IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolution for CID 11742 | | | | |
| Date: March 1, 2018 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Inc. |  |  | appatil@qti.qualcomm.com |
| Alfred Asterjadhi | Qualcomm Inc. |  |  | aasterja@qti.qualcomm.com |
| George Cherian | Qualcomm Inc. |  |  | gcherian@qti.qualcomm.com |
| Po-Kai Huang | Intel |  |  |  |
| Liwen Chu | Marvell |  |  |  |

Abstract

This submission proposes resolutions for CIDs received for TGax LB230 (4):

11742, 11023, 11876, 13141

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: No technical change – rearranged section for continuity
  + moved section 9.4.2.22.10 before 9.4.2.37 since 9.4.2.246 refers to content in 9.4.2.22.10
* Rev 2: Revised based on offline discussions + D2.2
* Rev 3: Revised based on offline feedback from Po-Kai + included CIDs 11023, 11876, 13141 + changes to section 27.16.2.2.2 are applied to approved text in doc 11-18/0365r1
* Rev 4: Editorial changes based on feedback when the doc was present at the MAC ad-hoc (3/1/18)

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.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg / Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 11742 | George Cherian | 290.38 | 27.9.2.1 | When an AP hosts multiple BSSs, but does not support Multi-BSSID feature (for various reasons), the STAs that are associated to one of the BSS of the AP would not know what other BSSs are that are hosted by the same AP. Hence the STA may perform SR over those packets for other BSSs hosted by the same AP. Fix it. | As in the comment. May need some indication from the AP. | Revised  Agree with the comment.  11ax D2.0 doesn’t provide guidance on AP/STA behavior when BSSs are co-located on the same device and are not part of a multiple BSSID set. It is critical for an AP to signal the presence of co-located BSS as it affects features such as SR, intra-PPDU PS and NAV setting.  This contribution provides a mechanism to signal the presence of co-located BSS via HE Operation element.  Section 27.2.1 has been updated to classify frames belonging to co-located BSS as intra-PPDU. Rules on when to advertise co-located BSSID are added to 11.1.3.8 (Multiple BSSID) and identification of co-located BSS is described in a new section in 27.16a. In addition, section 27.11.4 is updated to indicate that all co-located BSS shall have the same BSS Color.  **TGax editor, please make changes as suggested in doc 11-17-1859r4** |
| 11023 | Abhishek Patil | 149.25 | 9.4.2.238 | Since support for Multiple BSSID feature is mandatory for HE non-AP STAs, HE STAs can identify a beacon from transmitted BSSID by following the procedure described in baseline spec. Further non-AP HE STAs can decode the Multiple BSSID element carried in the transmitted BSSID's beacon to derive the address of their corresponding nontransmitted BSSID. HE Operations element doesn't need to advertise any fields related to multiple BSSID feature. | As in comment | Revised  Agree with the comment.  In a multiple BSSID set, only the transmitted BSSID beacons and carries the Multiple BSSID element. The HE Operations element doesn’t need to advertise that the AP belongs to a multiple BSSID set. It is determined based on the presence of Multiple BSSID element. Therefore, HE Operation element doesn’t need to advertise it. Propose to remove inconsistent text from this section.  Repurposed ‘Multiple BSSID AP’ bit in HE Op to indicate Co-Located BSS and MaxBSSID Indicator field to indicate Max Co-Located BSSID. Please see resolution to CID 11742  **TGax editor, please make changes as suggested in doc 11-17-1859r4** |
| 11876 | Hemanth Sampath | 149.25 | 9.4.2.238 | Per baseline spec, only the transmitted BSSID beacons in a multiple BSSID set. Therefore, 11ax spec doesn't need to define an alternate (or redundant) procedure to identify transmitted BSSID. Remove fields Multiple BSSID AP, TxBSSID Indicator and MaxBSSID Indicator from HE Operations element. Reduce the size of HE Operation Parameters field accordingly. | As in comment | Revised  Agree with the comment.  HE Operations element doesn’t need to advertise multi-BSS AP and whether or not the BSS is a TxBSSID. Please see resolution for CID 11023.  **TGax editor, please make changes as suggested in doc 11-17-1859r4** |
| 13141 | Po-Kai Huang | 149.51 | 9.4.2.238 | When Multiple BSSID AP subfield is set to 1, and the TxBSSID subfield is set to 0, the STA is required to scan the transmitted BSSID beacon to understand the broadcast AID assigned to its associated AP. The scanning process takes time and can be greatly simplified if the transmitted BSSID can be indicated to the STA in some ways. | Propose to have a mechanism to indicate transmitted BSSID to the STA direclty. Alternatively, having indication like BSSID index in multiple BSSID-index element for the STA to understand the relative location of its associated AP's BSSID in the multiple BSSID set. | Revised  Per baseline spec, there is only one beacon per multiple BSSID set. Further, 802.11ax mandates non-AP STAs to support multiple BSSID feature. As a result, the STAs are expected to parse the beacon from the transmitted BSSID. Therefore, there should not be any ambiguity in identifying the address of the transmitted BSSID. Inconsistencies in HE Operations element are removed.  Please see resolution for CID 11023.  **TGax editor, please make changes as suggested in doc 11-17-1859r4** |

