IEEE P802.11
Wireless LANs

|  |
| --- |
| LB271 – CR for some CIDs related to 35.3.11 |
| Date: 2023-05-10 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Laurent Cariou |  |  |  | laurent.cariou@intel.com |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 15698 | 35.3.11 | 531.41 | The baseline restricts STAs from transmitting until they receive an enabling signal (such as a Beacon frame) from the AP on the new channel. However, non-AP MLD can perceive the completion of a channel switch based on information acquired through a link other than the one where the channel switch was performed. Therefore, 11be should allow non-AP MLDs to transmit on link 1 if they perceive the completion of a channel switch on link 1 through a frame received on link 2. (May help with non-AP MLD power saving) | Please allow non-AP MLDs to perform transmissions when they confirm the completion of a channel switch on a specific link through another link. Furthermore, the AP MLD can notify the completion of a channel switch on a specific link by sending unsolicited Probe Response frames to other links. |  Reject – non-AP MLD can not retrieve the complete information on the other link, it is therefore more prudent to wait for the Beacon frame to be sent on the new channel. |
| 18001 | 35.3.11 | 531.52 | Channel Switch Wrapper element is missing from the list | Add the element to be consistent with the text in 35.15.3 |  Revised – agree with the commenter. Apply the changes marked as #18001 in this document. |
| 18235 | 35.3.11 | 531.60 | add channel switch wrapper element in the list of elements that can be included in basic ML element in beacon or probe response frame for a reported link in case of reported link puncturing pattern change | as in comment |  Revised – agree with the commenter. Same comment as CID18001. Apply the changes marked as #18001 in this document. |
| 16520 | 35.3.11 | 532.04 | Need to split the very long and complex sentence into two understandable sentences, for the sake of clarity, as suggested | Consider revising the long sentence as follows: "In case that the reporting AP, affiliated with the same AP MLD as the affected AP, corresponds to a nontransmitted BSSID in a multiple BSSID set, the transmitted BSSID in the same multiple BSSID set shall carry the corresponding element(s) in the Multiple BSSID element included in the Beacon frame and Probe Response frame that it transmits. Specifically, the corresponding element(s) will be included in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP which is contained in the Basic Multi-Link element corresponding to the AP MLD and is included in the nontransmitted BSSID profile corresponding to the reporting AP." |  Revised – agree with the commenter. Modify also the previous sentence in that case. Apply the changes marked a #16520 in this document. |
| 17833 | 35.3.11 | 532.21 | Next paragraph is NOTE 2 instead of the paragraph describing a nontransmitted BSSID. | reorder the NOTEs (1-3), change current NOTE 1 to be the last NOTE |  Revised – modify language to make it clear. Apply the change marked as #17833 in this document |
| 16521 | 35.3.11 | 532.53 | Need to split the very long and complex sentence into two understandable sentences, for the sake of clarity, as suggested | Consider revising the long sentence as follows: "In case that the reporting AP, affiliated with the same AP MLD as the affected AP, corresponds to a nontransmitted BSSID in a multiple BSSID set, the transmitted BSSID in the same multiple BSSID set shall carry the corresponding element(s) in the Multiple BSSID element included in the Beacon frame and Probe Response frame that it transmits. Specifically, the corresponding element(s) will be included in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP which is contained in the Basic Multi-Link element corresponding to the AP MLD and is included in the nontransmitted BSSID profile corresponding to the reporting AP." |  Revised – agree with the commenter. Apply this new structure also to the previous paragraph. Apply the changes marked as #16521 in this document. |
| 16815 | 35.3.11 | 533.08 | Why are we sending a channel switch announcement on all links, not just the links on which we're actually going to change channel? | As it says in the comment |  Reject – so that all non-AP MLD (which may monitoring other links) are informed of the switch. |
| 18296 | 35.3.11 | 533.08 | The following sentence is not correct. "If an AP affiliated with an AP MLD is switching channel, the Channel Switch Announcement element, or the Extended Channel Switch Announcement element with the Channel Switch Count field of the (Extended) Channel Switch Announcement element set to a nonzero value, and the Max Channel Switch Time element shall be included..." | Change to "If an AP affiliated with an AP MLD is switching channel, the Channel Switch Count field of the (Extended) Channel Switch Announcement element shall set to a nonzero value, and the Max Channel Switch Time element shall be included..." | Revised – sentence structure is correct. Modify it following the change suggested by CID17834 to improve readability. Apply the changes marked as #17834 in this document. |
| 17834 | 35.3.11 | 533.10 | "of the (Extended) Channel Switch Announcement element" is redudent | remove "of the (Extended) Channel Switch Announcement element" | Accept |
