IEEE P802.11
Wireless LANs

|  |
| --- |
| Resolution for CIDs related to Multiple BSSID |
| Date: September 7, 2018 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Inc. |  |  | appatil@qti.qualcomm.com |
| Jouni Malinen | Qualcomm Inc. |  |  | jouni@qca.qualcomm.com |
| Alfred Asterjadhi | Qualcomm Inc. |  |  | aasterja@qti.qualcomm.com |
| George Cherian | Qualcomm Inc. |  |  | gcherian@qti.qualcomm.com |

 Abstract

This submission proposes resolutions for comments received for TGax LB233 (10):

Part 1: 15054, 15058, 15082, 16129, 16586, 16587,

Part 2: 15056, 16590, 16591,

Part 3: 16589

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revised based on offline feedback
* Rev 2: Changed based on feedback when the doc was presented 9/6 PM
	+ CIDs 16586, 16587 and 16589 are deferred
	+ CIDS 15056, 16590, 16591 need further discussion
* Rev 3: Updates to Part 2 based on feedback for CIDs 15056, 16590, 16591

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 TGax Draft. This introduction is not part of the adopted material.

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

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

Part 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg / Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 15054 | Abhishek Patil | 237.16 | 11.1.3.8 | Add non-AP HE STA along with FILS STA to the second sentence in the first paragraph | Change the second sentence as: "Implementation of the Multiple BSSID capability is mandatory for a FILS STA and non-AP HE STA." | **Revised**Agree with the comment. Text updated as suggested by the comment**TGax editor, please make changes as shown in doc 11-18/1320r2 for CID 15054** |
| 15058 | Abhishek Patil | 238.55 | 11.1.4.3.4 | 11ax changes to item g and addition of item l to section 11.1.4.3.4 cover the case of a multiple BSSID capable FILS STA. Remove duplicate rules. | Delete the paragraph from baseline spec that covers Multiple BSSID FILS STA (802.11ai 2016 pg 101). Also delete the last sentence of the second paragraph on pg 102 of 802.11ai 2016 spec. | **Revised**Agree with the comment. Text updated as suggested by the comment**TGax editor, please make changes as shown in doc 11-18/1320r2 for CID 15058** |
| 15082 | Abhishek Patil | 281.12 | 27.5.3.2.1 | First bullet should also capture the multiple BSSID case where the STA is associated with nonTxBSSID and supports receiving a multi-BSS TF from TxBSSID | As in comment | **Revised**Agree with the comment. A new bullet was added to cover the multiple BSSID case.**TGax editor, please make changes as shown in doc 11-18/1320r2 for CID 15082** |
| 16129 | Mark RISON | 276.54 | 27.4.4.6 | "The AP shall set the STA\_ID\_LIST field as defined in 27.11.1(STA\_ID\_LIST).", "an AP may respond with a Multi-STA BlockAck framewith RA field set to broadcast address and STA\_ID\_LIST field set to 2047" -- no STA\_ID\_LIST field exists in a Multi-STA BlockAck frame | Change "STA\_ID\_LIST" to "AID11" and then change the first sentence cited to "[...] field to the 11 LSBs of the AID of the STA" | RevisedThe text in the two bullets refer to the STA\_ID of the broadcast RU in the DL HE MU PPDU. Therefore, the reference to STA\_ID is correct. It is not referring to the AID field in the multi-STA BA. The text in the bullets was revised to provide additional clarification.**TGax editor, please make changes as shown in doc 11-18/1320r2 for CID 16129** |
| 16586 | Po-Kai Huang | 376.48 | 27.16.6 | Due to the reason that multiple BSSID element is not mandatory support by the no-HE non-AP STA, Co-located BSSID set is introduced to enable Intra-BSS identification when virtual AP concept is still used. However, the concept of one control like Trigger frame that can be sent to associated STAs of different VAP is not enabled under Co-located BSSID set. Given that Trigger frame is one of the core concept introduced in 11ax to improve efficiency, enabling similar concept in Co-located BSSID is beneficial for efficiency improvement. | Except the Max Co-LocatedBSSID Indicator for intra-BSS identification, enable the concept of one control frame with a transmitted BSSID like MAC address that can be sent to STAs associated with BSSs in the same Co-located BSSID set. AP can indicate the n LSBs of the MAC address in HE operation element. The 48-n MSB of the MAC address can be the same as the BSSID of the AP that sends the HE operation elements. | **Reject**Multiple BSSID and Co-Located BSSID are separate features/concepts. In a Co-located BSSID set, each BSS is treated independent and as a result, each BSS sends a beacon or mgmt. response frames. Management frames are sent a low MCS and have very high medium occupancy (see studies presented for 11ai). This results in a lot of mgmt. frame overhead. Majority of the gains in a multi-BSS set come from mgmt. frame aggregation. Extending multi-BSS Control frame concept to Co-Located BSSID set will introduce unnecessary complexities (new signaling, etc) with very little gains. Further, enabling control frame aggregation in a Co-Located set, would discourage AP vendors from moving towards the more efficient multiple BSSID set alternative. |
| 16587 | Po-Kai Huang | 376.48 | 27.16.6 | The value of n under the Multiple BSSID concept is bounded by 8. Since Co-located BSSID is similar to Multiple BSSID concept for usage of multiple VAPs, suggeste to bound the value n under Co-located BSSID concept by 8. | The maximum value of n shall be 8. Normative texts shall be provided in the description for the indication in HE operation element. | **Reject**Multiple BSSID and Co-Located BSSID are separate features/concepts. In a multiple BSSID set, each (hidden) nontransmitted BSSID is advertised in the beacon of the transmitted BSSID. Each nontransmitted BSSID is assigned an index which is used to identify the BSS. The Multiple BSSID-Index element, which is carried in the nonTxBSSID profile for each BSS carries the index for the BSS. Since the BSSID Index field in this element is 1 octet long and can uniquely signal up to 255, the n value was bounded by 8.In a co-located BSSID set, each BSS transmits a beacon and is easily identifiable – i.e., each BSS is independent. There is no indexing involved and therefore, there is no need to artificially limit the value of n. |