* HE Operation element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
|  | Element ID | Length | Element ID Extension | HE Operation Parameters | BSS Color Information | Basic HE-MCS And NSS Set | VHT Operation Information | Max Co-Located BSSID Indicator |
| Octets: | 1 | 1 | 1 | 3 | 1 | 2 | 0 or 3 | 0 or 1 |
| * HE Operation element format | | | | | | | | |

***TGax Editor: Please modify Figure 9-589cr as follows (11ax D2.2 P154L26):***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0       B2 | B3 | B4      B13 | B14 | B15 |  | B16     B23 |
|  | Default PE Duration | TWT Required | TXOP Duration RTS Threshold | VHT Operation Information Present | Co-Located BSS |  | Reserved |
| Bits: | 3 | 1 | 10 | 1 | 1 |  | 8 |
| * HE Operation Parameters field format | | | | | | | |

***TGax Editor: Please modify the 5th paragraph as follows (11ax D2.2 P154L58):***

The Co-Located BSS subfield is set to 1 to indicate that the AP transmitting this element shares the same operating class, channel and antenna connector(s) with at least one other BSS and is set to 0 otherwise. A TDLS STA(17/1279r1), IBSS STA or mesh STA(17/533r5) transmitting this element sets the subfield to 0.(#3034)(#5923)(#5924)(#8261)(#Ed)

***TGax Editor: Please delete the 6th paragraph (11ax D2.2 P154L63):***

***TGax Editor: Please modify the last paragraph as follows (11ax D2.2 P155L43):***

The Max Co-Located BSSID Indicator field contains a value assigned to n, where 2n is the maximum number of BSSIDs in the co-Located BSSID set as defined in 27.16a (Co-Located BSSID Set). This field is present if the Co-Located BSS subfield in HE Operation Parameters field is set to 1 and is not present otherwise.(#4774)

Note: The Max Co-Located BSSID Indicator field doesn’t provide the exact number or the identity of each co-located BSSIDs.

* **Multiple BSSID procedure**

***TGax Editor: Please add the following as the 2nd paragraph in this section (11ax D2.2 P219L21):***

An AP with dot11MultiBSSIDActivated set to true does not belong to a co-located BSSID set (see 27.16a) and shall not set the Co-Located BSS subfield in HE Operation element to 1 in the Management frames that it transmits.

***TGax Editor: Please add a new section after 27.16 as follows:***

**27.16a Co-Located BSSID Set**

BSSs that are not part of a multiple BSSID set (i.e., dot11MultiBSSIDActivated is set to false) but shares the same operating class, channel and antenna connector(s) belong to a co-located BSSID set.

An AP that belongs to a co-located BSSID set shall

* set the Co-Located BSS subfield in the HE Operation element that it transmits to 1.
* set the Max Co-Located BSSID Indicator field in the HE Operation element that it transmits to a nonzero value n such that 2n indicates the maximum number of BSSIDs in the co-located set.

Members of the co-located BSSID set have the same 48-n MSBs 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 of the BSSID of the BSS are the same as the 48-n bits 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.

**27.2.2 Intra-BSS and inter-BSS frame determination**

***TGax Editor: Please change the 1st and 2nd paragraph in this section as follows (11ax D2.2 P231L51):***

A STA that obtains at least the RXVECTOR for a PPDU shall classify the PPDU as an inter-BSS frame if at least one of the following conditions is true:

* The RXVECTOR parameter BSS\_COLOR is not 0 and is not the BSS color of the BSS of which the STA is a member.
* The PPDU is an HE PPDU with the RXVECTOR parameter BSS\_COLOR not equal to 0 and the STA is an HE STA associated with a non-HE AP.
* The PPDU is a VHT PPDU with RXVECTOR parameter PARTIAL\_AID not equal to the BSSID[39:47] of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to and the RXVECTOR parameter GROUP\_ID is 0.
* The PPDU is a VHT PPDU with RXVECTOR parameter PARTIAL\_AID[5:8] not equal to the partial BSS color announced by the BSS of which the STA whose dot11PartialBSSColorImplemented is equal to true is a member and RXVECTOR parameter GROUP\_ID equal to 63 when the Partial BSS Color field in the most recent HE Operation element is 1.
* The PPDU is either a VHT MU PPDU or an HE MU PPDU with the RXVECTOR parameter UPLINK\_FLAG equal to 0 and the STA is an AP.
* The PPDU carries a frame that has a BSSID field, the value of which is not the BSSID of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to.
* The PPDU carries a frame that does not have a BSSID field but has both an RA field and TA field, neither value of which is equal to the BSSID of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to. The Individual/Group bit in the TA field value is forced to 0 prior to comparison.