| 16522 | 35.3.11 | 533.12 | Replace “the AP” with “the affected AP” in the sentence, as suggested, in order to emphasize that the start time of the advertisement of the mentioned elements refers to the time in which the affected AP starts to include them in the Beacon frame and Probe Response frame it transmits. | The sentence should be revised as follows: “ …shall be included in every Beacon and Probe Response frames on all links of the AP MLD from right after the time the \*affected\* AP includes the elements in the Beacon frame it transmits until the estimated channel switch ti”e." |  Revised – agree with the commenter. Mention affected AP in parenthesis to improve understanding. Apply the changes marked as #16522 in this document. |
| 18297 | 35.3.11 | 533.13 | In order to be consistent, chan“e "until the estimated channel switch t”me" “o "until the target switch t”me". | As in comment. |  Revised – agree with the commenter. Apply the changes marked as #18297 in this document. |
| 16523 | 35.3.11 | 533.14 | After the estimated channel switch time, the Max Channel Switch Time element shall be included in the per-STA profile corresponding to the affected AP in every Beacon and Probe Response frames on all links of the AP MLD, but the link on which the affected AP is operating and not in all links of AP MLD (as currently mentioned in the sentence).Please revise the sentence as suggested. | The sentence should be revised as follow“: "After the estimated channel switch time, the Channel Switch Announcement element and the Extended Channel Switch Announcement element shall not be included in the per-STA profile of the affected AP in the Beacon and Probe Response frames and the Max Channel Switch Time element 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, \*but the link on which the affected AP is operating,\* until the affected AP resumes BSS operation on the new chann”l." |  Revised – agree with the commenter. Apply the changes marked as #16523 in this document |
| 18298 | 35.3.11 | 533.14 | Change “After the estimated channel switch time,” to “After the target switch time,” | As in comment. |  Revised – agree with the commenter. Apply the changes marked as #18298 in this document |
| 17628 | 35.3.11 | 533.15 | It is hard for an AP to switch to a DFS channel without disrupting assoc clients because of the long CAC. Option 1) Quiet element on serving channel during CAC then CSA/ECSA with short MCST after DFS channel is proven to be clear. If first/second/third/… DFS channels checked holds radar then multiple Quiet intervals before CSA/ECSA. CSA/ECSA is only used when new DFS channel is known.Option 2) AP sends CSA/ECSA up front. But if checked channel has radar, clients are left hanging; AP now has to check a new channel and somehow report that new channel (if & when the check is successful) to the clients, perhaps via other APs in the AP MLD. But the language here seems to prohibit tha: “the Channel Switch Announcement element and the Extended Channel Switch Announcement element shall not be included in the per-STA profile of the affected AP in the Beacon and Probe Response frames” | 1) Add explanation for these two options. 2) In the second option, if the RNR can help point to the planned new channel, then describe that. Otherwise, remove the restriction at P533L16 |   |
| 18299 | 35.3.11 | 533.23 | Does “a second channel switch” change the target operating class/channel? If yes, then the (Extended) Channel Switch Announcement element shall be included. If not, then “The value carried in the Switch Time field indicates the adjusted estimated time of the first Beacon frame in the new channel” is good enough. Please clarify the second channel switch. | As in comment. |   |
| 16816 | 35.3.11 | 533.44 | “Between” should be “between” | As it says in the comment | Accept |
| 17881 | 35.3.11 | 533.49 | Change “AP (affected/reported) \*of\* an AP MLD” to “AP (affected/reported) \*affiliated with\* an AP MLD”. Same comment on P534L1. | As in comment | Accept  |
| 18251 | 35.3.11 | 533.56 | “… shall include the completeprofile for the AP indicating the target operating class/channel and a Max Channel Switch Time element in the per-STA profile corresponding to the AP (affected/reported AP) in the Basic Multi-Link element included in the (Re)Association Response frame “If the (re)Association Response frame is sent after target switch time but before the 1st beacon of the new channel of the reported link, the (re)association o unt frame has neither (e)CSA element in the complete profile nor RNR element for “indicating the target operating class/channel” | add RNR in (re)association response in this particular case |  Reject – the operating class and operating channels in that case are included in the operating elements in the complete profile. |
| 18300 | 35.3.11 | 533.60 | Since an NSTR mobile AP MLD will not transmit Beacon frames on the non-primary link, it is better to make the statement more general by changing “…to indicate the time at which the AP (affected/reported AP) will start beaconing, if the (Re)Association Response frame is sent between the last beacon on the initial operating class/channel and the first beacon on the target operating class/channel” to “…to indicate the time at which the AP (affected/reported AP) will resume the BSS operation, if the (Re)Association Response frame is sent between the target switch time and the estimated time that the AP resumes BSS operation on the new operating class/channel”. | As in comment. | Revised – agree with the commenter. Apply the changes marked as #18300 in this document |
