IEEE P802.11
Wireless LANs

|  |
| --- |
| SB1 CR for CIDs 22000 and 22001  |
| Date: 2024-04-07 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Binita Gupta | Cisco Systems |  |  | binitag@cisco.com |
| Brian Hart | Cisco Systems |  |  | brianh@cisco.com |

 Abstract

This submission proposes resolutions for following CIDs received in TGbe SA Ballot on 802.11be D5.0:

22000, 22001

**Revisions:**

* Rev 0: Initial version of the document.

***TGbe editor: The baseline for this document is 11be D5.0.***

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** | **Commenter** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 22000 | Binita Gupta | 35.3.23 | 587.17 | Per baseline the Neighbor Report element format supports providing a Preference value (Table 9-211 in REVme D4.0) and a Preference value of 0 indicates that the BSS listed is an excluded BSS and the STA should refrain from associating to excluded BSS. When an AP MLD is using BTM to recommend subset of links for a reported AP MLD, it can use Preference 0 to indicate link/AP where it can not accept association (e.g. due to high Channel load or too many associated STAs already) for that AP MLD. | Capture rules that an AP MLD can explicitly indicate that certain link/AP of a reported AP MLD is not accepting association by using Preference value 0 for a Neighbor Report element for that AP, when it is recommending a subset of links for that reported AP MLD in the BTM. Commenter will bring a contribution. | RevisedText is proposed to indicate excluded AP MLD or set of excluded affiliated APs of an AP MLD using Preference value 0.TGbe editor, please make the changes tagged by CID #22000 in 11-24/699r0. |
| 22001 | Binita Gupta | 35.3.23 | 587.01 | This subclause specifies the rules on how the Neighbor Report element is used to recommend a subset of links for an AP MLD (which could be the current AP MLD itself) in the BTM request. The same rules can also be applied for other usage of Neighbor Report element to recommend a subset of links for an AP MLD. E.g. (Re)Association Response when the association is rejected with REJECTED\_WITH\_SUGGESTED\_ BSS\_TRANSITION or in the Neighbor Report Response frame. | Add text to capture rules about usage of Neighbor Report element to recommend a subset of links for an AP MLD (which could be the current AP MLD itself) in other places where this element is used (besides the BTM), including for the scenarios mentioned in the comment. Commenter will bring a contribution. | RevisedText is proposed to enable recommending an AP MLD or a subset of affiliated APs of an AP MLD in the Neighbor Report elements in (Re)Association Response and Authentication frames with REJECTED\_WITH\_SUGGESTED\_ BSS\_TRANSITION status code or in the Neighbor Report Response frameTGbe editor, please make the changes tagged by CID #22001 in 11-24/699r0. |

Discussion:

In 802.11be the Neighbor Report element is extended to include the Basic Multi-Link element. The enhanced BTM procedure for MLDs (35.3.23) makes use of the Basic ML element in the Neighbor Report element to recommend an AP MLD or a subset of affiliated APs of an AP MLD to a non-AP MLD. The Neighbor Report element is also returned by the AP MLD in other frames for suggesting neighbor APs for BSS transition e.g. in the (Re)Association Response and Authentication frames when rejected with REJECTED\_WITH\_SUGGESTED\_ BSS\_TRANSITION and in the Neighbor Report Response frame. In these cases as well, it is beneficial if the AP MLD is able to recommend AP MLD or a subset of affiliated APs of an AP MLD using Basic ML element in the Neighbor Report element, for a non-AP MLD to make better selection for candidate AP MLD(s) for BSS transition. Hence, this behavior of making MLD level recommendation in the Neighbor Report element should be allowed in those frames as well. Spec text is proposed to enable this behavior for these frames, similar to the BTM Request frame.

In addition, for BTM Request, baseline uses the Preference field value of 0 for a Neighbor Report element to indicate that the BSS listed is an excluded BSS, and STA should refrain from associating on that BSS (see highlighted baseline text below). For MLO, entire AP MLD could be excluded or a subset of affiliated APs of an AP MLD could be excluded from association e.g. when overloaded. For MLD case, BTM should be able indicate an excluded AP MLD or excluded set of affiliated APs of an AP MLD using the Preference field value of 0 and the Basic ML element. Non-AP MLDs should refrain from associating with excluded AP MLD or excluded affiliated APs of an AP MLD. Spec text is proposed to support this behavior.