**Discussion:**

* **Multiple BSSID procedure**

***TGax Editor: Please make the following additions to the 1st paragraph in this section (11ax D3.1):***

***Change the 1st paragraph as follows:***

Implementation of the Multiple BSSID capability is optional for a WNM STA and for a DMG STA. Implementation of the Multiple BSSID capability is mandatory for a FILS STA and non-AP HE STA[15054]. A STA that implements the Multiple BSSID capability has dot11MultiBSSIDImplemented equal to true. When dot11MultiBSSIDImplemented is true, dot11WirelessManagementImplemented shall be equal to true except for a DMG STA and an HE STA, in which case it may be equal to false. A STA in which dot11MultiBSSIDActivated is true is defined as a STA that supports the Multiple BSSID capability. The STA shall set to 1 the Multiple BSSID field of the Extended Capabilities elements that it transmits.

* Criteria for sending a response

***TGax Editor: Please delete the following paragraph from this section in baseline spec (802.11ai 2016 pg101):***

~~If the Multiple BSSID bit is set in the Extended Capabilities element in the Probe Request frame, the FILS STA shall not respond to the Probe Request frame if its BSS information is present as a Nontransmitted BSSID Profile of a Multiple BSSID element in the response generated from another FILS STA.~~[15058]

* General

***TGax Editor: Please add a bullet in the 5th paragraph of this section as shown below (11ax D3.1):***

An AP that transmits a PPDU may solicit an HE TB PPDU from one or more STAs through one of the following mechanisms:

* Including in the PPDU one or more Trigger frames that include one or more User Info fields with one of the following AID12 subfield settings:
* The AID12 subfield is equal to the 12 LSBs of the AID of the STA if the User Info field is addressed to a STA that is associated with the AP.
* The AID12 subfield is equal to the 12 LSBs of the AID of the STA if the User Info field is addressed to a STA that is associated with a nontransmitted BSSID in a multiple BSSID set when dot11MultiBSSIDActivated is equal to true, the TA of the soliciting Trigger frame is set to the transmitted BSSID and the STA has set the Rx Control Frame To MultiBSS subfield in the HE Capabilities element it transmits to 1.[15082]
* The AID12 subfield is 0 if the User Info field is addressed to STAs that are associated with the AP and that follow the UL OFDMA-based random access procedure described in 27.5.5 (UL OFDMA-based random access (UORA)).
* The AID12 subfield is set to 2045 if the User Info field is addressed to STAs that are not associated with the AP and that follow the UL OFDMA-based random access procedure described in 27.5.5 (UL OFDMA-based random access (UORA)).
* Responding to an HE TB PPDU with an HE MU PPDU

***TGax Editor: Please make the following changes to the 3rd paragraph this section (11ax D3.1):***

[16129]An AP with dot11MultiBSSIDActivated equal to true may do one of the following:

* For each BSS belonging to the multiple BSSID set for which the AP has received an HE TB PPDU, the AP responds with a Multi-STA BlockAck frame whose RA field is set to the broadcast address and is carried in a DL HE MU PPDU. The Ack Type field and AID11 field of the Multi-STA BlockAck are set as described in 9.1.3.19.7.The AP shall set the STA\_ID\_LIST field of the corresponding RU to the value of the BSSID Index field as defined in 27.11.1 (STA\_ID\_LIST). There shall be no more than one group addressed Multi-STA BlockAck frame carried in a BSS specific broadcast RU of the DL HE MU PPDU.
* If all the recipient non-AP STAs (that sent an HE TB PPDU) have indicated support for receiving Control frames addressed to STAs from two or more BSSs of a multiple BSSID set by setting the Rx Control Frame to MultiBSS subfield in the HE Capabilities element to 1, the AP may respond with a Multi-STA BlockAck frame whose RA field is set to broadcast address and is carried in a DL HE MU PPDU. The AP shall set the STA\_ID\_LIST field of the corresponding RU to 2047. The Ack Type field and AID11 field of the Multi-STA BlockAck are set as described in 9.1.3.19.7. There shall be no more than one group addressed Multi-STA BlockAck frame carried in a broadcast RU of the DL HE MU PPDU.

\*\*\* There are no CIDs associated with these changes – Changes were agreed by TGax members during Sept ad-hoc \*\*\*

* Co-located BSSID set

***TGax Editor: Please make the following changes to the 3rd and the 4th paragraphs this section (11ax D3.1):***

***NOTE: Please see doc 11-18/1350r1 which fixes the MAC address representation in baseline (REVmd) spec.***

Members of the co-located BSSID set have the same 48-n bits (BSSID[0:(47-n)])in their BSSIDs.

When its associated AP has set the Co-Located BSS subfield in the HE Operation Parameters field to 1, a non-AP STA shall identify a BSS as a co-located BSS, if the 48-n bits (BSSID[0:(47-n)]) of the BSSID of the BSS are the same as the 48-n bits (BSSID[0:(47-n)]) of the BSSID of its associated AP, where n is the value carried in the Max Co-Located BSSID Indicator field of the HE Operation element transmitted by the associated AP.