| 16817 | 35.3.11 | 534.02 | “using Quiet elementand optionally Quiet Channel element” missing articles | As it says in the comment |  Revised – agree with the commenter. Apply the changes marked as #16817 in this document |
| 18236 | 35.3.11 | 534.19 | After the last beacon on the current channel of the reported link, the reporting link advertises Max Chanel Switch Time element for the affected link. However, the value of this field is dependent on the time of channel access on the reporting link and it is dynamic based on medium contention. This affects the generation of MIC for the protected beacon frame on the reporting linkThe above bahaviors of changing field values/MIC based on channel access time is not desirable. | The value of Max Channel Switch time after the affected AP ‘s last beacon on the current channel and before the 1st Beacon on the new channel, and/or the values of channel switch count/quiet count/DTIM count should be the same as the values carried in the most recent beacon on the reporting link. The reference point of max channel switch time/count should be based on the most recent TBTT of the reporting link (TBTT at the beginning of the current BI). This enables reporting link transmitter to keep same field values for a BI duration independent of channel access.Change P533L14 to “After the estimated channel switch time, ...The value carried in the Switch Time field indicates the estimated time delta between the most recent TBTT of the reporting link (TBTT at the beginning of the current BI), and the expected time of the first Beacon frame in the new channel on the reported link, or the estimated time delta between the most recent TBTT of the reporting link and the expected time that non-primary link BSS resumes operation in the new channel, expressed in TUs”Change P246L60 to “After the last beacon is transmitted on the reported link, the Switch Time field indicates the estimated time delta between the most recent TBTT of the reporting link (TBTT at the beginning of the current BI) and the expected time of the first Beacon in the new channel on the reported link, , or the estimated time delta between the most recent TBTT of the reporting link and the expected time that non-primary link BSS resumes operation in the new channel, expressed in TUs” |   |
| 15406 | 35.3.11 | 534.38 | In Figures 35-18 and 35-19, the patterns chosen for the interior of the Beacon and Assocation response boxes are very similar, making it hard to differentiate | Revise figures to make the difference between the two types of frames more apparent |  Revised – agree with the commenter. Darken one of the box. Apply the changes marked as #15406 in this document. |
| 17837 | 35.3.11 | 534.48 | what does the dash line mean in Figure 35-18? Same comment for Figure 35-19. | Remove the dash line if it is not necessary. |  Revised – The dash line is meant to meant that Beacon frames are transmitted after but are not shown in the figure. Replace the dash with Beacon frames. Apply the changes marked as #17837. |
| 15539 | 35.3.11 | 534.50 | What does “BPCC” mean in the Figure 35-18 and Figure 35-19? | Give a definition. |  Revised – agree with the commenter. Apply the changes marked as #15539 in this document. |
| 18237 | 35.3.11 | 534.56 | From Fig 35-18, the quiet count value seems depend on the channel access time of the association response frame, For example, if the frame is sent on link 2 before the last link 1 TBTT before quiet duration, then Quiet count=1. If the frame is delayed due to channel access and is sent after the last link 1 TBTT before quiet duration, then Quiet time needs to be changed to 128.The above bahaviors of changing field values based on channel access time is not desirable. | The of channel switch count/quiet count/DTIM count should be the same as the values carried in the most recent beacon on the reporting link. The reference point of the count should be based on the most recent TBTT of the reporting link (TBTT at the beginning of the current BI). This enables reporting link transmitter to keep same field values for a BI duration independent of channel access.Add in 35.3.11 “The value of channel switch count, quiet count or DTIM count advertised by the reporting link for an affected/reported link, is the value that is in effect on the affected/reported link at the most recent TBTT of the reporting link (TBTT at the beginning of the current BI)."Change Fig 35-18 to have (Re)Association Response frame having the same count value as the beacon prior on the reporting link. |   |
| 18252 | 35.3.11 | 534.56 | Comparing Fig 35-18 and Fig 35-19, assuming all beacons sent at TBTT. Comparing the beacons from reporting and affected AP with the same count, why in Fig 35-18 reporting AP is lagging but in Fig 35-19 the affected AP is lagging? There should be text requirement describe these two different behaviors | Add text to describe these two different behaviors or revise figures |  Reject – the objectives of these figures is not to describe the particular lagging of TBTT on one link compared to the other one. Adding such description would therefore be very confusing. |
| 15407 | 35.3.11 | 536.05 | In figure 35-20, the patterns chosen for the interior of the two Beacon frames with pertinent Ies are very similar, making it hard to differentiate | Revise figure to make the difference between the types of frames more apparent |  Revised Instruct to replace as shown in changes marked as #15407 in this document. |