*11.21.7.3 BSS transition management request*

*…*

*﻿The AP shall include the BSS Transition Candidate List Entries field in the BSS Transition Management*

*Request frame if the AP has information in response to the BSS Transition Management Query frame. The*

*BSS Transition Candidate List Entries field contains zero or more Neighbor Report elements describing the*

*preferences for target BSS candidates. A Preference field value of 0 indicates that the BSS listed is an excluded*

*BSS. The STA should refrain from associating to an AP corresponding to an excluded BSS. The Preference*

*field values are used to establish the relative order of entries within the given list at the given time, and for the*

*given AP.*

﻿ ***TGbe editor: Please update following sections as shown below.***

**﻿9.4.2.35 Neighbor Report element**

**…**

**﻿**When the Extremely High Throughput subfield is set to 1, and when the Basic Multi-Link element is present as a subelement in the report for a reported AP, the fields included in the Basic Multi-Link element are identical in content to the corresponding fields that are present in the Basic Multi-Link element that the AP includes in the Beacon frames that it transmits.

﻿NOTE 2—A Basic Multi-Link subelement included in a Neighbor Report element does not carry the Link Info field as described in 35.3.3 (Advertisement of ML information in Multi-Link element), except as described in 35.3.23 (BSS transition management for MLDs)(#22001), 11.3.8 (Neighbor report information upon rejection with suggested BSS transition) and 35.3.2x (Usage of the neighbor report for MLDs).

﻿**35.3.3 Advertisement of ML information in Multi-Link element**

**35.3.3.1 General**

**…**

**﻿**The Basic Multi-Link element when carried in the Neighbor Report element shall not include a Link Info field, except as described in 35.3.23 (BSS transition management for MLDs)(#22001), 11.3.8 (Neighbor report information upon rejection with suggested BSS transition) and 35.3.2x (Usage of the neighbor report for MLDs).

…

**﻿11.3.8 Neighbor report information upon rejection with suggested BSS transition**

**﻿**An AP may provide neighbor report information to a STA that requests authentication or association by responding with an Authentication or (Re)Association Response frame that has the Status Code field set to ﻿REJECTED\_WITH\_SUGGESTED\_BSS\_TRANSITION and that includes one or more Neighbor Report elements.

(#22001)For MLO, an AP affiliated with an AP MLD may provide neighbor report information to a non-AP STA affiliated with a non-AP MLD that requests authentication or association by responding with an Authentication or (Re)Association Response frame that has the Status Code field set to ﻿REJECTED\_WITH\_SUGGESTED\_BSS\_TRANSITION and that includes one or more Neighbor Report elements, and:

* If the Neighbor Report element includes a Basic Multi-Link element, then the Neighbor Report element describes ﻿the preference for a target AP MLD candidate and not for a target BSS candidate, otherwise, it describes the preference for a target BSS candidate.
* ﻿The Preference field value of a Neighbor Report element that includes a Basic Multi-Link element describing an AP MLD provides the indication of preference for the given AP MLD, within the given list at the given time.
* For each Neighbor Report element that includes a Basic Multi-Link element, the AP MLD follows the same rules as in clause 35.3.23 (﻿BSS transition management for MLDs) to provide preference for a reported AP MLD without recommendations about specific affiliated APs or provide a preference for a reported AP MLD with only a subset of recommended affiliated APs.
* The AP MLD may include multiple Neighbor Report elements to report the same AP MLD with a different recommended subset of affiliated APs following the same rules as in clause 35.3.23 (﻿BSS transition management for MLDs).

(#22000)The AP MLD may include Neighbor Report element(s) with Preference field value of 0 to indicate an excluded AP MLD or excluded affiliated APs of an AP MLD following the same rules as in clause 35.3.23 (﻿BSS transition management for MLDs).﻿An HE STA that has received from an HE AP an Authentication or (Re)Association Response frame that has

the Status Code field set to REJECTED\_WITH\_SUGGESTED\_BSS\_TRANSITION and that includes one or

more Neighbor Report elements for BSSs that are part of the ESS of the HE AP shall, if it re-attempts to

associate with the ESS, select an AP from (one of) the Neighbor Report element(s).

(#22001)If a non-AP STA affiliated with a non-AP MLD has received from an AP affiliated with an AP MLD an Authentication or (Re)Association Response frame that has the Status Code field set to REJECTED\_WITH\_SUGGESTED\_BSS\_TRANSITION, and that includes one or more Neighbor Report elements with a Basic Multi-Link element indicating preference for reported AP MLD(s) that are part of the ESS of the AP MLD, and if the non-AP MLD re-attempts to associate with the ESS, it shall select an AP MLD from (one of) the reported AP MLDs recommended in the Neighbor Report element(s).

