IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolution for CIDs related to Multiple BSSID set (CC 34) | | | | |
| Date: March 20, 2021 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Inc. |  |  | appatil@qti.qualcomm.com |
| Gaurang Naik |  |  | gnaik@qti.qualcomm.com |
| George Cherian |  |  | gcherian@qti.qualcomm.com |
| Alfred Asterjadhi |  |  | aasterja@qti.qualcomm.com |
| Duncan Ho |  |  | dho@qti.qualcomm.com |
| Yanjun Sun |  |  | yanjuns@qti.qualcomm.com |
| Pascal Viger | Canon |  |  |  |
| Gaurav Patwardhan | HPE |  |  |  |
| Tomo Adachi | Toshiba |  |  |  |
| Jarkko | Apple |  |  |  |
| Ryuichi | Sony |  |  |  |
| Insun | LGE |  |  |  |
| Liwen | NXP |  |  |  |
| Yunbo | Huawei |  |  |  |

Abstract

This submission proposes resolutions for following 6 CIDs received for TGbe CC34:

1096, 2275, 1095, 2292, 2540, 1819

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: contribution was revised based on feedback received from several members (added as co-authors)
* Rev 2: Based on inputs from Jarkko, the titles for clause 35.3.17 and AA.3 are updated to include co-hosted BSSID set
* Rev 3: Updated Annex AA to remove the term standalone AP (CID 1819)
* Rev 4:
  + Minor updates based on comment in doc 11-21/0218 (Mark Rison) – tagged as [#1]
  + Proposed spec text changes
    - Issue #2 identified by Yunbo
    - Issue #3 identified by Liwen
    - Issue #4 fixes error in D0.4
* Rev 5:
  + Removed some of the changes made in r4 as they were covered in doc 11-21/254r6
* Rev 6: Minor updates throughout the document to update baseline to D0.4 + recently approved text

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.***

#1: indicates changes based on comments/suggestions in doc 11-21/0218r0 (Mark Rison)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 1096 | Alfred Asterjadhi | 87.18 | 11.1.3.8.1 | This sentence is out of place. The requirement needs to be added to MLO subclauses rather than here. | As in comment. | **Revised**  The cited sentence was moved to clause 35.3.18 and updated based on resolution to other comments.  **TGbe editor please implement changes as shown in doc 11-21/0255r6 tagged as 1096** |
| 2275 | Michael Montemurro | 87.17 | 11.1.3.8.1 | I'm not even sure what this means. Does AP's belonging to a multiple BSSID set refer to the AP's advertised in a multple BSSID set, or does it refer to APs affiliated with an AP MLD? | Update the text to refer to APs affiliated with an AP MLD | **Revised**  The cited text was moved to clause 35.3.18 as a resolution to CID 1096. The text is updated to clarify that an AP MLD can have at most one affiliated AP from a multiple BSSID set.  **TGbe editor please implement changes as shown in doc 11-21/0255r6 tagged as 2275** |
| 1095 | Alfred Asterjadhi | 123.63 | 26.17 | Not the right location. This should be a requirement at the MLD level. Move to MLO operation (AP MLD side) and specify that the MLD shall not have affiliated APs of the same co-hosted BSS set. | As in comment. | **Revised**  The cited sentence was moved to clause 35.3.18 and updated based on resolution to other comments. The title of the subclause 35.3.18 and content in clause AA.3 were updated to include co-hosted BSSID set.  **TGbe editor please implement changes as shown in doc 11-21/0255r6 tagged as 1095** |
| 2292 | Michael Montemurro | 123.62 | 26.17.7 | This text makes no sense. Does it mean "affiliated APs belonging"? Looking at 26.17.6 in P802.11ax D8.0, I'm not exactly sure how to fix it. | Perhaps change the cited sentence to "Affiliated APs of an AP MLD that belong to the same co-hosted BSSID shall not be affiliated with an AP MLD." | **Revised**  The cited text was moved to clause 35.3.18 as a resolution to CID 1095. The text is updated to clarify that an AP MLD can have at most one affiliated AP from a co-hosted BSSID set. The title of the subclause 35.3.18 and content in clause AA.3 were updated to include co-hosted BSSID set.  **TGbe editor please implement changes as shown in doc 11-21/0255r6 tagged as 2292** |
| 2540 | Robert Stacey | 123.62 | 26.17.7 | Inappropriate passive statement. Normative statements must identify the implementation. | Change to "An AP that belongs to a co-hosted BSSID set shall not be an affiliated AP in an AP MLD if another affiliated AP in the AP MLD is already present in the co-hosted BSSID set." | **Revised**  The cited text was moved to clause 35.3.18 as a resolution to CID 1095. The text is updated to clarify that an AP MLD can have at most one affiliated AP from a co-hosted BSSID set. The title of the subclause 35.3.18 and content in clause AA.3 were updated to include co-hosted BSSID set.  **TGbe editor please implement changes as shown in doc 11-21/0255r6 tagged as 2540** |
| 1819 | James Yee | 146.25 | 35.3.17 | Not sure if a "standalone AP" is well defined. | Clarify | **Revised**  Replaced or Deleted the term standalone AP from 35.3.18 and Annex AA  **TGbe editor please implement changes as shown in doc 11-21/0255r6 tagged as 1819** |