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

Tgbe editor: Modify subclause 35.3.4.5 Probe Request frame content for a non-AP EHT STA as follows:

* + 1. **Multi-link procedures for channel switching, extended channel switching, and channel quieting**

In this subclause, the term affected AP is used to identify an AP that is subject to channel switching, extended channel switching, and channel quieting among all the APs that are affiliated with an AP MLD.

(#18300)NOTE – The corresponding procedure for an NSTR Mobile AP MLD is described in 35.3.19.3 (NSTR mobile AP MLD multi-link procedures for channel switching, extended channel switching, and channel quieting)

If an AP (affected AP) affiliated with an AP MLD includes any of the following applicable elements outside the Basic Multi-Link element in the Beacon frame, Probe Response frame or (Extended) Channel Switch Announcement frame it transmits:

* Channel Switch Announcement element
* Extended Channel Switch Announcement element
* Max Channel Switch Time element
* (#18001)Channel Switch Wrapper element
* Quiet element corresponding to quiet intervals other than quiet intervals scheduled to protect R-TWT SPs (see [35.8.5.2 (Quieting STAs during R-TWT SPs)](#bookmark136))
* Quiet Channel element

then one of the following shall apply if other APs are affiliated with the same AP MLD as the affected AP:

* (#16520)If another AP (reporting AP), affiliated with the same AP MLD as the affected AP, does not correspond to a nontransmitted BSSID, then the reporting 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 included in the Beacon frame and Probe Response frame that it transmits.
* (#16520)If another AP (reporting AP), affiliated with the same AP MLD as the affected AP, corresponds to a nontransmitted BSSID in a multiple BSSID set, then the AP corresponding to the transmitted BSSID in the same multiple BSSID set shall carry the corresponding element(s) in the Multiple BSSID element included in the Beacon frame and Probe Response frame that it transmits. Specifically, the corresponding element(s) shall be included in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP which is contained in the Basic Multi-Link element corresponding to the AP MLD and is included in the nontransmitted BSSID profile corresponding to the reporting AP.

