### IEEE P802.11 Wireless LANs

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| 11ax D4.0 MAC Comment Resolution for Co-hosted BSSID | | | | |
| Date: 2019-03-10 | | | | |
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Abstract

This submission proposes resolutions for comments of TGax Draft D4.0 with the following CIDs:

21157

Revisions:

* Rev 0: Initial version of the document.

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 D4.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D4.0 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.***

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 21157 | Po-Kai Huang | 438.50 | 26.17.7 | Due to the reason that multiple BSSID element is not mandatory support by the no-HE non-AP STA, Co-hosted 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-hosted BSSID set. Given that Trigger frame is one of the core concept introduced in 11ax to improve efficiency, enabling similar concept in Co-hosted BSSID is beneficial for efficiency improvement. | Except the Max Co-Located BSSID 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-hosted 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. An HE extended MAC Capabiltieis element can be introduced to indicate the capability for the STA to receive this Trigger frame. | Revised –  Agree in principle with the commenter.  TGax editor to make the changes shown in 11-19/0339r0 under all headings that include CID 21157 |

**Discussion:** *None.*

**Propose:** Revised for CID 21157 per discussion and editing instructions in 11-18/0339r0.

***TGax editor: Change 26.17.7 Co-hosted BSSID set: (Track change on)***

* Co-hosted BSSID set(18/1814r2)

BSSs that are not part of a multiple BSSID set (i.e., dot11MultiBSSIDImplemented(19/0028r4) is set to false) but share the same operating class, channel and antenna connectors belong to a co-hosted BSSID set(18/1814r2).

An AP that belongs to a co-hosted BSSID(18/1814r2) set shall perform the following operations:

* Set the Co-Hosted BSS subfield(18/1814r2) in the HE Operation element that it transmits to 1.
* Set the Max Co-Hosted BSSID Indicator field(18/1814r2) in the HE Operation element that it transmits to a nonzero value *n,* where *1 ≤ n ≤ 8,*(#16587)such that 2*n* indicates the maximum number of BSSIDs in the co-hosted(#Ed) set.

Members of the co-hosted BSSID(18/1814r2) set have the same 48 – *n* bits (BSSID[0:(47 –*n*)]) in their BSSIDs.

If(#15420) its associated AP has set the Co-Hosted BSS subfield(18/1814r2) in the HE Operation Parameters field to 1, a non-AP STA shall identify a BSS as a co-hosted BSS(18/1814r2), 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-Hosted BSSID Indicator field(18/1814r2) of the HE Operation element transmitted by the associated AP.

One of the BSSs in the co-hosted BSSID set has BSSID equal to control BSSID, and the control BSSID may be put in the TA field of a Trigger frame or Multi-STA BlockAck or HE NDP Announcement frame addressed to STAs from at least two different BSSs of the co-hosted BSSID set.

The BSSID[40:47] of the control BSSID is indicated in the BSSID[40:47] of the Control BSSID field of the HE Operation element.The AID space is shared by all BSSs in the co-hosted BSSID set. *(#21157)*

***TGax editor: Change 9.4.2.243 HE Operation element: (Track change on)***

* HE Operation element

The operation of HE STAs in an HE BSS is controlled by the following:

* the HT Operation element and the HE Operation element if operating in the 2.4 GHz band
* the HT Operation element, VHT Operation element and the HE Operation element if operating in the 5 GHz band
* The HE Operation element if operating in the 6 GHz band

The format of the HE Operation element is defined in Figure 9-772h (HE Operation element format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Element ID | Length | Element ID Extension | HE Operation Parameters | BSS Color Information | Basic HE-MCS And NSS Set | VHT Operation Information | Max Co-Hosted BSSID Indicator(18/1841r2) | 6 GHz Operation Information(#15120) | BSSID[40:47] of the Control BSSID |
| Octets: | 1 | 1 | 1 | 3 | 1 | 2 | 0 or 3 | 0 or 1 | 0 or 4 | 0 or 1*(#21157)* |
| * HE Operation element format | | | | | | | | | |  |

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

The format of the HE Operation Parameters field is defined in Figure 9-772i (HE Operation Parameters field format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0       B2 | | B3 | B4      B13 | B14 | B15 | B16 | B17 | B18 | B19    B23 |
|  | Default PE Duration | | TWT Required | TXOP Duration RTS Threshold | VHT Operation Information Present | Co-Hosted BSS(18/1814r2) | ER SU Disable | 6 GHz Operation Information Present(#15120) | BSSID[40:47] of the Control BSSID Presnet | Reserved |
| Bits: | 3 | | 1 | 10 | 1 | 1 | 1 | 1 | 1*(#21157)* | 6 |
|  | | * HE Operation Parameters field format | | | | | | | | |

(… exsiting texts …..)

