IEEE P802.11
Wireless LANs

|  |
| --- |
| MLO discovery: Information Request |
| Date: 2020-11-30 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Namyeong Kim | LG Electronics |  |  | Namyeong.kim@lge.com |
| Jason Yuchen Guo | Huawei |  |  | guoyuchen@huawei.com |

Abstract

This document provides draft spec text regarding information request for MLD Probing and addresses TBD signaling for requesting partial information on multiple APs of an AP MLD in TGbe draft D0.2.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: implemented the decision of defined a container of MLD probe request and proposed the detail signaling for partial information request
	+ Reuse of (Extended) Request elelement for partial information request
	+ Propose two options to decide the scope of partial information requested
* Rev 2: modified the proposal text based on members comments
	+ Add the section 9.4.2.295b.3 Probe Request variant Multi-Link element (NOTE: Add this modification only the option 2 (either option 2-1 or option 2-2) is selected)
	+ Editorial changes

**The texts are based on the following motion**

802.11be agrees to define the following mechanism:

• A STA of a non-AP MLD can request a peer AP of AP MLD a part of complete information of other APs of the same AP MLD.

• The signaling for requesting the part of complete information is TBD.

• NOTE – As an example, the part of complete information may be information that is not included on the beacon frame sent from the peer AP.

[Motion 131, #SP190, [19] and [134]]

1. **Introduction**

A non-AP STA can request the complete or partial information on multiple APs that are affiliated with an AP MLD through MLD probe request.

Overall, this document covers how to request partial information of requested AP(s).

* A detail signalling to request the specific elements of requested AP(s)
* A scope of partial information requested

1. **Discussion 1: Reuse of (Extended) Request element**

The (Extended) Request element had already defined in the baseline specification to request specific elements (i.e. targeted element IDs) to an AP using a Probe Request frame.

To request the partial information of other AP(s) of AP MLD, I propose to reuse the (Extended) Request element.

1. **Discussion 2: Constructure of MLD probe request to request partial information**

An MLD probe request allows a non-AP STA to request partial information for other APs. This document proposes serveral options for the contructure of the MLD probe request. The existing (Extended) Request element can be included a part of Probe Request frame like this:

* Inclusion of the (Extended) Request element in Probe Request frame body or
* Inclusion of the (Extended) Request element in Per-STA Profile of Probe Request frame

In this proposal, I propose 3 options for the constructure of MLD probe request to request partial information for other APs.

* Option 1: A MLD probe request allows a non-AP STA to request the same set of partial information for all APs (i.e. transmitting AP and other APs that are requested in Link Info field of ML Element of MLD probe request). That is, the (Extended) Request element is included in Probe Request frame body and applies to all APs.
* Option 2: A MLD probe request allows a non-AP STA to request the different set of partial information for each AP that is requested in Link Info field of ML Element of MLD probe request individually. That is, the (Extended) Request element is included in Per-STA Profile of ML Element of Probe Request frame. The partial information request of the transmitting AP follows the existing rule (i.e., (Extended) Request element is included in Probe Request frame body).
	+ Option 2-1: The (Extended) Request element corresponding to the Per-STA Profile *is not* *inherited* from the (Extended) Request element in the Probe Request frame body.
	+ Option 2-2: The (Extended) Request element corresponding to the Per-STA Profile *is* *inherited* from the (Extended) Request element in the Probe Request frame body.

|  |  |  |
| --- | --- | --- |
|  | **Pros** | **Cons** |
| Option 1 (for all APs) | Low overhead to request the same partial info to apply for all APs  | Not support the different partial info request for each AP |
| Option 2-1 (for each AP & non-inheritance rule based approach) | Full flexibility (Support same or different partial info request ) | Overhead in case of requesting the same partial info to apply for all APs |
| Option 2-2 (for each AP & inheritance rule based approach) | Full flexibility (Support same or different partial info request)Optimized overhead to request the same partial info to apply for all APs (by inheritance rule) |  |

1. **Proposed spec text**

***TGbe editor: Please modify the following before the 5th paragraph 35.3.4.2 Use of MLD probe request as follows:***

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

An MLD probe request is a Probe Request frame:

* with the Address 1 field set to the broadcast address and the Address 3 field set to the BSSID of an AP’s BSS, or with the Address 1 and Address 3 fields set to the BSSID of an AP, or other addressing TBD.
* and that includes a Probe Request variant Multi-Link element to identify that the Probe Request frame is an MLD probe request and to identify from which APs of the AP MLD the information is requested

An MLD probe request allows a non-AP STA to request an AP to include the complete or partial set of capabilities, parameters and operation elements of other APs affiliated to the same AP MLD as the AP. The information of an AP affiliated to the same AP MLD as the AP identified in the Address 1 or Address 3 field of the Probe Request frame is requested if one of the following conditions are met:

* the Multi-Link element in the Probe Request frame does not include any per-STA profile.
* the link ID of the AP corresponds to the Link ID field in a Per-STA Profile subelement in the Multi-Link element in the Probe Request frame.

The complete information of a requested AP sent by a reporting AP is defined as all elements that would be provided if the requested AP was transmitting the Probe Response frame, except the following elements, if present: the Reduced Neighbor Report element, the Multiple BSSID element, the Multi-Link element, other exceptions TBD.

The partial information of a requested AP sent by a reporting AP is defined as part of all elements that would be provided if the requested AP was transmitting the Probe Response frame. The part of all elements is only requested information to obtain the specific elements of the requested AP.