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 Beacon Interval indicated in the corresponding element(s) of the affected AP and not to the TBTT and Beacon Interval of the reporting AP.

NOTE 1—The affected AP can correspond to a transmitted BSSID in a multiple BSSID set or an AP with dot11MultiBSSIDImplemented equal to false. The case where the affected AP corresponds to nontransmitted BSSID in a multiple BSSID set is covered in the next (#17833)normative requirement paragraph.

NOTE 2—The Switch Time field in the Max Channel Switch Time element carried in the per-STA profile of the reported AP is not tied to a TBTT on the affected link. Instead, it provides an estimated time when the first Beacon frame will be transmitted on the new channel of the affected link after the channel switch has occurred.

NOTE 3—For the Beacon and Probe Response frames all five elements are applicable. For the (Extended) Channel Switch Announcement frame, the applicable elements include the Channel Switch Announcement, Extended Channel Switch Announcement, and Max Channel Switch Time elements.

If an AP corresponding to the transmitted BSSID in a multiple BSSID set includes any of the following elements in the Beacon frame or Probe Response frame it transmits so that 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
* (#18001)Channel Switch Wrapper element
* Quiet element corresponding to quiet intervals other than quiet intervals scheduled to protect R-TWT SPs (see [35.8.5.2 (Quieting STAs during R-TWT SPs)](#bookmark136))
* 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 with at least another AP, then one of the following shall apply:

* (#16521)If another AP (reporting AP), affiliated with the same AP MLD does not correspond to a nontransmitted BSSID, then it 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.
* (#16521)If another AP (reporting AP), affiliated with the same AP MLD as the affected AP, corresponds to a nontransmitted BSSID in a multiple BSSID set, the AP corresponding to the transmitted BSSID in the same multiple BSSID set shall carry the corresponding element(s) in the Multiple BSSID element included in the Beacon frame and Probe Response frame that it transmits. Specifically, the corresponding element(s) are included in the STA Profile field of the Per-STA Profile subelement corresponding to the affected AP which is contained in the Basic Multi-Link element corresponding to the AP MLD and is included in the nontransmitted BSSID profile corresponding to the reporting AP.

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 Beacon Interval included in the corresponding element(s) of the affected AP and not with respect to the TBTT and Beacon Interval of the reporting AP.

NOTE 4—The Switch Time field in the Max Channel Switch Time element is not tied to a TBTT on the affected link. Instead, it provides an estimated time when the first Beacon frame will be transmitted on the affected link after the channel switch has occurred.

If an AP(#16522) (affected AP) affiliated with an AP MLD is switching channel, the Channel Switch Announcement element, or the Extended Channel Switch Announcement element with the Channel Switch Count field(#17834) set to a nonzero value, and the Max Channel Switch Time element shall be included in every Beacon and Probe Response frames on all links of the AP MLD from right after the time the affected AP (#16522) includes the elements in the Beacon frame it transmits until the estimated (#18297)target switch time. After the estimated (#18298)target switch time, the Channel Switch Announcement element and the Extended Channel Switch Announcement element shall not be included in the per-STA profile of the affected AP in the Beacon and Probe Response frames and the Max Channel Switch Time element 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(#16523), except the link corresponding to the affected AP, until the affected AP resumes BSS operation on the new channel. The value carried in the Switch Time field indicates the adjusted estimated time of the first Beacon frame in the new channel.