Part 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg / Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 15056 | Abhishek Patil | 237.60 | 11.1.3.8 | The Beacon frame of a multiple AP can carry a partial list of nontransmitted BSSIDs without any guarantee as to which Beacon includes a particular profile. | Spec should provide rule to make the behavior deterministic. | **Revised**Agree with the comment. Baseline spec (REVmd D1.4) has removed the ambiguity by adding a bit to Extended Capabilities element to signal if the AP is advertising complete or partial list of nonTxBSSID profiles. An HE AP shall provide such indication to its associated STAs so that there is no ambiguity.REVmd also provides a mechanism for APs to advertise the number of active BSSIDs in the set (via the Active BSSID Count element). With this information, an unassociated non-AP STA can determine how many nonTxBSSIDs it has discovered so far if the AP is advertising a partial list. This element is now extended in this contribution to include the periodicity with which the AP advertises nonTxBSSID profiles. The periodicity value would let unassociated STAs know how many beacons they need to receive in order to discover all the active BSSIDs in the set.Further, the contribution defines a new element which an unassociated STAs can include in its probe request frame to indicate the profiles that it has already discovered. An HE AP that receives a probe request which includes this element shall include the missing profiles in its probe response frame.From associated STA point of view, it is critical that the profile is present during it’s associated BSS’s DTIM beacon. This contribution addresses by recommending a multi-BSS HE AP to includes a profile during the associated BSS’s DTIM beacon. This is mandatory if there is a change in the profile. With this, associated STAs can determine when to expect the profile of its associated BSS in the Beacon frame and check if there is any change to the profile. Another fix relates to the straddling of a profile across to the next multiple BSSID element in the frame. This contribution adds a rule that an HE AP shall not split an element across more than one Multiple BSSID element in the frame. **TGax editor, please make changes as shown in doc 11-18/1320r4 for CID 15056** |
| 16591 | Po-Kai Huang | 237.64 | 11.1.3.8 | Currently, AP may choose to include only a partial list of nontransmitted BSSID profiles in the Probe response frame due to the size limit of probe response frame. There are two problems. First, STA does not know that the probe response does not have all the nontransmitted BSSID profiles. Second, STA does not have a way to retrive the nontransmitted BSSID profiles that are not included in the probe response. | Provide methods to solve the two problems. First, AP can indicate that the probe response does not include all the nontransmitted BSSID profiles. Second, STA can send a probe request with indication that certain BSS information are not requied so that AP shall respond with probe response that do not include BSS information that are not requested by the STA and meet the size requirement of probe response. | **Revised**Agree with the comment. Please see resolution to CID 15056 and REVmd D1.4**TGax editor, please make changes as shown in doc 11-18/1320r4 for CID 16591** |
| 16590 | Po-Kai Huang | 237.64 | 11.1.3.8 | Currently, AP may choose to include only a partial list of nontransmitted BSSID profiles in the Beacon frame due to the size limit of beacon frame. There are two problems. First, STA does not know that the beacon frame does not have all the nontransmitted BSSID profiles. Second, STA does not know when transmitted BSSID AP will include the nontransmitted BSSID profile of the associated BSS in a beacon. | Provide methods to solve the two problems. AP can indicate the period with unit of Beacon interval such that all the nontransmitted BSSID profiles are spreaded out in different Beacons within the period and repeated periodically based on the period. | **Revised**Agree with the comment. Please see resolution to CID 15056 and REVmd D1.4**TGax editor, please make changes as shown in doc 11-18/1320r4 for CID 16590** |

**Discussion:**

* **Multiple BSSID procedure**

***TGax Editor: Please make the following additions to the 1st paragraph in this section (11ax D3.1):***

***Change the 1st paragraph as follows:***

Implementation of the Multiple BSSID capability is optional for a WNM STA and for a DMG STA. Implementation of the Multiple BSSID capability is mandatory for a FILS STA. A STA that implements the Multiple BSSID capability has dot11MultiBSSIDImplemented equal to true. When dot11MultiBSSIDImplemented is true, dot11WirelessManagementImplemented shall be equal to true except for a DMG STA and an HE STA, in which case it may be equal to false. A STA in which dot11MultiBSSIDActivated is true is defined as a STA that supports the Multiple BSSID capability. The STA shall set to 1 the Multiple BSSID field of the Extended Capabilities elements that it transmits. An AP that supports enhancements related to the discovery and advertisement of nontransmitted BSSID shall set the Enhanced Multi-BSSID Advertisement Support bit in Extended Capabilities element to 1 and is referred to as an EMA AP in this section.

