### IEEE P802.11Wireless LANs

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| 11ax D3.0 MAC Comment Resolution for Co-located BSS |
| Date: 2018-09-04 |
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Abstract

This submission proposes resolutions for comments of TGax Draft D3.0 with the following CIDs:

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Have separate capability bit for control BSSID under Co-located BSS

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 D3.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D3.0 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** |
| 16586 | 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. | Revised – Agree in principle with the commenter. In HE Operation element, the value of n can be up to 255, which represents an unrealistic 2^255 co-locatted APs. Since the value of n is limited to 8 when multiple BSSID set is used, and co-located BSSID set is created in situation that multiple BSSID element can not be used due to legacy compatibility, we revise to make the maximum value of n to be 8.TGax editor to make the changes shown in 11-18/16586r0 under all headings that include CID 16856 |
| 16587 | 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. | Revised – Agree in principle with the commenter.TGax editor to make the changes shown in 11-18/xxxxr0 under all headings that include CID 16857 |

**Discussion:** *None.*

**Propose:** Revised for CID 16586, 16587 per discussion and editing instructions in 11-18/xxxxr0.

***TGax editor: Change 27.16.6 Co-located BSSID set: (Track change on)***

* Co-located BSSID set

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

An AP that belongs to a co-located BSSID set shall perform the following operations:

* 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, where 1*$\leq $*n*$\leq $*8(#16586),* such that 2*n* 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.

One of the BSSs in the co-located BSSID set has BSSID equal to control BSSID, and the 8 LSBs of the control BSSID is indicated in the LSBs of the Control BSSID field of the HE operation element. *(#16587)*

***TGax editor: Change 27.16.6 Co-located BSSID set: (Track change on)***

* HE Operation element

The operation of HE STAs in an HE BSS is controlled by the HT Operation element, the VHT Operation element and the HE Operation element. The format of the HE Operation element is defined in Figure 9-589cq (HE Operation element format).

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|  |  |  |  |  |  |  |  |  |  |
|  | 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(#11742) | LSBs of the Control BSSID |
| Octets: | 1 | 1 | 1 | 3(#11374) | 1(#11374) | 2 | 0 or 3 | 0 or 1 | 0 or 1*(#16587)* |
| * HE Operation element format
 |  |

(…existing texts …)

(#11742)The Max Co-Located BSSID Indicator field contains a value assigned to *n*, where 2*n* is the maximum number of BSSIDs in the co-located BSSID set as defined in 27.16.6 (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.

NOTE—The Max Co-Located BSSID Indicator field doesn't provide the exact number or the identity of each co-located BSSIDs.

The LSBs of the Control BSSID field indicates the 8 LSBs of the control BSSID. This field is present if the Co-Located BSS subfield in HE Operation Parameters field is set to 1 and is not present otherwise. *(#16587)*

***TGax editor: Change 9.3.1.23 Trigger frame format: (Track change on)***

* 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
STAs that belong to a single BSS. The TA field is the address of the transmitted BSSID if the Trigger frame is addressed to 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 STAs from at least two different BSSs of the co-located BSSID set.(#16587)The rules for setting of the TA field are defined in 27.5.3.2.3 (Allowed settings of the Trigger frame fields and TRS Control subfield).

(…existing texts…)

***TGax editor: Change 9.4.2.237.2 HE MAC Capabilities information field: (Track change on)***

**9.4.2.237.2 HE MAC Capabilities Information field**

The format of the HE MAC Capabilities Information field is defined in Figure 9-589ck (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 | Fragmentation Support | 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 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 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 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B24 | B25 | B26 | B27    B28 | B29 | B30 | B31 | B32 |
|  | Reserved | 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 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B33 | B34 | B35 | B36 | B37 | B38 | B39       B41 |
|  | QTP Support | BQR Support | SRP Responder | NDP Feedback Report Support | OPS Support | A-MSDU In A-MPDU Support | 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 | Rx Control Frame to Co-located BSS | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 2 |

(…existing texts…)

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| * HE MAC Capabilities Information field format
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The subfields of the HE MAC Capabilities Information field are defined in Table 9-262z (Subfields of the HE MAC Capabilities Information field).

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| (… existing fields …) |
| Rx Control Frame to Co-located BSS | If a non-AP STA associates with an AP that is in a co-located BSSID set and has BSSID different from control BSSID, indicates whether the non-AP STA supports reception of a control frame with TA equal to the control BSSID.(#16587) | For a non-AP STA:Set to 1 if a non-AP STA associates with an AP that is in a co-located BSSID set and has BSSID different from control BSSID, and the STA supports receiving a Control frame addressed to STAs associated with two or more BSSs in a co-located BSSID set and that has the TA field set to the control BSSID.(#16587)Set to 0 otherwise.Reserved for an AP. (#11016) |

***TGax editor: Change 27.2.5.3 CTS response to MU-RTS: (Track change on)***

* CTS response to MU-RTS

If an HE STA receives an MU-RTS Trigger frame, the HE STA 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 STA. The User Info field is addressed to a STA 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 STA is associated (#12272)or by 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(#13506) 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 STA is associated with a 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-located BSS subfield to 1 in the HE Capabilities element that the STA transmits.(#13143)(#16587)
* The UL MU CS condition indicates that the medium is idle (see 27.5.3.5 (UL MU CS mechanism)).
* The RU Allocation subfield in the User Info field addressed to the STA indicates primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel,160 MHz channel, or 80+80 MHz channel.

