IEEE P802.11
Wireless LANs

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| LB266 CR for nonprimary link channel switch |
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This document proposes resolution to the following LB266 CIDs in 35.3.19.3 (changes relative to draft 2.2):

10659 13424 13819

Revisions:

* Rev0: Initial version of the document.

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| **CID** | **Page** | **Line** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 13819 | 470 | 15 | 35.3.19.3 | The TSFs of the primary link and the nonprimay link are the same, is there any difference to say the timing fields are in reference to the primay link or the reported link? | please clarify | **Revised**A note describing the reason why the timing fields are in reference to the TBTT and BI of the primary link is added.**TGbe editor, please add NOTE1 in 11-22/1767r0 tagged with 13819.** |
| 10659 | 470 | 12 | 35.3.19.3 | Include Max Channel Switch Time element in the list. | As in comment | **Revised**Agree with the comment in principle. New bullets are added to describe the rule to set the Switch Time field of the Max Channel Switch Time element that is transmitted for the AP operating on the nonprimary link.**TGbe editor, please apply changes as shown in 11-22/1767r0 tagged with 10659.** |
| 13844 | 470 | 5 | 35.3.19.3 | It is unclear how an NSTR mobile AP MLD utilize the Max Channel Switch Time element for the non-primary link. If it is necessary to retain the functionality of the element, there should be some modifications for the NSTR mobile AP MLD. | We may have two options:1. Let an AP operating on the non-primary link transmit a frame(not a Beacon frame) indicating completion of the indicated channel switching after channel swtiching2. Let an AP operating on the primary link indicate completion of the channel swtiching of the non-primary link. | **Revised**Agree with the comment. New bullets are added to describe the rule to set the Switch Time field of the Max Channel Switch Time element that is transmitted for the AP operating on the nonprimary link.**TGbe editor, please apply the changes as shown in 11-22/1767r0 tagged with 13844.** |

**Discussion: (#10659)(#13844)**

**Max Channel Switch Time element**

Because the NSTR mobile AP MLD does not send the Beacon frame on the nonprimary link, a new rule for setting the Switch Time element of the Max Channel Switch Time element needs to be provided.

The rule for setting the Max Channel Switch Time element in the Per-STA profile carried in the Beacon or Probe Response frame is defined in the draft spec as below:

(TGbe D2.2 35.3.11\_P.473 L.36) If an AP affiliated with an AP MLD is switching channel, the Channel Switch Announcement element(#13917)(#14118), 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 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 estimated channel switch time. 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 until the affected AP resumes BSS operation on the new channel. **The value carried in the Switch Time field indicates the (#14118)adjusted estimated time of the first Beacon frame in the new channel.**

We propose to reuse the above rule with the modification as follows:

A Max Channel Switch Time element in a Per-STA profile of the Beacon or Probe Response frame transmitted on the primary link indicates the **adjusted estimated time** at which the AP corresponding to the Per-STA profile **resumes the BSS operation** **on the new channel**.

Not all the NSTR mobile AP MLDs are expected to support the estimation. If a NSTR mobile AP MLD does not support the estimation, the NSTR mobile AP MLD can set the Switch Time field of the Max Channel Switch Time element to 0.

**Indication for the announced channel/class switching completion**

A non-AP STA, except a non-AP STA that is associated with the AP operating on the nonprimary link can recognize that the AP has completed the announced channel/class switching when the STA receives the first beacon on the new channel/class transmitted by the AP. The non-AP STA associated with the regular AP follows the rule:

(TGbe D2.2 35.3.11\_P.476 L.1) The 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.

A non-AP STA associated with an AP operating on the nonprimary link needs to follow a different rule to ensure that its transmission is initiated after the time the AP has resumed BSS operation. This is because the AP operating on the nonprimary link does not transmit a Beacon frame on the nonprimary link.

The Max Channel Switch Time element is included in the Per-STA Profile subelement of the AP operating on the nonprimary link until the AP resumes BSS operation on the new channel. Therefore, the non-AP MLD that is associated with the NSTR mobile AP MLD can figure out that the announced channel/class switching of the nonprimary link is completed, if it receives Beacon/Probe Response frame that does not include the Max Channel Switch Time element in the Per-STA Profile corresponding to the AP operating on the nonprimary link.

(TGbe D2.2 35.3.11\_P.473 L.36) If an AP affiliated with an AP MLD is switching channel, the Channel Switch Announcement element(#13917)(#14118), 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 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 estimated channel switch time. 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 until the affected AP resumes BSS operation on the new channel.** The value carried in the Switch Time field indicates the (#14118)adjusted estimated time of the first Beacon frame in the new channel.

Therefore, a non-AP MLD associated with an NSTR mobile AP MLD can transmit an UL PPDU on the nonprimary link after it receives Beacon/Probe Response frame that does not include the Max Channel Switch Time element in the Per-STA profile corresponding to the AP operating on the nonprimary link.

**Proposed resolution:**

***TGbe editor: Please update the subclause 35.3.19.3 as shown below:***

**35.3.19.3 NSTR mobile AP MLD multi-link procedures for channel switching, extended
channel switching, and channel quieting**

Multi-link procedures for channel switching, extended channel switching, and channel quieting for (#13425)an AP affiliated with an NSTR mobile AP MLD on the nonprimary link follow the same rules defined in 35.3.11 (Multi-link procedures for channel switching, extended channel switching, and channel quieting) with the following exceptions:

* (#13425)An AP affiliated with an NSTR mobile AP MLD on the primary link may schedule channel switching and quiet intervals for the AP affiliated with the same NSTR mobile AP MLD on the nonprimary link by including the corresponding elements in the STA Profile field of the Per-STA Profile subelement corresponding to the AP on the nonprimary link carried in Beacon frames and Probe Response frames that it transmits on the primary link.
* 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 AP operating on the primary link.

(#13819)NOTE1- The TBTT and the BI are not defined for a BSS of an AP operating on the nonprimary link. This is because the AP does not send the Beacon frame for its BSS.

* (#10659)(#13844)The Switch Time field in the Max Channel Switch Time element included in the Per-STA Profile subelement corresponding to the AP operating on the nonprimary link indicates an adjusted estimated time until the corresponding AP resumes BSS operation on the new channel/class if the NSTR mobile AP MLD supports the estimation. Otherwise, it is set to 0.
* (#10659)(#13844)A non-AP MLD that is associated with an NSTR mobile AP MLD shall not transmit the UL PPDU(s) on the nonprimary link when the most recently received Beacon or Probe Response frame from the NSTR mobile AP MLD includes the Max Channel Switch Time element in the Per-STA Profile subelement corresponding to the nonprimary link and does not include the (Extended) Channel Switch Announcement element in the same Per-STA Profile subelement. A non-AP MLD that is associated with an NSTR mobile AP MLD may transmit the UL PPDU(s) on the nonprimary link when the most recently received Beacon or Probe Response frame from the NSTR mobile AP MLD does not include the Max Channel Switch Time element in the Per-STA Profile subelement corresponding to the nonprimary link or the most recently received Beacon or Probe Response frame includes both the (Extended) Channel Switch Announcement element and the Max Channel Switch Time element in the Per-STA Profile subelement corresponding to the nonprimary link.

(#10659)(#13844)NOTE2- The NSTR mobile AP MLD might transmit an unsolicited Probe Response frame including the Per-STA Profile subelement corresponding to the AP operating on the nonprimary link through the primary link, when the AP operating on the nonprimary link has completed the announced channel/class switching and the AP has decided to operate on the new channel/class.