The 6 GHz Operation Information Present field is set to 1 to indicate that the 6 GHz Operation Information field is present and set to 0, otherwise. The 6 GHz Operation Information Present field is set to 1 by an AP operating in the 6 GHz band.

The BSSID[40:47] of the Control BSSID Presnet subfield is set to 1 to indicate that the BSSID[40:47] of the Control BSSID subfield is present in the HE Operation element and is set to 0 otherwise. An HE STA sets the BSSID[40:47] of the Control BSSID subfield Present to 0 if the Co- Hosted BSS subfield is set to 0. *(#21157)*

(…existing texts …)

The Minimum Rate field indicates the minimum rate with NSS no more than 3 and HE-MCS no more than 3 that is allowed for a STA to use in unit of 1 Mb/s.(18/1849r4)

The BSSID[40:47] of the Control BSSID field indicates the BSSID[40:47] of the control BSSID. This field is present if the BSSID[40:47] of the Control BSSID Presnet subfield in HE Operation Parameters field is set to 1 and is not present otherwise. *(#21157)*

***TGax editor: Change 9.3.1.22 Trigger frame format: (Track change on)***

9.3.1.22.1 Trigger frame format

(…existing texts…)

The TA field is the address of the STA transmitting the Trigger frame if the Trigger frame is addressed to non-AP STAs that belong to a single BSS. The TA field is the address of the transmitted BSSID if the Trigger frame is addressed to non-AP STAs from at least two different BSSs of the multiple BSSID set. The TA field is the address of the control BSSID if the Trigger frame is addressed to non-AP STAs from at least two different BSSs of the co-hosted BSSID set.(#21157) The rules for setting of the TA field are defined in 26.5.3.2.4 (Allowed settings of the Trigger frame fields and TRS Control subfield).

(…existing texts…)

***TGax editor: Change 9.4.2.242.2 HE MAC Capabilities information field: (Track change on)***

**9.4.2.242.2 HE MAC Capabilities Information field**

The format of the HE MAC Capabilities Information field is defined in Figure 9-772b (HE MAC Capabilities Information field format).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B4 | B5 B7 | B8 B9 | B10       B11 | B12       B14 |
|  | +HTC HE Support | TWT Requester Support | TWT Responder Support | Dynamic Fragmentation Support(#15885) | Maximum Number Of Fragmented MSDUs/A-MSDUs Exponent | Minimum Fragment Size | Trigger Frame MAC Padding Duration | Multi-TID Aggregation Rx Support |
| Bits: | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 3 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B15     B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 |
|  | HE Link Adaptation Support | All Ack Support | TRS Support | BSR Support | Broadcast TWT Support | 32-bit BA Bitmap Support | MU Cascading Support | Ack-Enabled Aggregation Support |
| Bits: | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B24 | B25 | B26 | B27    B28 | B29 | B30 | B31 | B32 |
|  | Rx Control Frame to Co-hosted BSS.(#21157) | OM Control Support | OFDMA RA Support | Maximum A-MPDU Length Exponent Extension | A-MSDU Fragmentation Support | Flexible TWT Schedule Support | Rx Control Frame To MultiBSS | BSRP BQRP A-MPDU Aggregation |
| Bits: | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B33 | B34 | B35 | B36 | B37 | B38 | B39       B41 |
|  | QTP Support | BQR Support | SRP Responder | NDP Feedback Report Support | OPS Support | A-MSDU In Ack-Enabled A-MPDU Support(#15887) | Multi-TID Aggregation Tx Support |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B42 | B43 | B44 | B45 | B46 | B47 |
|  | HE Subchannel Selective Transmission Support | UL 2×996-tone RU Support | OM Control UL MU Data Disable RX Support | HE Dynamic SM Power Save(#16595) | Punctured Sounding Support(#16723) | HT And VHT Trigger Frame RX Support(#15662) |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 |
| * HE MAC Capabilities Information field format | | | | | | |

