IEEE P802.11  
Wireless LANs

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| Resolution for CIDs related to 35.3.4.2 Use of ML probe request and response | | | | |
| Date: 2021-03-12 | | | | |
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Abstract

This document proposes resolution for CIDs 1793, 2420 related 35.3.4.2 Use of ML probe request and response.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Modified some text to clarify
* Rev 2: modified some text to clarify
* Rev 3-4: some editorial changes

***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.***

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 1793 | 129/54 | 35.3.4.2 | We've resolved how to signal when a critical update occurs on the side of AP MLD. However, on the side of non-AP MLD, there is no how to retrieve the updated information for critical update yet. We need to design it (Please see Doc. 20/1737 (with the latest version)) | We need to design how to retrieve the updated information for critical update as in the comment. For example, to retrieve the updated information, a non-AP MLD transmits a Probe Request frame by including the most recently stored change sequence element/field in ML element. Without a change sequence element/field, it indicates that the request is critical update request as an additional signaling (Please see Doc. 20/1737 (with the latest version)). | **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 11-21/0720r0 tagged as 1793.** |
| 2420 | 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 20/1737) | Please define method to retrieve critical update information of other APs using MLD probe request as follows.  a STA sends MLD probe request indicating request of critical update information (e.g. "critical update request" subfield in Per-STA Control field of Per-STA Profile in Probe Request variant Multi-Link element is set to 1). And, a STA may include the value of the most recently received change sequence number of the another AP in the MLD probe request to retrieve only elements that need to be updated by the STA. | **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 11-21/0720r0 tagged as 2420.** |

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).

**Discussions**

* **Signaling to indicate the request of updated BSS parameters with respect to critical update**
  + Newly defined *“Critical Update Requested*” subfield in STA Control field of Probe Request variant Multi-Link element
    1. The requested information type of partial information request should be explicitly distinguishable (request of either specific elements using (Extended) Request element or updated elements with respect to critical update).
       - Only 1 bit is required.
    2. The AP MLD may not support tracking of updates with respect to each BSS Parameters Change Count (BPCC) corresponding to AP affiliated with the AP MLD. Then, the AP MLD has to recognize the Critical Update Requested subfield to determine whether it is for critical update or not and the non-AP MLD may not also include the Last Known BPCC subfield in ML probe request.

1. **Proposed spec text**

***TGbe editor: Please modify the clause 9.4.2.295b.3 as shown below (Track Changes ON):***

**9.4.2.295b.3 Probe Request variant Multi-Link element**

The format of a Per-STA Profile subelement is defined in Figure 9-788er (Per-STA Profile subelement of the Probe Request variant Multi-Link element format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subelement ID | | | Length | STA Control | STA Info | STA Profile |
| Octet: |  | 1 |  | 1 | 2 | variable | variable |

**Figure 9-788er—Per-STA Profile subelement of the Probe Request variant Multi-Link element format**

The Subelement ID field value is defined in Table 9-322ap (Optional subelement IDs for Basic variant Multi-Link element). The subelement format and ordering of subelements are defined in 9.4.3 (Subelements).

The format of the STA Control field is defined in Figure 9-788es ([STA Control of the Probe Request variant Multi-Link element field format)](#bookmark46).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 | B6 | B7 B15 |
|  | Link ID | Complete Profile | Critical Update Requested | Last Known BPCC Present | Reserved |
| Bits: | 4 | 1 | 1 | 1 | 1 |

Figure 9-788es. STA Control field of the Probe Request variant 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 Last Known BSS Parameters Change Count (BPCC) Present subfield is set to 1 when the Last Known BPCC subfield defined in Figure 9-788xx (STA Info field of the Probe Request variant Multi-Link element format) is present in the STA Info field. Otherwise the subfield is set to 0.

The format of the STA Info field is defined in Figure 9-788xx ([STA Info field of the Probe Request variant Multi-Link element field format)](#bookmark46).

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

Figure 9-788xx. STA Info field of the Probe Request variant Multi-Link element format

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 Info field of a per-STA Profile subelement may include the Last Known BPCC subfield if the STA requests partial information to obtain the updated BSS parameters for critical update from the AP corresponding to the per-STA profile. Otherwise, the STA Info field is reserved.

The STA Profile field of a Per-STA Profile subelement includes only an (Extended) Request element if the non-AP STA requests partial information to retrieve specific elements from the AP corresponding to the per-STA profile. Otherwise, the STA Profile field is reserved.

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

**35.3.4.2 Use of MLD 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 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 an 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 is optionally present in the STA Info field of the per-STA profile as defined in 9.4.2.295b.3 (Probe Request variant Multi-Link element). In this case, the Complete Profile subfield of the STA Control field shall be set to 0.

If an AP is affiliated with an AP MLD receives an ML probe request from a non-AP STA requesting the updated BSS parameters for other APs affiliated with the same AP MLD as the AP, it shall respond with an ML probe response that includes a Basic variant Multi-Link element with the per-STA profile that carries at least either of the following:

* 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
* 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, Wide Bandwidth Channel Switch element, Channel Switch Wrapper element, Operating Mode Notification element, Quiet Channel 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.

NOTE - If the AP receives the ML probe request not including the Last Known BPCC subfield in the per-STA profile or the AP does not support tracking the changed elements per each incremented value of BSS Parameter Change Count subfield, it should response with an ML probe response including all elements classified as critical update events in the per-STA profile.

***TGbe editor: Please modify the clause 35.3.4.4 as shown below:***

**35.3.4.4 Multi-link element usage rules in the context of discovery**

***TGbe editor: Please insert the following paragraphs after the last paragraph of section 35.3.4.4:***

When an ML probe request is transmitted by a non-AP STA affiliated with a non-AP MLD, one of the following shall be true:

Complete Profile subfield of the STA Control field of the Per-STA Profile subelement in Probe Request variant Multi-Link element is set to 1

Critical Update Requested of the STA Control field of the Per-STA Profile subelement in Probe Request variant Multi-Link element is set to 1

(Extended) Request element is carried in Probe Request frame body and/or Per-STA Profile subelement in Probe Request variant Multi-Link element

No Per-STA Profile subelement in Probe Request variant Multi-Link element is present