IEEE P802.11
Wireless LANs

|  |
| --- |
| CC36 CR for ML probing to retrieve Critical Update |
| Date: 2022-01-12 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Namyeong Kim | LG Electronics | 19, Yangjae-daero 11gil, Seocho-gu, Seoul 137-130, Korea |  | namyeong.kim@lge.com |
| Insun Jang | LG Electronics |  | insun.jang@lge.com |
| Sunhee Baek | LG Electronics |  | sunhee.baek@lge.com |
| Jinsoo Choi | LG Electronics |  | js.choi@lge.com |

Abstract

This document proposes resolution for CID 6457 related 35.3.4.2 Use of ML probe request and response.

Revisions:

* Rev 0: Initial version of the document.

***TGbe editor: Please note that baseline is 11be D1.0***

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbe Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 6457 | 130/30 | 35.3.4.2 | We need to define solicited method for critical update information of other APs. In baseline spec., a STA shall awake to gather the updated parameters from AP's Beacon and this may be inefficient when the STA is in doze state. If we can use MLD probe request to retrieve the critical update information, it is beneficial for power saving. (Please see contribution 21/720) | Please define a solicited method to retrieve critical update information of other APs using ML probe request. | **Revised**Agree with the commenter. This CR document designs how to retrieve the updated BSS parameter for critical update of other APs of an AP MLD and describes the detail signaling for this. **TGbe editor please implement changes as shown in doc 11-21/0xxxr0 tagged as 6457.** |

1. **Introduction**

A STA affiliated with a non-AP MLD may miss the reception of updated BSS parameters of an AP which is occurred critical updates in some cases (e.g. long sleep device). In this contribution, we propose the solicited method to retrieve the updated BSS parameters of another AP by the non-AP STA. For example, the non-AP STA may request the updated BSS parameters of the another AP using ML probe request carrying the Last Known BSS Parameters Change Count (BPCC) (i.e. last value of BSS Parameters Change Count subfield corresponding to the another AP stored on non-AP MLD side).

1. **Proposed spec text**

***TGbe editor: Please modify the clause 9.4.2.312.3 as shown below (Track Changes ON):***

**9.4.2.312.3 Probe Request Multi-Link element**

The format of the STA Control field is defined in Figure 9-1002k ([STA Control field format)](#bookmark46).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 | B6 B15 |
|  | Link ID | Complete Profile | Critical Update Requested | Reserved |
| Bits: | 4 | 1 | 1 | 10 |

Figure 9-788es. STA Control field of the Probe Request Multi-Link element format

The Link ID subfield specifies a value that uniquely identifies the AP from which information is requested.

The Complete Profile subfield is set to 1 when complete information is requested from the AP as defined in 35.3.4.2 (Use of ML probe request and response). Otherwise the subfield is set to 0.

The Critical Update Requested subfield is set to 1 if a non-AP STA requests the updated BSS parameters which are classified as critical update event defined in 11.2.3.15 (TIM Broadcast) to the AP corresponding to the per-STA profile. Otherwise, the subfield is set to 0.

The format of the Last Known BSS Parameters Change Count (BPCC) subfield is defined in Figure 9-1002x (the Last Known BPCC subfield in the STA Profile field of Probe Request Multi-Link element).

|  |  |
| --- | --- |
|  | B0 B7 |
|  | Last Known BPCC |
| Octets | 0 or 1 |

Figure 1002-x. Last Known BPCC subfield in the STA Profile field of Probe Request Multi-Link element

The Last Known BSS Parameters Change Count (BPCC) subfield indicates the value of the most recently stored BSS Parameters Change Count subfield at the requesting STA.

The STA Profile field of a per-STA Profile subelement shall include the Last Known BPCC subfield if the Critical Update Requested subfield is set to 1 of the per-STA Profile.

If the Complete Profile subfield is set to 0, the STA Profile field, if present in a Per-STA Profile subelement (see 35.3.4.2 (Use of ML probe request and response) and 35.3.2.3.2 (Inheritance in the per-STA profile of Probe Request Multi-Link element), includes exactly one of the following:

* one Request element (see 9.4.2.9 (Request element)), or
* one Extended Request element (see 9.4.2.10 (Extended Request element)), or
* one Request element and one Extended Request element, or
* one Last Known BPCC subfield

If the Complete Profile subfield is set to 1, the STA Profile field is not present in a Per-STA Profile subele-ment.