***TGbe editor: Please note Baseline is 11be D0.4 + text approved as of 5/17/21.***

11.1.3.8 Multiple BSSID procedure

11.1.3.8.1 General

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

[CID 1096]

26.17.7 Co-hosted BSSID set

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

[CID 1095]

***TGbe editor: Please update the title of clause 35.3.18 as shown below:***

**35.3.18 Multi-Link operation in a multiple BSSID set or co-hosted BSSID set**[CID 1095, 2292, 2540]

**35.3.18.1 General**

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

[CID 1096, 2275]An AP MLD shall not have more than one affiliated AP amongst APs that are members of the same multiple BSSID set.

[CID 1095, 2292, 2540]An AP MLD shall not have more than one affiliated AP amongst APs that are members of the same co-hosted BSSID set.

[CID 1819]Each AP affiliated with an MLD shall be independently configured to operate as a transmitted or as a nontransmitted BSSID in a multiple BSSID set, or as an AP belonging to a co-hosted BSSID set, or as an AP that is not part of either a multiple BSSID set or a co-hosted BSSID set. Annex AA provides example configurations.

* **Introduction**

***Change as follows:***

***TGbe editor: Please update the following paragraph as shown below:***

This annex provides examples showing the relationship between profile periodicity (indicated by the Full Set Rx Periodicity field in the Multiple BSSID Configuration element) and the DTIM interval (DTIM Period field in the Multiple BSSID-Index element) for a multiple BSSID set as described in 11.1.3.8.3 (Discovery of a nontransmitted BSSID profile). ~~The examples provide guidance on how an AP might organize the advertisement of nontransmitted BSSID profiles in its Beacon frames if it cannot fit all the profiles in a single Beacon frame (i.e., partial list of profiles) it is advertising. By having the DTIM interval for a nontransmitted BSSID a multiple of the profile periodicity, the profile for that BSSID would always appear in its DTIM beacon. This helps an associated non-AP STA save power as it is able to receive any updates to the profile when it wakes to receive the DTIM beacon.~~

[CID 1095, 2292, 2540]In addition, this annex also provides examples illustrating the relationship between multiple BSSID set, co-hosted BSSID set and multi-link operation.

***TGbe editor: Please update the title of clause AA.3 as shown below:***

[CID 1095, 2292, 2540]AA.3 Example illustrating the relationship between multi-link operation and multiple BSSID set or co-hosted BSSID set

***TGbe editor: Please update the 3rd and 4th paragraph in clause AA.3 as shown below:***

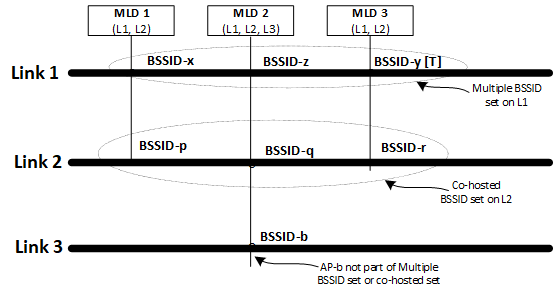
[#1]The first example illustrates the case where APs on each link belong to a multiple BSSID set. Since by definition, APs affiliated with an AP MLD have the same properties (such as security), APs in a multiple BSSID set on a link are not part of the same AP MLD. Figure AA-6 (Example of APs from multiple BSSID set on all links in a multi-link setup) shows an example where APs affiliated with an MLD belong to a multiple BSSID set on their respective link. Further, APs within the same MLD may correspond to a transmitted or nontransmitted BSSID.

