IEEE P802.11  
Wireless LANs

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| LB225 11ax D1.0 Comment Resolution HE MAC Capabilities | | | | |
| Date: 2017-08-23 | | | | |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs :

* 3124, 4768, 8671, 8672, 3126, 3176, 3271, 3275, 3278, 3284, 4560, 4586, 4588, 4593, 4605, 4609, 4618, 4619, 4623, 4627, 4628, 4633, 4636, 4639, 4648, 4654, 4658, 5136, 5137, 5138, 5760, 5838, 5839, 5840, 6063, 6091, 6390, 6396, 6406, 6409, 7056, 7370, 7372, 7408, 7536, 7554, 7555, 7556, 7761, 7764, 7766, 7767, 8041, 8119, 8120, 8121, 8388, 8399, 8429, 8431, 8514, 9507, 9668, 9669, 9670, ~~9671,~~ ~~9672, 10073~~.

The resolution is based on D1.4.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: change the definition of Multi-TID Aggregation Support

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.***

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| **CID** | **PP** | **LL** | **Comment** | **Proposed Change** | **Resolution** |
| 3124 | 76 | 8 | At 67.16, the HE Capabilities element is defined to be extensible. However at 76.08, the parsing of the PPE Thresholds field presumably relies on the Length field. These are incompatible. | Either add a count field for the PPE Thresholds in the frame format, or declare at 67.16 that the element is not extensible. | **Rejected.**  **Discussion: The variable-length PPE Thresholds field can be figured out through** NSS M1 subfield and RU Index Bitmask subfield. So extensible HE Capabilities element has no issue. |
| 4768 | 76 | 18 | Somebody has to do some work here to ensure that each capability bit here: - Has a corresponding normative setting somewhere in >9 clauses. - Uses consistent terminology (support/supported/capable). - Has a reference to the subclause where the normatvie behavior is defined (perhaps in the definition cell (for all of them). - Has an explicit indication of the setting if its values depend on other caps (e.g., Minimum Fragment Size is reserved if Fragmentation Support is 0 and so on) - Maximum A-MPDU Lenght Support's cells are empty because the text is outside the table. Need to add it here. | As in comment. | **Revised**  **Discussion:**  **1, Support is now used in D1.4**  **2, It is good to have reference to normative behavior. But it is not required as in 802.11 baseline.**  **3, dependency among capabilities subfields are added.**  **4, For Maximum A-MPDU Length Exponent, see CID 8672.**  **TGax editor to make changes in 11-17/1285r2 under CID 4768** |
| 8671 | 76 | 19 | Replace "defined in the subclauses below." with references to the relevant subclauses | See comment | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-17/1285r2 under CID 8671** |