***TGax Editor: Please make changes to the following paragraph in this section as shown below (11ax D3.1):***

A nontransmitted BSSID profile represents information about a particular nontransmitted BSSID and consists of a set of elements that are carried in the Nontransmitted BSSID Profile subelement of the Multiple BSSID element. Each nontransmitted BSSID profile, at a minimum, shall include the elements that are mandatory for that BSS (i.e., Nontransmitted BSSID Capability element (see 9.4.2.72), SSID element (see 9.4.2.2), Multiple BSSID-Index element (see 9.4.2.74) and FMS Descriptor element (see 9.4.2.75) when dot11FMSActivated is true and the TIM element (see 9.4.2.6) indicates there are buffered group addressed frames for this nontransmitted BSSID). The AP or PCP may include two or more Multiple BSSID elements containing elements for a given BSSID index in a Probe Response frame, a Beacon frame or a DMG Beacon frame. A nontransmitted BSSID profile consists of all elements carried in all such Multiple BSSID elements sharing the same BSSID index. When there is a need to carry a nontransmitted BSSID profile across multiple Multiple BSSID elements in a frame, an EMA AP shall not split an element in the profile into multiple Multiple BSSID elements, and it shall place the next element in the profile as the first subelement of the immediately following Multiple BSSID element. An AP or PCP may choose to include only a partial list of nontransmitted BSSID profiles in the Probe Response frame, Beacon frame or DMG Beacon frame or to include different sets of nontransmitted BSSID profiles in different Probe Response frames, Beacon frames or DMG Beacon frames.

An unassociated non-AP STA may send a directed Probe Request frame containing Known BSSID element (see 9.4.2.247a (Known BSSID element)) to an EMA AP that advertises partial list of nontransmitted BSSID profiles to gather information on nontransmitted BSSIDs it has not discovered. An EMA AP, when transmitting a Probe Response frame in response to a Probe Request frame containing Known BSSID element, should not include the nontransmitted BSSID profiles for BSSIDs listed in the Known BSSID element.

* **Extended Capabilities element**

***Insert the following row into Table 9-135 (Extended Capabilities element) (header row shown for convenience):***

|  |
| --- |
| * **Extended Capabilities element**
 |
| **Bit** | **Information** | **Notes** |
| <ANA> | Enhanced Multi-BSSID Advertisement Support | This field is reserved for a non-AP STA or when the AP has dot11MultiBSSIDActivated set to false.When set to 1, indicates that the AP supports enhancements related to discovery and advertisement of nontransmitted BSSIDs. Otherwise the field is set to 0. Also see 11.1.3.8 (Multiple BSSID procedure) |

***TGax Editor: Please add a new section after 9.4.2.247 as follows (11ax D3.1):***

9.4.2.247a Known BSSID element

The Known BSSID element identifies the nontransmitted BSSIDs that a non-AP STA has discovered so far. A non-AP STA can include this element in a directed Probe Request frame to discover other nontransmitted BSSIDs not known to the requesting STA.

The format of the Known BSSID element is shown in Figure 9-589dj1 (Known BSSID element format)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | BSSID Bitmap |
| Octets: | 1 | 1 | 1 | variable |
|  | **Figure 9-589dj1 – Known BSSID element format** |

The Element ID, Length, and Element ID Extension fields are defined in 9.4.2.1 (General).

The format of the BSSID Bitmap field is as shown in Figure 9-589dj2 (BSSID Bitmap field format).

|  |  |  |
| --- | --- | --- |
|  | Bitmap | Pad |
| Bits: | 2n | 0 to 7 |
|  | **Figure 9-589dj1 – Known BSSID element format** |

The Bitmap subfield is a set of 2n – 1 bits where n is the value carried in the MaxBSSID Indicator field of the Multiple BSSID element advertised by the AP to which the Probe Request frame is being sent to. Each bit represents one of 2n – 1 possible BSSID Index values (see 9.4.2.74 (Multiple BSSID-Index element)) in the multiple BSSID set. A value of 1 at bit position *k* indicates that the non-AP STA has knowledge of nontransmitted BSSID whose BSSID Index value is *k*. Otherwise the bit is set to 0.