**﻿35.3.23 BSS transition management for MLDs**

**﻿**A STA affiliated with an MLD shall follow the procedure defined in 11.21.7 (BSS transition management),

except that:

* The procedure is applied between the SMEs of an AP MLD and the SME of a non-AP MLD and not between the SMEs of an AP affiliated with an AP MLD and the SME of a non-AP STA affiliated with a non-AP MLD.
* If the Neighbor Report element that is carried in the BSS Transition Candidate List Entries field of a BSS Transition Management Query, Request or Response frame includes a Basic Multi-Link element, then the Neighbor Report element describes the preference for a target AP MLD candidate and not for a target BSS candidate, otherwise, it describes the preference for a target BSS candidate.
* The Preference field value of a Neighbor Report element that includes a Basic Multi-Link element describing an AP MLD provides the indication of preference for the given AP MLD, within the given list at the given time.
* ﻿If an AP MLD intends to provide a preference for a reported AP MLD without recommendations about specific affiliated APs, it shall:
	+ include a Neighbor Report element for one of the APs affiliated with the AP MLD, and include a Basic Multi-Link element in the Neighbor Report.
	+ set to 0 all subfields of the Presence Bitmap subfield.
	+ not include any Per-STA Profile subelement in the Basic Multi-Link element.
* If an AP MLD intends to provide a preference for a reported AP MLD with only a subset of recommended affiliated APs,
	+ it shall include a Neighbor Report element for one of the recommended APs affiliated with the AP MLD, and include a Basic Multi-Link element in the Neighbor Report element of this reported AP.
	+ it shall include a Link ID Info field in the Common Info field of the Basic Multi-Link element with the field value set to that corresponding to the AP reported in the Neighbor Report element.
	+ it shall set to 0 all subfields of the Presence Bitmap subfield of the Basic Multi-Link element included in the Neighbor Report element of the reported AP except the Link ID Info Present subfield.
	+ it shall include in the Basic Multi-Link element in the Neighbor Report element of the reported AP a Per-STA Profile subfield only for each of the other recommended affiliated APs (if any) (#22002)to a non-AP MLD that has dot11EHTBTMMLDRecommendationForMultipleAPsImplemented set to 1, and with all the fields set to 0 in the STA Control field, except the Link ID field.
	+ The AP MLD shall not include more than one Neighbor Report element reporting the same AP MLD with the same recommended subset of affiliated APs. If multiple Neighbor Report elements are used to report the same AP MLD with a different recommended subset of affiliated APs, the Preference field value in these elements may be different.
* (#22000)A Preference field value of 0 for a Neighbor Report element that includes a Basic Multi-Link element describing a reported AP MLD ﻿without listing specific affiliated APs indicates that the reported AP MLD is an excluded AP MLD, and the non-AP MLD should refrain from requesting association with the AP MLD.
* A Preference field value of 0 for a Neighbor Report element that includes a Basic Multi-Link element describing a reported AP MLD and listing a subset of affiliated APs of that AP MLD indicates that all listed affiliated APs of the reported AP MLD are excluded APs, and the non-AP MLD should refrain from requesting association with the AP MLD that includes any of those excluded APs.
* …

**35.3.2x Usage of the neighbor report for MLDs**

A STA affiliated with an MLD shall follow the procedure defined in 11.10.10 (Usage of the neighbor report),

except that:

* The procedure is applied between an AP MLD and a non-AP MLD and not between an AP affiliated with an AP MLD and a non-AP STA affiliated with a non-AP MLD.
* If the Neighbor Report element that is carried in the Neighbor Report Response frame includes a Basic Multi-Link element, then the Neighbor Report element describes the preference for a target AP MLD candidate and not for a target BSS candidate, otherwise, it describes the preference for a target BSS candidate.
* The Preference field value of a Neighbor Report element that includes a Basic Multi-Link element describing an AP MLD provides the indication of preference for the given AP MLD, within the given list at the given time.
* For each Neighbor Report element that includes a Basic Multi-Link element, the AP MLD follows the same rules as in clause 35.3.23 (﻿BSS transition management for MLDs) to provide preference for a reported AP MLD without recommendations about specific affiliated APs or provide a preference for a reported AP MLD with only a subset of recommended affiliated APs.
* The AP MLD may include multiple Neighbor Report elements to report the same AP MLD with a different recommended subset of affiliated APs following the same rules as in clause 35.3.23 (﻿BSS transition management for MLDs).
* (#22000)The AP MLD may include Neighbor Report element(s) with Preference field value of 0 to indicate an excluded AP MLD or excluded affiliated APs of an AP MLD following the same rules as in clause 35.3.23 (﻿BSS transition management for MLDs).