NOTE 5—The reporting AP might increase the value carried in the Switch Time field of the Max Channel Switch Time element if the affected AP performs a second channel switch between the target time of a first channel switch and the time at which the affected AP will start beaconing on the new channel corresponding to the first channel switch.

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, and if another AP is affiliated with the same AP MLD as the affected AP, then:

* the other AP (reporting AP) affiliated with the AP MLD shall set the Operating Class and Channel Number fields corresponding to the affected AP 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) to the initial operating class/channel before the target switch time,
* the other AP (reporting AP) affiliated with the AP MLD shall set the Operating Class and Channel Number fields corresponding to the affected AP 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) to the target operating class/channel at and after the target switch time.
* (#16816)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.

If an AP (affected/reported AP) (#17881)affiliated with an AP MLD is switching from an initial operating class/channel to a target operating class/channel at a target switch time using channel switch announcement or extended channel switch announcement procedure and includes a Max Channel Switch Time element in the Beacon and Probe Response frames it sends, and another AP (reporting AP) affiliated with the AP MLD, if any, receives a (Re)Association Request frame to perform multi-link setup with the AP MLD with the AP (affected/reported AP) as a requested link, then the other AP (reporting AP) shall include the complete profile for the AP indicating the target operating class/channel and a Max Channel Switch Time element in the per-STA profile corresponding to the AP (affected/reported AP) in the Basic Multi-Link element included in the (Re)Association Response frame it sends in response to indicate the time at which the AP (affected/reported AP) will resume BSS operation(#18300), if the (Re)Association Response frame is sent between the last beacon on the initial operating class/channel and the first beacon on the target operating class/channel. Otherwise, the other AP (reporting AP), if any, should not include a Max Channel Switch Time element or (Extended) Channel Switch Announcement element in (Re)Association Response frames.

When an AP (affected/reported AP) of an AP MLD has announced quiet intervals other than quiet intervals scheduled to protect R-TWT SPs (see [35.8.5.2 (Quieting STAs during R-TWT SPs)](#bookmark136)) using (#16817)a Quiet element and optionally (#16817)a Quiet Channel element, and another AP (reporting AP) of the same AP MLD, if any, receives a (Re)Association Request frame to perform multi-link setup with the AP MLD with the AP (affected/ reported AP) as a requested link, then the other AP (reporting AP), if any, shall include the corresponding Quiet element and Quiet Channel element (if present) in the per-STA profile corresponding to the AP (affected/reported AP) in the Basic Multi-Link element included in the (Re)Association Response frame it sends in response. Otherwise, the other AP (reporting AP) should not include a Quiet element and Quiet Channel element in (Re)Association Response frames.

For the example shown in [Figure 35-18 (Example of an AP carrying a Quiet element to signal channel](#bookmark66) [quieting on another link)](#bookmark66), AP 1 and AP 2 are two APs affiliated with an AP MLD that operate on Link 1 and Link 2, respectively. The Beacon frame transmitted by AP 1 (the affected AP) includes a Quiet element to indicate a scheduled quiet interval on Link 1. From this point onward and until the quiet interval begins on Link 1, AP 2 (the reporting AP) includes a Quiet element in the Per-STA Profile subelement corresponding to AP 1 in the Basic Multi-Link element carried in its Beacon frames. Although not shown in the figure, Quiet element will also be included in the Per-STA Profile subelement of the Basic Multi-Link element corresponding to AP 1 carried in the Probe Response frames transmitted by AP 2. The values of the Quiet Count field, Quiet Offset field, and the Quiet Duration field of the Quiet element carried on Link 2 are set by AP 2 with reference to Link 1. As the value of the Beacon Interval for AP 2 is greater than the value of beacon interval for AP 1, the Quiet Count field of the Quiet element carried in the Per-STA Profile subelement corresponding to AP 1 is decremented at a faster rate (i.e., 2 in this example) in every subsequent beacon transmitted by AP 2. A non-AP STA affiliated with a non-AP MLD, which is capable of operating on Link 2, transmits a (Re-)Association Request frame to AP 2 (not shown in the figure), in order to perform multi-link setup. The multi-link setup includes Link 1 as one of the links. Since the (Re)Association Response frame is transmitted by AP 2 after the quiet interval has started on Link 1, AP 2 includes the Quiet element in the per-STA profile corresponding to AP 1 in the (Re)Association Response frame it transmits. The Quiet Count field of the Quiet element carried in the (Re)Association Response frame is set to 128 to indicate that the quiet interval on Link 1 started in the beacon interval that occurred one TBTT in the past on Link 1 (see 9.4.2.22 (Quiet element)).