Otherwise, a STA that obtains at least the RXVECTOR for a PPDU shall classify the PPDU as an intra-BSS frame if at least one of the following conditions is true:

* The RXVECTOR parameter BSS\_COLOR of the PPDU carrying the frame is 0 or the BSS color of the BSS of which the STA is a member.
* The PPDU is a VHT PPDU with RXVECTOR parameter PARTIAL\_AID equal to the BSSID[39:47] of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to, and the RXVECTOR parameter GROUP\_ID equal to 0
* The PPDU is a VHT PPDU with RXVECTOR parameter PARTIAL\_AID[5:8] equal to the partial BSS color of the BSS of which the STA whose dot11PartialBSSColorImplemented is equal to true is a member, the RXVECTOR parameter GROUP\_ID is equal to 63 and the Partial BSS Color field in the most recent HE Operation element is 1.
* The PPDU carries a frame that has an RA, TA or BSSID field value that is equal to the BSSID of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to. The Individual/Group bit in the TA field value is forced to the value 0 prior to the comparison.
* The PPDU carries a Control frame that does not have a TA field and that has an RA field value that matches the saved TXOP holder address of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to.
* BSS\_COLOR

***TGax Editor: Please update the 9th paragraph in this section as follows (11ax D2.2 P324L22):***

All APs that are members of a multiple BSSID set or co-located BSSID set shall use the same BSS color.

* Power management
* Intra-PPDU power save for non-AP HE STAs

***TGax Editor: Please make the following changes to the 3rd paragraph in this section (11ax D2.2 P330L40):***

A non-AP HE STA that is in intra-PPDU power save mode may enter the doze state until the end of a PPDU currently being received when one of the following conditions is met:

* The PPDU is an HE MU PPDU where the RXVECTOR parameter BSS\_COLOR is the BSS color of the BSS with which the STA is associated, the RXVECTOR parameter UPLINK\_FLAG is 0 and the RXVECTOR parameter STA\_ID\_LIST does not include the identifier of the STA or the broadcast identifier(s) intended for the STA and the BSS Color Disabled subfield is 0 in the most recently received HE Operation element from the AP to which it is associated.
* The PPDU is an HE MU PPDU, HE SU PPDU or HE ER SU PPDU and one of the following conditions are true:
* The RXVECTOR parameter BSS\_COLOR is the BSS color of the BSS with which the STA is associated, the RXVECTOR parameter UPLINK\_FLAG is 1 and the BSS Color Disabled subfield is 0 in the most recently received HE Operation element from the AP to which it is associated.
* The RXVECTOR parameter BSS\_COLOR is the BSS color of the BSS with which the STA is associated, the RXVECTOR parameter UPLINK\_FLAG is 0 and a PHY-RXEND.indication(UnsupportedRate) primitive was received and the BSS Color Disabled subfield is 0 in the most recently received HE Operation element from the AP to which it is associated.
* The PPDU is an HE TB PPDU where the RXVECTOR parameter BSS\_COLOR is the BSS color of the BSS with which the STA is associated and the BSS Color Disabled subfield is 0 in the most recently received HE Operation element from the AP to which it is associated.
* The PPDU is a VHT PPDU where the RXVECTOR parameter PARTIAL\_AID is the BSSID[39:47] of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to and the RXVECTOR parameter GROUP\_ID is 0.
* The PPDU is a PPDU with:
* An A-MPDU including TA or RA equal to either the BSSID of the BSS with which the STA is associated or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to and,
* The RA is not the individual MAC address of the STA or the group address(es) of the STA
* The PPDU is either an HE MU PPDU with the RXVECTOR parameter UPLINK\_FLAG set to 0 or a VHT MU PPDU containing an A-MPDU with
* The RA(s) in the A-MPDU is(are) equal to the STA's individual address and,
* The STA has received in the A-MPDU at least one MPDU delimeter with EOF equal to 1 and with MPDU length field equal to 0.

**TGax Editor: This section was updated in doc 11-18/0365r1. The changes below are applied to the approved text from this doc:**

* Autonomous reporting of BSS color collision

***TGax Editor: Please make the following changes to the 2nd paragraph in this section:***

A non-AP HE STA that supports autonomous reporting of BSS color collision may send a color collision report to its associated AP when it detects that color collision has occurred. The STA shall declare that a color collision has occurred if it receives an MPDU with at least three Address fields in the MAC header and with the same color as its associated BSS in which none of the Address fields match the BSSID of the BSS that the STA is associated with, or any of the other BSSs in the same multiple BSSID set or co-located BSSID set to which its BSS belongs to.