The subfields of the HE MAC Capabilities Information field are defined in Table 9-321a (Subfields of the HE MAC Capabilities Information field).

|  |  |  |
| --- | --- | --- |
| * Subfields of the HE MAC Capabilities Information field | | |
| (… existing fields …) | | | |
| Ack-Enabled Aggregation Support | Indicates support by a STA to receive an A-MPDU that contains two or more frames at least one of which solicits an Ack frame or acknowledgment context in a Multi-STA BlockAck frame as described in 26.6.4 (Multi-TID A-MPDU and ack-enabled A-MPDU) and 26.5.1.1 (General). | Set to 1 if the STA supports reception of this A-MPDU format.  Set to 0 otherwise. | |
| Rx Control Frame to Co-hosted BSS | If a non-AP STA associates with an AP that is in a co-hosted BSSID set and has BSSID different from control BSSID, indicates whether the non-AP STA supports reception of a control frame with TA field equal to the control BSSID.(#21157) | For a non-AP STA:  Set to 1 if a non-AP STA associates with an AP that is in a co-hosted BSSID set and has BSSID different from control BSSID, and the non-AP STA supports receiving a Control frame addressed to STAs associated with two or more BSSs in a co-hosted BSSID set and that has the TA field set to the control BSSID.  Set to 0 otherwise.  Reserved for an AP. (#21157)  (#11016) | |
| OM Control Support | Indicates support for receiving an MPDU that contains an OM Control subfield. | If the +HTC-HE Support subfield is 1 in a non-AP STA:  Set to 1 if the non-AP STA supports reception of the OM Control subfield.  Set to 0 otherwise.  Reserved if the +HTC-HE Support subfield is 0 in a non-AP STA.  An AP sets the OM Control Support subfield to 1. | |

***TGax editor: Change 26.2.6.3 CTS frame response to an MU-RTS Trigger frame: (Track change on)***

* CTS frame response to an MU-RTS Trigger frame(#15729)

If a non-AP STA(#16592) receives an MU-RTS Trigger frame, the non-AP STA(#16592) shall commence the transmission of a CTS frame response at the SIFS time boundary after the end of a received PPDU when all the following conditions are met:

* The MU-RTS Trigger frame has one of the User Info fields addressed to the non-AP STA(#16592). The User Info field is addressed to a non-AP STA(#16592) if the AID12 subfield is equal to the 12 LSBs of the AID of the STA and the MU-RTS Trigger frame is sent by the AP with which the non-AP STA(#16592) is associated or by the AP corresponding to the transmitted BSSID if the non-AP STA(#16592) is associated with a nontransmitted BSSID and has indicated support for receiving Control frames with TA field(#15959) set to the transmitted BSSID by setting the Rx Control Frame To MultiBSS subfield to 1 in the HE Capabilities element that the non-AP STA(#16592) transmits. or by the AP corresponding to the control BSSID if the non-AP STA is associated with an AP with BSSID different from control BSSID and has indicated support for receiving Control frames with TA set to the control BSSID(#13506) by setting the Rx Control Frame to Co-hosted BSS subfield to 1 in the HE Capabilities element that the non-AP STA transmits.(#13143)(#21157)
* The UL MU CS condition indicates that the medium is idle (see 26.5.3.5 (UL MU CS mechanism)).(19/0162r1)

(… existing texts …)

***TGax editor: Change 26.4.1 Overview: (Track change on)***

* Overview

(… existing texts …)

An AP that transmits a Multi-STA BlockAck frame addressed to HE STAs shall set the TA field of the frame to the MAC address of the AP except the following:

* dot11MultiBSSIDImplemented(19/0028r4) is true and the Multi-STA BlockAck frame is directed to STAs from at least two different BSSs of the multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID.
* the Multi-STA BlockAck frame is directed to non-AP STAs from at least two different BSSs of the co-hosted BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID. (#21157)

(… existing texts …)