***TGbe editor: Please modify the clause 35.3.4.2 as shown below:***

**35.3.4.2 Use of ML probe request and response**

***TGbe editor: Please insert the following paragraphs after the 8th paragraph of section 35.3.4.2:***

An ML probe request also allows a non-AP STA affiliated with a non-AP MLD to request an AP (reporting AP) to retrieve a set of updated BSS parameters with respect to critical update for other AP(s) affiliated with the same AP MLD as the AP. When a non-AP STA requests to the AP (reporting AP) the updated BSS parameters with respect to critical update for other AP(s) affiliated with the same AP MLD as the AP, the Critical Update Requested subfield of the STA Control field of the per-STA profile corresponding to the requested AP shall be set to 1 and the Last Known BPCC subfield shall be carried in the STA Profile field of the per-STA profile as defined in 9.4.2.312.3 (Probe Request Multi-Link element). In this case, the Complete Profile subfield of the STA Control field shall be set to 0.

If an AP (reporting AP) corresponds to a transmitted BSSID in a multiple BSSID set, an ML probe request also allows a non-AP STA affiliated with a non-AP MLD to request the AP to retrieve a set of updated BSS parameters with respect to critical update for other AP(s) affiliated with the same AP MLD as the nontransmitted BSSID(s) in the same multiple BSSID set as the AP. When a non-AP STA requests to the AP (reporting AP) the updated BSS parameters with respect to critical update for other AP(s) affiliated with the same AP MLD as the nontransmitted BSSID(s) in the same multiple BSSID set as the AP, the Critical Update Requested subfield of the STA Control field of the per-STA profile corresponding to the requested AP shall be set to 1 and the Last Known BPCC subfield shall be carried in the STA Profile field of the per-STA profile as defined in 9.4.2.312.3 (Probe Request Multi-Link element). In this case, the Complete Profile subfield of the STA Control field shall be set to 0.

If an AP (reporting AP) is affiliated with an AP MLD receives an ML probe request from a non-AP STA requesting the updated BSS parameters for requested AP(s), it shall respond with an ML probe response that includes a Basic Multi-Link element at least either of the following:

* with the per-STA profile that carries any elements changed between the value of Last Known BPCC subfield carried in the per-STA profile of the Probe Request frame and the value of most recently transmitted BSS Parameters Change Count subfield for the requested AP corresponding to the per-STA profile.
* with the per-STA profile that carries all elements classified as critical update events defined in 11.2.3.15 (TIM Broadcast) with the following exceptions:
	+ the (Extended) Channel Switch Announcement element, Quiet element, Quiet Channel element, Wide Bandwidth Channel Switch element, Channel Switch Wrapper element, Operating Mode Notification element and BSS Color Change Announcement will not be sent by the AP if the corresponding link has not had any updates related to these elements.
* without Link Info field if the value of Last Known BPCC subfield carried in the per-STA profile of the Probe request frame is the same with the value of most recently transmitted BSS Parameters Change Count subfield for the requested AP corresponding to the per-STA profile.

NOTE – When an AP (reporting AP) receives the ML probe request including the Last Known BPCC subfield in the per-STA profile corresponding to requested AP, it should response with an ML probe response including all elements classified as critical update events defined in 11.2.3.15 (TIM Broadcast) in the per-STA profile corresponding to the requested AP if the AP does not support tracking the changed elements per each incremented value of BSS Parameter Change Count subfield.

***TGbe editor: Please modify the clause 35.3.9 as shown below:***

**35.3.9 BSS parameter critical update procedure**

…

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.
* Any STA affiliated with the non-AP MLD attempts to send a Probe Request frame to its associated AP soliciting information of the AP.

NOTE—The Probe Request frame can be either ML probe request or a Probe Request frame that is not ML probe request. The ML probing rule for soliciting information for the AP which changed value of the BSS Parameter Change Count subfield from the previously received value as defined in 35.3.4.2 (Use of ML probe request and response).