***TGbe editor: Figure AA-6 remains unchanged:***

[#1]Figure AA-6 (Example of APs from multiple BSSID set on all links in a multi-link setup) illustrates that APs corresponding to BSSID-x and BSSID-y are part of the multiple BSSID set on link 1 and belong to different MLDs (MLD 1 and MLD 3, respectively). On link 1, AP-y, affiliated with MLD 3, corresponds to the transmitted BSSID (depicted as BSSID-y [T]) for the multiple BSSID set on link 1. On link 2, there are three APs that are part of the same multiple BSSID set and each belongs to a different MLD. AP-q, affiliated with MLD 2, corresponds to the transmitted BSSID (depicted as BSSID-q [T]) for the multiple BSSID set on link 2. On link 3, there are three APs which are part of the same multiple BSSID set and two of the APs belongs to two different MLDs. AP-a, affiliated with MLD 1, corresponds to the transmitted BSSID (depicted as BSSID-a [T]) for the multiple BSSID set on link 3. AP-c is a not affiliated with any MLD

***TGbe editor: Please update the 5th & 6th paragraph and Figure AA.7 in clause AA.3 as shown below:***

[CID 1819, #1]The second example illustrates the case where APs affiliated with an MLD belong to a mix of a multiple BSSID set, a co-hosted BSSID set and an AP that is not a member of multiple BSSID set or a co-hosted BSSID set. Since by definition, APs affiliated with an AP MLD have same properties (such as security), APs in a co-hosted BSSID set on a link are not part of the same AP MLD. Figure AA-7 (Example of mix of multiple BSSID set, co-hosted set and standalone AP in a multi-link setup) shows an example where APs affiliated with an MLD belong to a mix of multiple BSSID set, co-hosted set or is a standalone AP on their respective link.



**Figure AA-7—Example showing a mix of multiple BSSID set, co-hosted set and an AP that is not a member of a multiple BSSID set or a co-hosted BSSID set**[CID 1819]

[CID 1819, #1]As seen from Figure AA-7 (Example of mix of multiple BSSID set, co-hosted set and standalone AP in a multi-link setup), APs corresponding to BSSID-x, BSSID-z, and BSSID-y are part of the multiple BSSID set on link 1 and belong to different MLDs (MLD 1, MLD 2, and MLD 3, respectively). On link 1, AP-y, affiliated with MLD 3, corresponds to the transmitted BSSID (depicted as BSSID-y [T]) for the multiple BSSID set on link 1. The three APs on link 2, AP-p, AP-q and AP-r, belong to the same co-hosted BSSID set and each is affiliated with a different MLD, MLD 1, MLD2 and MLD3 respectively. On link 3, there is a single AP (AP-b) that is affiliated with MLD 2.

============

**Discussion: Item A**

Liwen pointed out the need to signal the Max BSSID Indicator value when a reported AP belongs to a multiple BSSID set. In an ML probing response and (Re)Association Response frame, a non-AP MLD must be told the MaxBSSID Indicator value associated with the multiple BSSID set for the reported AP so that it can identify all the BSSIDs on the reported link that are part of the multiple BSSID set. Such information will help the STA affiliated with the non-AP MLD that is operating on the link accurately perform intra-BSS operations such as intra-BSS PS, intra-BSS NAV and SR.