***TGax editor: Change 26.5.3.2* Rules for soliciting UL MU frames*: (Track change on)***

**26.5.3.2 Rules for soliciting UL MU frames**

**26.5.3.2.1 General**

(… existing texts …)

An AP that transmits a PPDU may solicit an HE TB PPDU from one or more non-AP STAs(#16592) 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 set(#Ed) to the 12 LSBs of the AID of the non-AP STA(#16592) if(#15324) the User Info field is addressed to a STA that is associated with the AP.
* The AID12 subfield is set(#Ed) to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with a nontransmitted BSSID in a multiple BSSID set to which the AP belongs, (19/0028r4)the TA field of the Trigger frame is set to the transmitted BSSID and the non-AP STA has set the Rx Control Frame To MultiBSS sub-field in the HE Capabilities element it transmits to 1.(#15082)

The AID12 subfield is set(#Ed) to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with an AP with BSSID different from control BSSID, (19/0028r4)the TA field of the Trigger frame is set to control BSSID and the non-AP STA has set the Rx Control Frame to Co-hosted BSS subfield in the HE Capabilities element it transmits to 1.(#15082)(#21157)

(… existing texts …)

***TGax editor: Change 26.5.3.2.4 Allowed settings of the Trigger frame fields and TRS Control subfield: (Track change on)***

**26.5.3.2.4 Allowed settings of the Trigger frame fields and TRS Control subfield**

(… existing texts …)

An AP that transmits a Trigger frame shall set the TA field of the frame to the MAC address of the AP, except the following:

* if dot11MultiBSSIDImplemented is true and the Trigger frame is directed to non-AP STAs from at least two different BSSs of a multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID.
* if the Trigger frame is directed to non-AP STAs from at least two different BSSs of a co-hosted BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID.(#21157)

(… existing texts …)

***TGax editor: Change 26.5.3.3.1 General: (Track change on)***

* General

(… existing texts …)

If a non-AP STA does not satisfy the conditions specified in 26.5.3.3.2 (Conditions for not responding with an HE TB PPDU) that prevents the non-AP STA from transmitting an HE TB PPDU, a(#16668) non-AP STA(#16592) shall transmit an HE TB PPDU a SIFS after a received PPDU, if all the following conditions are met:

* The received PPDU contains either a Trigger frame (that is not an MU-RTS variant) with a User Info field addressed to the non-AP STA(#16592), or an MPDU addressed to the non-AP STA(#16592) that contains an TRS Control subfield. A(#16754) User Info field in the Trigger frame is addressed to a non-AP STA(#16592) if one of the following conditions are met:
* The AID12 subfield is equal to the 12 LSBs of the AID of the non-AP STA(#16592) and the Trigger frame is sent by the AP with which the non-AP STA(#16592) is associated with or by the AP corresponding to the transmitted BSSID if the non-AP STA(#16592) is associated with a nontransmitted BSSID and has indicated support for receiving Control frames with TA field set(#15959) to the transmitted BSSID by setting the Rx Control Frame To MultiBSS subfield to 1 in the HE Capabilities element that the STA transmits or by the AP corresponding to the control BSSID if the non-AP STA is associated with an AP with BSSID different from control BSSID and has indicated support for receiving Control frames with TA field set to the control BSSID by setting the Rx Control Frame to Co-Hosted BSS subfield to 1 in the HE Capabilities element that the STA transmits.(#13143)(#21157)..

(… existing texts …)

***TGax editor: Change 27.5.6.2 STA behavior: (Track change on)***

* STA behavior

A non-AP STA(#16592) is scheduled to respond to the NFRP Trigger frame if all the following conditions are met:

* The non-AP STA(#16592) is associated with the BSSID indicated in the TA field of the NFRP Trigger frame or the non-AP STA(#16592) (19/0028r4)is associated with a nontransmitted BSSID of a multiple BSSID set and the TA field of the NFRP Trigger frame is set to the transmitted BSSID of that multiple BSSID set or the non-AP STA is associated with an AP of a co-hosted BSSID set with BSSID different from control BSSID and the TA field of the NFRP Trigger frame is set to the control BSSID of that co-hosted BSSID set.(#21157).