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| **CID** | **PP** | **LL** | **Comment** | **Proposed Change** | **Resolution** |
| 8672 | 79 | 42 | "Definition" and "Encoding" are empty for "Maximum A-MPDU Length Exponent" | See comment | **Revised**  **Discussion:**the field name will redefined to assume it is the extension of Maximum A-MPDU Length Exponent, and the related definition and encoding will be added. The setting of the field will be the normative behavior.  **TGax editor to make changes shown in 11-17/1285r2 under CID 8672** |
| 3126 | 79 | 42 | The Maximum AMPDU Length Exponent field needs definition | Add one | **Revised**  **See CID 8672** |
| 3176 | 79 | 42 | Missing definition and encoding of "Maximum AMPDU Length Exponent" in Table 9-262z | Add the missing items | **Revised**  **See CID 8672** |
| 3271 | 79 | 9 | Add clarity and call out bit position in Table 9-262z for subfield "MU Cascade Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B22:" in Definition column before the word "Indicates" Add bits "B22:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 3275 | 79 | 15 | Add clarity and call out bit position in Table 9-262z for subfield "Ack-Enabled Multi-TID Aggregation Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B23:" in Definition column before the word "Indicates" Add bits "B23:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 3278 | 79 | 22 | Add clarity and call out bit position in Table 9-262z for subfield "Group Addressed Multi-STA BlockAck In DL MU Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B24:" in Definition column before the word "Indicates" Add bits "B24:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 3284 | 79 | 28 | Add clarity and call out bit position in Table 9-262z for subfield "OMI A-Control Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B25:" in Definition column before the word "Indicates" Add bits "B25:" in Encoding column before the word "If" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4560 | 77 | 21 | Add clarity and call out bit position in Table 9-262z for subfield "HTC-HE Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B0:" in Definition column before the word "Indicates" Add bit "B0:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4586 | 78 | 54 | Add clarity and call out bit position in Table 9-262z for subfield "Minimum Fragment Size" corresponding to those bit positions in Figure 9-589ck. | Add bits "B8-B9:" in Definition column before the word "Indicates" Add bits "B8-B9:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4588 | 78 | 13 | Add clarity and call out bit position in Table 9-262z for subfield "Trigger Frame MAC Padding Duration" corresponding to those bit positions in Figure 9-589ck. | Add bits "B10-B11:" in Definition column before the word "Indicates" Add bits "B10-B11:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4593 | 78 | 20 | Add clarity and call out bit position in Table 9-262z for subfield "Multi-TID Aggregation Support" corresponding to those bit positions in Figure 9-589ck. | Add bits "B12-B14:" in Definition column before the word "Indicates" Add bits "B12-B14:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4605 | 78 | 43 | Add clarity and call out bit position in Table 9-262z for subfield "UL MU Response Scheduling Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B18:" in Definition column before the word "Indicates" Add bits "B18:" in Encoding column before the word "If" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4609 | 78 | 49 | Add clarity and call out bit position in Table 9-262z for subfield "A-BSR Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B19:" in Definition column before the word "Indicates" Add bits "B19:" in Encoding column before the word "If" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4618 | 79 | 4 | Add clarity and call out bit position in Table 9-262z for subfield "32-bit BA Bitmap Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B21:" in Definition column before the word "Indicates" Add bits "B21:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4619 | 79 | 34 | Add clarity and call out bit position in Table 9-262z for subfield "OFDMA RA Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B26:" in Definition column before the word "Indicates" Add bits "B26:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4623 | 79 | 42 | Add clarity and call out bit position in Table 9-262z for subfield "Maximum A-MPDU Length Exponent" corresponding to those bit positions in Figure 9-589ck. | Add bits "B27-B28:" in Definition column Add bits "B27-B28:" in Encoding column | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4627 | 79 | 42 | Table 9-262z subfield "Maximum A-MPDU Length Exponent" not defined in Definition and Encoding columns of Table 9-262z | Add definition and Definition and Encoding columns | **Revised**  **See CID 8672** |