The Pad subfield contains additional bits set to 0 to make the total number of bits in the BSSID Bitmap field equal to an integer number of octets.

* **Elements**
* **General**

***TGax Editor: Please add a new row to Table 9-77 as follows (11ax D3.1):***

***Insert the following new rows into Table 9-77 (Element IDs) (header row shown for convenience):***

|  |
| --- |
| **Table 9-77 – Element IDs** |
| **Element** | **Element ID** | **Element ID Extension** | **Extensible** | **Fragmentable** |
| Known BSSID (see 9.4.2.247a (Known BSSID element)) | 255 | <ANA> |  No | No |

* + - 1. **Probe Request frame format**

***TGax Editor: Please add a new row to Table 9-33 as follows (11ax D3.1):***

***Insert the following new rows into Table 9-33 (Probe Request frame body):***

|  |
| --- |
| **Table 9-33 – Probe Request frame body** |
| **Order** | **Information** | **Notes** |
| <ANA> | Known BSSID | The Known BSSID element is optionally present when dot11MultiBSSIDActivated is set to true. |

***TGax Editor, the changes described beyond this point apply to REVmd D1.4***

***TGax Editor: Please update section 9.4.2.237 in REVmd D1.4 as follows:***

* **Multiple BSSID Configuration element**

The Multiple BSSID Configuration element is used to provide configuration information of a multiple BBSID set.

The format of the Multiple BSSID Configuration element is shown in Figure 9-762 (Multiple BSSID Configuration element format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | BSSID Count | Profile Periodicity |
| Octets: | 1 | 1 | 1 | 1 | 1 |
| * **Multiple BSSID Configuration element format**
 |

The Element ID, Length, and Element ID Extension fields are defined in 9.4.2.1 (General).

The BSSID Count field carries the total number of active BSSIDs in the multiple BSSID set.

Profile Periodicity field indicates the least number of Beacon frames or DMG Beacon frames a STA needs to receive in order to discover all the active nontransmitted BSSIDs in the set.

***TGax Editor: Please replace all references to 'Active BSSID Count element’ in REVmd D1.4 to ‘Multiple BSSID Configuration element’.***

***TGax Editor: Please update row corresponding to ‘Complete List of NonTxBSSID Profiles’ of 9.4.2.26 in REVmd D1.4 as follows:***

* Extended Capabilities element

***Insert the following rows into Table 9-146 (Extended Capabilities element) (header row shown for convenience):***

|  |
| --- |
| * Extended Capabilities field
 |
| **Bit** | **Information** | **Notes** |
| 80 | Complete List Of NonTxBSSID Profiles | This field is reserved for a non-AP STA or when the AP has dot11MultiBSSIDActivated set to false.When set to 1, indicates that the frame carrying this element includes a complete list of nontransmitted BSSID profiles. When set to 0 by the non-HE AP, there is no indication about the completeness of the list of the nontransmitted BSSID profiles in the frame. When set to 0 by an HE AP, indicates that the frame carrying this element does not include a complete list of nontransmitted BSSID profiles.Also see 11.1.3.8 (Multiple BSSID procedure) |

* Multiple BSSID procedure

***TGax Editor: Please update this paragraph in this section of REVmd D1.4 as follows:***

The nontransmitted BSSID profile shall include the SSID element (see 9.4.2.2 (SSID element)) and Multiple BSSID-Index element (see 9.4.2.73 (Multiple BSSID-Index element)) for each of the supported BSSIDs. The AP or PCP may include all other elements in the nontransmitted BSSID profile. The AP or PCP may include two or more Multiple BSSID elements containing elements for a given BSSID index in one Beacon frame or DMG Beacon frame. If two or more are given, the profile is considered to be the complete set of all elements given in all such Multiple BSSID elements sharing the same BSSID index. Since the Multiple BSSID element is also present in Probe Response frames, an AP or PCP may choose to advertise the complete or a partial profile of a BSS corresponding to a nontransmitted BSSID only in the Probe Response frames. In addition, the AP or PCP may choose to include only a partial list of nontransmitted BSSID profiles in the Beacon frame or DMG Beacon frame or to include different sets of nontransmitted BSSID profiles in different Beacon frames or DMG Beacon frames. [#Ed – new paragraph]