***TGax editor: Change 27.5.6.3.1 General: (Track change on)***

* General

An AP shall set the NDP Feedback Report Support subfield in the HE Capabilities element to 1 if it supports NDP feedback report and set it 0 otherwise.(18/1498r4)

An AP may include the NDP Feedback Report Parameter Set element in Beacon frames, Probe Responses frames and (Re)Association frames in order to modify parameters for NDP Feedback Report operation. The procedure of NDP Feedback report described in this subclause allows operation even if the NDP Feedback Report Parameter Set element is not sent by the AP.(#15836)

The NFRP Trigger frame shall be transmitted in a non-HT PPDU or HT PPDU, or as an EOF-MPDU in a VHT, HE ER SU PPDU or HE SU PPDU.

An AP that transmits an NFRP Trigger frame shall set the TA field of the frame to the MAC address of the AP, except the following:(#15356)

* dot11MultiBSSIDImplemented(19/0028r4) is true and the Trigger frame is directed to STAs from at least two different BSSs of a multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID.
* if the Trigger frame is directed to non-AP STAs from at least two different BSSs of a co-hosted BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID.(#21157)

(… existing texts …)

***TGax editor: Change 26.7.3 Rules for HE sounding protocol sequences: (Track change on)***

* Rules for HE sounding protocol sequences

(… existing texts …)

An AP that transmits an HE NDP Announcement frame addressed to HE STAs shall set the TA field of the frame to the MAC address of the AP, except the following:(#15358)

* dot11MultiBSSIDImplemented(19/0028r4) is true and the HE NDP Announcement frame is directed to STAs from at least two different BSSs of the multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID.
* the HE NDP Announcement frame is directed to non-AP STAs from at least two different BSSs of a co-hosted BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID.(#21157)

If the HE NDP Announcement frame is transmitted in a non-HT duplicate PPDU then the TA field of the HE NDP Announcement frame is a bandwidth signaling TA (see 10.6.6.6 (Channel Width selection for Control frames)).

(… existing texts …)

An HE beamformee that receives an HE NDP Announcement frame as part of an HE TB sounding sequence with a STA Info field addressed to it soliciting SU or MU feedback shall generate an HE compressed beamforming/CQI report(#16328) using the feedback type, *Ng* and codebook size indicated in the STA Info field. If the HE beamformee then receives a BFRP Trigger frame with a User Info field addressed to it, the HE beamformee transmits an HE TB PPDU containing(#17069) the HE compressed beamforming/CQI report(#16328) following the rules defined in 26.5.3.3 (Non-AP STA behavior for UL MU operation).(#16681) If the HE NDP Announcement frame has the TA field set to the transmitted BSSID, and the HE beamformee is a non-AP STA associated to a nontransmitted BSSID that supports receiving Control frames with TA field set(#15959) to the transmitted BSSID, then the HE compressed beamforming/CQI report(#16328) sent in response shall have the RA field set to either the nontransmitted BSSID or the transmitted BSSID. If the HE NDP Announcement frame has the TA field set to the control BSSID, and the HE beamformee is a non-AP STA associated to an AP with BSSID different from control BSSID that supports receiving Control frames with TA field set to the control BSSID, then the HE compressed beamforming/CQI report(#12775) sent in response shall have the RA field set to either the BSSID of the associated AP or the control BSSID. (#21157)

(… existing texts …)

***TGax editor: Change 26.14.4 SM Power Save: (Track change on)***

* SM power save

(… existing texts …)

The STA enables its multiple receive chains when it receives a Trigger frame that starts a frame exchange sequence. Such a frame exchange sequence shall satisfy the following conditions:

* The starting Trigger frame is a single-spatial stream frame.
* The starting Trigger frame is from the associated AP or from the AP corresponding to the transmitted BSSID if STA is associated with a nontransmitted BSSID and has indicated support for receiving Control frames with TA set to the transmitted BSSID by setting the Rx Control Frame To MultiBSS subfield to 1 in the HE Capabilities element that the STA transmits or from the AP corresponding to the control BSSID if the non-AP STA is associated with an AP with BSSID different from control BSSID and has indicated support for receiving Control frames with TA field set to the control BSSID by setting the Rx Control Frame to Co-Hosted BSS subfield to 1 in the HE Capabilities element that the STA transmits.(#13143)(#21157).

(… existing texts …)