***TGbe editor: Please make the following change to the figure and text in clause 9.4.2.295.b as shown below:***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B3 | | B4 | | | B5 | B6 | B7 | B8 | B9 | B10 | B11 15 |
| Link ID | | Complete Profile | | | MAC Address Present | Beacon Interval Present | DTIM Info Present | NSTR Link Pair Present | NSTR Bitmap Size | MaxBSSID Indicator Present | Reserved |
| Bits: |  | 4 | |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |

### Figure 9-788ej—STA Control field format

***TGbe editor: Please insert the following paragraph after the paragraph starting: “If the Complete Profile subfield is equal to 1 and the NSTR Link Pair Present subfield is equal to 1 in the STA Control field, …” as follows:***

The MaxBSSID Indicator Present subfield indicates the presence of the MaxBSSID Indicator subfield in the STA Info field and is set to 1 if the MaxBSSID Indicator subfield is present in the STA Info field; otherwise set to 0. A non-AP STA sets the MaxBSSID Indicator Present subfield to 0 in transmitted Basic variant Multi-Link element. An AP sets this subfield to 1 when the element carries complete profile and the reported AP is a member of a multiple BSSID set.

***TGbe editor: insert the following (new) paragraph after the paragraph starting “The DTIM Count field and the DTIM Period field are …” as follows:***

The MaxBSSID Indicator subfield is defined in 9.4.2.45 (Multiple BSSID element) and carries the same value as the MaxBSSID Indicator field of the Multiple BSSID element transmitted by the AP corresponding to the transmitted BSSID on the reported link.

**Discussion: Item B**

Clause 35.5.3 makes an incorrect reference to a capability bit (Rx Control Frame To MultiBSS subfield) in EHT Capabilities element. The *Rx Control Frame To MultiBSS* subfield is carried in the HE Capabilities element

**35.5.3 Rules for EHT sounding protocol sequences**

***TGbe editor: Please update the following paragraph as shown below:***

An EHT AP with dot11MultiBSSIDImplemented equal to true shall not send an EHT NDP Announcement frame with the TA field set to the transmitted BSSID to a non-AP STA that is associated with an AP corresponding to a nontranmitted BSSID in the multiple BSSID set unless the AP has received from the non-AP STA an HE Capabilities element with the Rx Control Frame To MultiBSS subfield in the HE MAC Capabilities Information field equal to 1.

**Discussion: Item C**

Yunbo identified missing text in the example describing inheritance in the per-STA profile of Basic variant Multi-Link element carried in a in Multiple BSSID element.

***TGbe editor: Please update the following text in clause 35.3.18.2 as shown below (baseline text from approved doc 11-21/254r5):***

**35.3.18.2 Inheritance in the per-STA profile of Basic variant Multi-Link element for an AP in a multiple BSSID set**

***TGbe editor: Please update the following paragraph as shown below:***

Figure 35-13 (Example of inheritance in a complete per-STA profile for a multiple BSSID scenario) illustrates inheritance when a per-STA profile carries complete information in a Basic variant Multi-Link element that is contained in a nontransmitted BSSID profile of a Multiple BSSID element. The example shows a Management frame transmitted by an AP corresponding to the transmitted BSSID. The Management frame carries several elements with their corresponding element IDs shown in parenthesis. The frame also carries a Multiple BSSID element that includes profile for nontransmitted BSSID N. The nontransmitted BSSID profile contains a Basic variant Multi-Link element carrying complete profile for AP x. The BSSID N is inheriting elements with IDs B, C, and E. Elements with ID D and ID F are specific to BSSID N and appear in its nontransmitted BSSID profile. Furthermore, BSSID N does not inherit element with ID A and the ID is listed in the Non-Inheritance element. Since the value of element F for BSSID N is not the same as that advertised by the transmitted BSSID, the element is carried in the profile for BSSID N. An element with ID Y is specific to the BSSID N and is included in its profile. AP x inherits elements with IDs D and F directly from the BSSID N and element with ID C indirectly from the transmitted BSSID (via the BSSID N’s inheritance). AP x does not inherit element A (same as nontransmitted BSSID). The elements with IDs B and Y are specific to AP x and appear in its profile. Furthermore, AP x does not inherit element E from the transmitted BSSID and the ID is listed in the Non-Inheritance element present in its profile.

============

**Strawpoll**:

Do you support the resolutions proposed to the following CIDs in doc 11-21/0255r6 and the changes proposed to address the issues described in discussion items A, B & C?

1096, 2275, 1095, 2292, 2540, 1819