The requested information for the requested AP in the MLD probe request is partial if an (Extended) Request element for the requested AP is present in the Probe Request frame, and the Requested Element IDs field in the (Extended) Request element determines the list of elements that are requested to be included in the MLD probe response. Additional condition(s) of whether the requested information is complete or partial is TBD.

***Option 1: The request of the same set of partial information which applies to all APs (i.e. transmitting AP and requested APs)***

If the (Extended) Request element is present in Probe Request frame body outside of Probe Request variant Multi-Link element, then the (Extended) Request element requests the partial information that applies to all APs (i.e. transmitting AP and requested APs). In this case, the Complete Profile subfield of the Per-STA Control field in the Per-STA Profile subelement for the requested AP is set to 0. If the Complete Profile subfield of a Per-STA Control field is set to 1 in a Per-STA Profile subelement of the requested AP, the non-AP STA requests complete information of the AP corresponding to the Per-STA Profile subelement.

***Option 2: The request of the different set of paritial information for each AP individually (only one of option 2-1 and option 2-2 will be included in the spec text)***

If the (Extended) Request element is present in Probe Request frame body outside of Probe Request variant Multi-Link element), then the (Extended) Request element requests the partial information for transmitting AP.

If the (Extended) Request element is present in a Per-STA Profile subelement of a Probe Request variant Multi-Link element of Probe Request frame, then the (Extended) Request element requests the partial information for the requested AP that corresponds to the Link ID field of the Per-STA Control field in the Per-STA Profile subelement. In this case, the Complete Profile subfield of the Per-STA Control field in the Per-STA Profile subelement is set to 0.

***Option 2-1: non-inheritance rule based approach***

If the (Extended) Request element is present in the Probe Request frame body and the (Extended) Request element is not present in a Per-STA Profile subelement of a Probe Request variant Multi-Link element of Probe Request frame, the (Extended) Request element corresponding to the Per-STA Profile is not inherited from the (Extended) Request element in the Probe Request frame body. In this case, the Complete Profile subfield of the Per-STA Control field in the Per-STA Profile subelement is set to 1.

***Option 2-2: inheritance rule based approach***

If the (Extended) Request element is present in the Probe Request frame body and the (Extended) Request element is not present and a Complete Profile subfield of a Per-STA Control field is set to 0 in a Per-STA Profile subelement of Probe Request variant Multi-Link element of Probe Request frame, the (Extended) Request element corresponding to the Per-STA Profile is inherited from the (Extended) Request element in the Probe Request frame body.

If the (Extended) Request element is not present and a Complete Profile subfield of a Per-STA Control field is set to 1 in a Per-STA Profile subelement of Probe Request variant Multi-Link element of Probe Request frame, the non-AP STA requests complete information of the AP corresponding to the Per-STA Profile.

If an AP that is part of an AP MLD receives an MLD probe request from a non-AP STA requesting complete information, it shall respond with an MLD probe response, which is a Probe Response frame that includes a Basic variant Multi-Link element with a STA profile with the complete information for each of the APs that are affiliated to the same AP MLD as the AP and that are requested by the MLD probe request. If it receives an MLD probe request from a non-AP STA requesting partial information, it shall respond with an MLD probe response that includes a Basic variant Multi-Link element with a STA profile with at least the elements requested from the (Extended) Request element for each of the APs that are affiliated to the same AP MLD as the AP and that are requested by the MLD probe request, unless the elements requested are not part of the complete information for each of the APs.

***TGbe editor: Modify the following subclause 9.4.2.295b.3 Probe Request variant Multi-Link element in 802.11be D0.3 (NOTE: Add this modification only the option 2 (either option 2-1 or option 2-2) is selected):***

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

The Probe Request variant Multi-Link element is used to request an AP to provide information of other APs affiliated with the same AP MLD as the AP. The inclusion of a Probe Request variant Multi-Link element in a Probe Request frame identifies it as an MLD probe request.

The subfields of the Multi-Link Control field of the Probe Request variant Multi-Link element except the Type subfield are TBD.

The presence and format of the Common Info field in the Probe Request variant Multi-Link element are TBD.

The format of the Link Info field of the Probe Request variant Multi-Link element is defined in Figure 9-788ek (Link Info field of the Probe Request variant Multi-Link element format).



Figure 1 Link Info field of the Probe Request variant Multi-Link element format

The Per-STA Profile Subelements field contains zero or more Per-STA Profile subelements as defined in 9.4.2.295b.2 (Basic variant Multi-Link element). Each Per-STA Profile subelement starts with a Per-STA Control field as defined in 9.4.2.295b.2 (Basic variant Multi-Link element).

A Per-STA Profile subelement includes a (Extended) Request element if a non-AP STA requests partial information to an AP corresponding to the per-STA profile. If the (Extended) Request element is present in the Per-STA Profile subelement, the Complete Profile subfield of the Multi-Link Control field is set to 0. Other fields and/or elements is TBD.

**Straw Poll #1:**

Which options do you prefer to request partial information for other APs?

* Option 1 : The request of the *same* set of partial information which applies to all APs
* Option 2 : The request of the *different* set of paritial information for each AP individually (for option 2-1 and option 2-2)
	+ NOTE: only one of option 2-1 and option 2-2 will be included in the spec text.

**Straw Poll #2:**

Do you support the inclusion of the text contained on doc 11-20-1667r2 to the R1 SFD for 802.11 TGbe?