(… existing texts …)

***TGax editor: Change 27.4.1 Overview: (Track change on)***

**27.4.1 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:

* when dot11MultiBSSIDActivated 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.
* when the Multi-STA BlockAck frame is directed to STAs from at least two different BSSs of the co-located BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID. (#16587)

(… existing texts …)

***TGax editor: Change 27.5.3.2.3 Allowed settings of the Trigger frame fields and TRS Control subfield: (Track change on)***

**27.5.3.2.3 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:

* when dot11MultiBSSIDActivated 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.
* when the Trigger frame is directed to STAs from at least two different BSSs of a co-located BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID.(#16587)

(… existing texts …)

***TGax editor: Change 27.5.3.3 STA behaviour for UL MU operation: (Track change on)***

**27.5.3.3 STA behavior for UL MU operation**

(… existing texts …)

A STA shall transmit an HE TB PPDU a SIFS after a received PPDU, if all(#11319) the following conditions are met:(#11990)

* The received PPDU contains either a Trigger frame (that is not an MU-RTS variant) with a User Info field addressed to the STA, or an MPDU addressed to the STA that contains an TRS Control subfield(#13136)(#14137). The User Info field in the Trigger frame is addressed to a STA if one of the following conditions are met:
* The AID12 subfield is equal to the 12 LSBs of the AID of the STA and the Trigger frame is sent by the AP with which the STA is associated with or by 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 by the AP corresponding to the control BSSID if 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 by setting the Rx Control Frame to Co-located BSS subfield to 1 in the HE Capabilities element that the STA transmits.(#13143)(#16587)The AID12 subfield is 0, the STA supports the UL OFDMA-based random access procedure (see 27.5.5 (UL OFDMA-based random access (UORA))) and the Trigger frame is sent by the AP with which the STA is associated.(#13143)(18/360r2)
* The AID12 subfield is 2045, the STA supports the UL OFDMA-based random access procedure (see 27.5.5 (UL OFDMA-based random access (UORA))), and the STA is not associated with the AP.

(… existing texts …)

***TGax editor: Change 27.5.5.5 Additional considerations for unassociated STAs: (Track change on)***

**27.5.5.5 Additional considerations for unassociated STAs**

(… existing texts …)

A non-AP STA that transmits an HE TB PPDU on an RA-RU allocated in a Trigger frame sent by an AP to which the STA is not associated shall performs the following operations:

* set the TXVECTOR parameter BSS\_COLOR to the value of the RXVECTOR parameter BSS\_COLOR of the soliciting Trigger frame (see 27.5.5.3 (Transmission procedure for UORA) and 27.5.3.3 (STA behavior for UL MU operation)).(#11364, #12178, #11731)
* shall include at most one Management frame in the HE TB PPDU(#11001)
* set the RA field of the frame carried in the HE TB PPDU to the TA address of the soliciting Trigger frame .(#13143)(#16587)

(… existing texts …)

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

**27.5.6.2 STA behaviour**

(… existing texts …)

A STA is scheduled to respond to the NFRP Trigger frame(#13318) if all the following conditions are met:

* The STA is associated with the BSSID indicated in the TA field of the NFRP Trigger frame or the STA has dot11MultiBSSIDActivated set to true and 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 STA is associated with an AP of a co-located 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-located BSSID set.(#16587)

(… existing texts …)

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

**27.5.6.3.1 General**

(… existing texts …)

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:

* when dot11MultiBSSIDActivated 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.
* when the Trigger frame is directed to STAs from at least two different BSSs of a co-located BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID.(#16587)

***TGax editor: Change 27.6.3.1 Rules for HE sounding protocol sequences: (Track change on)***

**27.6.3 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:

* when dot11MultiBSSIDActivated 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.
* when the HE NDP Announcement frame is directed to STAs from at least two different BSSs of a co-located BSSID set, in which case, the AP shall set the TA field of the frame to the control BSSID.(#16587)
* 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 10.7.6.6 (Channel Width selection for Control frames)).

(… existing texts …)

A non-AP HE beamformee that receives a broadcast HE NDP Announcement frame that has more than one STA Info field(#12698) from the HE beamformer with which it is associated and that contains the HE beamformee's 11 LSBs of the AID in any of the STA Info fields and also receives an HE NDP a SIFS after the HE NDP Announcement frame shall compute the HE compressed beamforming and CQI report(#12775) using the feedback type, *Ng* and codebook size indicated in the received HE NDP Announcement frame. The HE beamformee shall transmit the HE TB PPDU its HE compressed beamforming and CQI report(#12775) in response to a BFRP Trigger frame(#11432) that contains the 11 LSBs of the AID of the HE beamformee in any of the User Info fields following the rules defined in 27.5.3.3 (STA behavior for UL MU operation)(#12941). 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 set to the transmitted BSSID, then the HE compressed beamforming and CQI report(#12775) 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 set to the control BSSID, then the HE compressed beamforming and CQI report(#12775) sent in response shall have the RA field set to either the BSSID of the associated AP or the transmitted BSSID. (#16587)

(… existing texts …)