An AP advertising a complete list of nontransmitted BSSID profiles shall set the Complete List Of NonTxBSSID Profiles field of Extended Capabilities element to 1. An EMA AP, when advertising a partial list of BSSID profiles, shall include Multiple BSSID Configuration element (see 9.4.2.237 (Multiple BSSID Configuration element)) in its Beacon frame or DMG Beacon frame or Probe Response frame to indicate the configuration of the multiple BSSID set. The BSSID Count field of the Multiple BSSID Configuration element indicates number of active BSSIDs in the multiple BSSID set while the Profile Periodicity field indicates the number of beacons a scanning STA is required to receive in order to discover all the active nontransmitted BSSIDs in the set.

An EMA AP that includes a partial list of nontransmitted BSSID profiles in its Beacon frame or DMG Beacon frame, should advertise a particular nontransmitted BSSID profile in a repeating pattern such that the profile is present in at least one Beacon in a sequence of beacons indicated by the Profile Periodicity field of the Multiple BSSID Configuration element. If there is any change in a particular nontransmitted BSSID's profile (i.e., set of elements belong to the profile or the element values), the EMA AP shall include the profile in the next DTIM beacon of that BSS so that STAs with that BSS become aware of the change immediately.

Note - It is recommended that an AP selects the periodicity in which the profile repeats to be a multiple of the BSS’s DTIM interval so that associated STAs in PS mode don't have to wake-up for additional beacons.

Part 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 16589 | Po-Kai Huang | 237.15 | 11.1.3.8 | Group addressed frame transmission under multiple BSSID concept can only be achieved in the following two methods. First, group addressed frames of different BSSs in the Multiple BSSID set are transmitted one after the other after one beacon frame. Second, group addressed frames of different BSSs in Multiple BSSID set are transmitted in different beacon interval based on DTIM indication. The first approach increases power concumption of the STAs because STAs may need to wait for group addressed frames from other BSSs to be transmitted before received the group addressed frames from its own BSS. The second approach increase the delay of transmitting group addressed frame if the group addressed transmission are spreaded out in different Beacon Intervals. | Enable group addressed frame transmission for different BSSs in the multiple BSSID set to be spreaded out withn a beacon interval. | **Revised**Baseline spec allows each nonTxBSSID to have a different DTIM interval. A multi-AP has the flexibility to select the DTIM interval for each nonTxBSSID such that it satisfy the delay constraints required by the STAs associated with the respective BSS.**TGax editor, please make changes as shown in doc 11-18/1320r2 for CID 15054** |

**Discussion:**

* Multiple BSSID procedure

***TGax Editor: Please change the 5th paragraph of this section in baseline spec (802.11-2016 pg 1589) as shown below:***

The Partial Virtual Bitmap field ~~in~~ of the TIM element carried in the transmitted BSSID Beacon or DMG Beacon frame shall indicate the presence or absence of traffic to be delivered to all stations associated to a transmitted or nontransmitted BSSID. The first 2n bits of the bitmap are reserved for the indication of group addressed frame for the transmitted and all nontransmitted BSSIDs such that bit position 0 indicates group addressed traffic for transmitted BSSID while bit position matching a nontransmitted BSSID’s index (see 9.4.2.74) indicating group addressed traffic for that nontransmitted BSSID. The AID space is shared by all BSSs and the lowest AID value that shall be assigned to a station associated with a BSS of the set is 2n (see 9.4.2.6). Each BSS of the set may have a different DTIM interval indicated via the DTIM Period and DTIM Count fields present the Multiple BSSID-Index element.