o unt Cou nt =4

**Affected**

**AP**

Qu iet Duration

o unt Cou nt =3

o unt Cou nt =2

Qu iet Cou nt =1

Link 1 (AP1)

Qu iet o unt =3

**Reporting**

**AP**

o unt Cou nt =1

Qu iet Cou nt =128

BPCC for AP1 incremented

(Re)Association Res ponse frame includes Quiet element

Link 2 (AP2)

Beacon frames

(Re)Association Response frame

###### Figure 35-18—Example of an AP carrying a Quiet element to signal channel quieting on another link

For the example shown in [Figure 35-19 (Example of an AP carrying a Channel Switch Announcement](#bookmark67) [element to signal channel switching on another link)](#bookmark67), AP 1 and AP 2 are two APs affiliated with an AP MLD that operate on Link 1 and Link 2, respectively. The Beacon frame transmitted by AP 1 (the affected AP) includes a Channel Switch Announcement element to indicate that the channel on Link 1 will be switched. From this point onward and until the channel on Link 1 switches, AP 2 (the reporting AP) includes a

Channel Switch Announcement element in the per-STA profile corresponding to AP 1 in the Basic Multi- Link element carried in the Beacon frame it transmits. When AP 1 begins to include the Channel Switch Announcement element in its Beacon frames, the BSS Parameters Change Count subfield in the TBTT Information field corresponding to AP 1 in the Reduced Neighbor Report element carried in AP 2’s Beacon frames is incremented by 1. The values of the Channel Switch Count field of the Channel Switch Announcement element carried on Link 2 are set by AP 2 with reference to Link 1. As the value of the beacon interval for AP 2 is twice the value of beacon interval for AP 1, the Channel Switch Count field of the Channel Switch Announcement element is decremented by 2 in every subsequent beacon transmitted by AP 2. If AP 1 carries the Extended Channel Switch Announcement element and the Max Channel Switch Time element in the Beacon frame its transmits, AP 2 also includes the Extended Channel Switch Announcement element and the Max Channel Switch Time element in the per-STA profile corresponding to AP 1 in the Basic Multi-Link element in the Beacon frames it transmits. Although not shown in the figure, the Channel Switch Announcement element, Extended Channel Switch Announcement element (if included by AP 1), and Max Channel Switch Time element (if included by AP 1) will also be included in the Per-STA Profile subelement of the Basic Multi-Link element corresponding to AP 1 carried in the Probe Response frames transmitted by AP 2. A non-AP STA affiliated with a non-AP MLD, that operates on Link 2, transmits a (Re)Association Request frame to AP 2 (not shown in the figure) requesting Link 1 as one of the links for multi-link setup. Since the (Re)Association Response frame is transmitted by AP 2 after the last Beacon frame on the initial operating class/channel on Link 1 and before the first beacon on the new operating class/channel is transmitted, AP 2 includes the Max Channel Switch Time element in the per-STA profile corresponding to AP 1 in the (Re)Association Response frame it transmits. The value carried in Max Channel Switch Time element provides an estimate of time until the first TBTT on the new channel on Link 1. The non-AP STA affiliated with the non-AP MLD operating on Link 1 does not transmit a frame until it hears the first Beacon frame from AP 1 on Link 1.

