)(#1900)(#2848)(#3012)An AP affiliated with an AP MLD sets the Critical Update Flag subfield to 1 if there is a change to a value carried in the (#1068)BSS Parameters Change Count subfield of the MLD Parameters field in the Reduced Neighbor Report element for any AP affiliated with the same AP MLD. Otherwise the AP sets the subfield to 0 (See 35.3.9 (BSS parameter critical update procedure)).

The Nontransmitted BSSIDs Critical Update Flag subfield is reserved except when the Capability Information field is carried in a Beacon or a Probe Response frame transmitted by an AP corresponding to the transmitted BSSID in a multiple BSSID set and there exist at least one AP in the multiple BSSID set that is affiliated with an AP MLD. An AP affiliated with an AP MLD sets the Nontransmitted BSSIDs Critical Update Flag subfield to 1 if the Critical Update Flag subfield of the Nontransmitted BSSID Capability field is set to 1 in at least one non-transmitted BSSID profile in the Multiple BSSID element in the same frame. Otherwise the AP sets the subfield to 0.

**9.4.2.71 Nontransmitted BSSID Capability element**

***Insert the following NOTES after the fifth paragraph (“The Nontransmitted BSSID Capability field contains the contents of. ”)***

(#1013)NOTE—The Critical Update Flag subfield of the Nontransmitted BSSID Capability field is set to 1 in the Bea- con frame(s) until and including the next DTIM Beacon frame of the nontransmitted BSSID if there is a change to a value carried in the BSS Parameters Change Count subfield of the MLD Parameters field in the Reduced Neighbor Report element for any AP in the same AP MLD as the AP corresponding to the nontransmitted or a value carried in the BSS Parameters Change Count subfield in the Common Info field of the Basic variant Multi-Link element in the Non- transmitted BSSID profile corresponding to the nontransmitted BSSID. Otherwise the subfield is set to 0 (See 35.3.9 (BSS parameter critical update procedure)).

NOTE—The Nontransmitted BSSIDs Critical Update Flag subfield of the Nontransmitted BSSID Capability field is reserved.

**11.2.3.15 TIM Broadcast**

***TGbe editor: add following line in subclause 11.2.3.15 TIM Broadcast as follows: (#5258, #6064)***

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)

**9.4.2.170 Reduced Neighbor Report element**

**9.4.2.170.2 Neighbor AP Information field**

***TGbe editor: modify the following table 9-709b as follows: (#5258, #6064)***

B0 B7 B8 B11 B12 B19 B20 B21 B22 B24

Bits: 8 4 8 1 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MLD ID | Link ID | BSS Parameters Change Count | All Updates Included | Reserved |

**Figure 9-709b—MLD Parameters subfield format**

***TGbe editor: add the following paragraph after the paragraph starting with “The BSS Parameters Change Count”: (#5258, #6064)***

The All Updates Included subfield indicates if the updated elements that correspond to the latest critical update that generated a change to the value carried in the BSS Parameters Change Count subfield for the AP are included in the frame carrying the Reduced Neighbor Report. It is set to 1 if all the updated elements are included and set to 0 otherwise.