Chan nel Switch o unt =4

Chan nel Switch o unt =3

Chan nel Switch o unt =2

Chan nel Switch Cou nt =1

Chan nel Switch o unt =3

**Affected AP**

Chan nel Switch o unt =1

Max Chann el Switch Time

Last Beaco n on initial operating class/channel

First Beaco n on new operating class/channel

Link 1 (AP1)

BPCC for AP1 incremented

**Reporting AP**

Beacon frames

Frames includes Max Ch annel Switch Time element

(Re)Association Response frame

Link 2 (AP2)

###### Figure 35-19—Example of an AP carrying a Channel Switch Announcement element to signal channel switching on another link

An AP affiliated with an AP MLD that intends to setup quiet interval(s) other than quiet intervals scheduled to protect R-TWT SPs (see [35.8.5.2 (Quieting STAs during R-TWT SPs)](#bookmark136)) for its BSS shall advertise the corresponding element(s) for a duration that is greater than or equal to the maximum of the TBTTs until the next DTIM Beacon frame corresponding to each AP affiliated with the same AP MLD. An AP affiliated with an AP MLD that intends to switch the operating channel for its BSS should advertise the corresponding element(s) for a duration that is greater than or equal to the maximum value of TBTTs until the next DTIM Beacon frame corresponding to each AP affiliated with the same AP MLD unless the AP is required to switch channels in a short period to meet regulatory requirement. [Figure 35-20 (Example of advertisement](#bookmark68) [duration that includes DTIM Beacon on all links)](#bookmark68) illustrates a scenario where each link has a different DTIM

interval, and the affected AP advertises the pertinent elements long enough to be included in at least one DTIM Beacon frame on each link.

Advertisement duration includes at least one DTIM Beacon frame on each link

DTIM interval of 5

**Link 1 (affected AP)**

Interval that includes DTIM Beacon on all links DTIM interval of 4

**Link 2 (reporting AP)**

DTIM interval of 3

**Link 3 (reporting AP)**

Beacon frame

Beacon frame from the affected AP carries the pertinent IE(s)

DTIM Beacon frame

Beacon frame from the reporting AP carries the pertinent IE(s) in per‐STA profile of ML IE

DTIM Beacon frame on the link carries the pertinent IE(s)


###### Figure 35-20—Example of advertisement duration that includes DTIM Beacon on all links

NOTE 6—Advertising the pertinent element(s) for a duration that includes the DTIM Beacon frame on a link makes it possible for a non-AP MLD that is monitoring only another link, if any, and is in doze state to wakeup only to receive the DTIM beacon on that link to get the notification (by receiving the element(s) in the per-STA profile, corresponding to the affected AP, of the Basic Multi-Link element).

NOTE 7—When the other AP affiliated with the same AP MLD corresponds to a nontransmitted BSSID in a multiple BSSID set and the transmitted BSSID in the same multiple BSSID set operates as an EMA AP, then the profile for a BSS corresponding to the nontransmitted BSSID is expected to appear in the DTIM beacon for that BSSID (as described in

11.1.3.8.3 (Discovery of a nontransmitted BSSID p rofile)). With this mechanism, a non-AP STA, that is associated with an AP corresponding to the nontransmitted BSSID, can receive the profile (and any updates carried within the profile) in a DTIM Beacon frame without having to wake up for additional beacons thus conserving power in the process.

Tgbe editor: Replace Figure 35-17—Example of an AP carrying a Quiet element to signal channel quieting on another link with the following figure (#17837, #15539, #15406)



Tgbe editor: Replace Figure 35-18—Example of an AP carrying a Channel Switch Announcement element to signal channel switching on another link with the following figure (#17837, #15539, #15406):



Tgbe editor: Replace Figure 35-19—Example of advertisement duration that includes DTIM Beacon on all links with the following figure (#15407):