| 4628 | 79 | 47 | Add clarity and call out bit position in Table 9-262z for subfield "A-MSDU Fragmentation Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B29:" in Definition column before the word "The" Add bits "B29:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4633 | 79 | 52 | Add clarity and call out bit position in Table 9-262z for subfield "Flexible TWT Schedule Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B30:" in Definition column before the word "Indicates" Add bits "B30:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4636 | 79 | 57 | Add clarity and call out bit position in Table 9-262z for subfield "Rx Control Frame to MultiBss" corresponding to those bit positions in Figure 9-589ck. | Add bit "B31:" in Definition column before the word "Indicates" Add bits "B31:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4639 | 80 | 4 | Add clarity and call out bit position in Table 9-262z for subfield "BSRP A-MPDU Aggregation" corresponding to those bit positions in Figure 9-589ck. | Add bit "B32:" in Definition column before the word "Indicates" Add bits "B32:" in Encoding column before the word "Set" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4648 | 80 | 16 | Add clarity and call out bit position in Table 9-262z for subfield "A-BQR Support" corresponding to those bit positions in Figure 9-589ck. | Add bit "B34:" in Definition column before the word "Indicates" Add bits "B34:" in Encoding column before the word "If" | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4654 | 80 | 24 | Add clarity and call out bit position in Table 9-262z for subfield "Reserved" corresponding to those bit positions in Figure 9-589ck. | Add bit "B35-B39: are Reserved" in Definition column Add bits "B35-B39: are Reserved" in Encoding column. | **Rejected**  **Discussion: The Subfield name implies the bit position.** |
| 4658 | 80 | 24 | Missing row for Reserved subfield in Table 9-262z | Add row for "Reserved" subfield | **Rejected**  **Discussion: The reserved subfield is defined in 9.2.2 “**Reserved fields and subfields are set to 0 upon transmission and are ignored upon reception.**”** |
| 5136 | 78 | 14 | What does an HE AP STA set this field to? Please clarify. | As in comment | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes shown in 11-17/1285r2 under CID 5136** |
| 5137 | 79 | 42 | The information is blank in Table 9-262z for "Maximum AMPDU Length Exponent" | Add information | **Revised**  **See CID 8672** |
| 5138 | 79 | 57 | What does an HE AP STA set this field to? Please clarify. | As in comment | **Revised**  **Generally agree with the commenter.**  **TGax editor to make changes in 11-17/1285r2 under CID 5138** |
| 5760 | 76 | 22 | HE MAC Capabilities field is missing a few items: other than frag=off, bitmap=64, other bitmap size are all optional and need to have a capability indication | Add capability indication for bitmap size+Frag conbinations other than Frag=off, bitmap=64 | **Rejected**  **Discussion: the bitmap support other than 64 is implied through BA negotiation.** |
| 5838 | 78 | 19 | Multi-TID Aggregation Support subfield in HE Cap IE should be indicated as receive capability, not transmit capability | Replace the text: "Indicates the number of TIDs minus 1 of QoS Data frames that an HE STA can receive in a multi-TID A-MPDU" With the text: "Indicates the number of TIDs minus 1 of QoS Data frames that an HE STA can aggregate in a multi-TID A-MPDU" | **Revised.**  **Discussion: Normally a device needs to announce it RX capability so that a transmitter knows the restriction of its transmission. As a non-AP STA, additional requirement is that its associated AP needs to know its TX capability so that the AP can set the correct value in the Trigger frame, which is inline with the AP’s receiver capability. Then the STA can decide if to fill up the A-MPDU up to what is supported by the AP as indicated in the TID Aggregation limit. Resolution clarifies this aspect.**  **TGax editor maeks changes in 11-17/1285r2 under CID 5838** |
| 5839 | 80 | 26 | Need a table to depcit the relatioship of HE Maximum A-MPDU Length Exponent and VHT Maximum A-MPDU Length Exponent. The sentence in D1.0 seems suggesting the HE Maximum A-MPDU Length Exponent value is only applied when VHT Maximum A-MPDU Length Exponent = 7, and other cases, use the VHT Maximum A-MPDU Length Exponent instead | Add a table to depict the relatiohship between VHT & HE Maximum A-MPDU Length Exponent fields | **Revised.**  **See CID 8672** |
| 5840 | 80 | 41 | Need a table to depcit the relatioship of HE Maximum A-MPDU Length Exponent and HT Maximum A-MPDU Length Exponent (when there is no VHT Cap IE). The sentence in D1.0 seems suggesting the HE Maximum A-MPDU Length Exponent value is only applied when HT Maximum A-MPDU Length Exponent =7, and other cases, use the HT Maximum A-MPDU Length Exponent instead | Add a table to depict the relatiohship between HT & HE Maximum A-MPDU Length Exponent fields (ehen no VHT Cap IE) | **Revised.**  **See CID 8672** |
| 6063 | 79 | 22 | The function of the 'Group addressed Multi-STA BlockACK In DL MU Support ' subfield need to be defined. Define how the STA receives a group addressed Multi-STA BlockAck frame that is sent in a DL MU PPDU in a non-broadcast RU. | Define the method of sending a group addressed Multi-STA BlockACK in DL MU PPDU or clarify the 'Group addressed Multi-STA BlockACK in DL MU Support' subfield. | **Revised.**  **See 7555** |
| 6091 | 79 | 42 | Maximum AMPDU Length Exponent description is missing | Add the detail description | **Revised**  **See CID 8672** |
| 6390 | 80 | 28 | Why "Receive" rather than "receive"? Is this a defined term? | Change "Receive" to "receive". | **Accepted** |
| 6396 | 80 | 32 | Why "Receive" rather than "receive"? Is this a defined term? | Change "Receive" to "receive". | **Accepted** |
| 6406 | 80 | 44 | Why "Receive" rather than "receive"? Is this a defined term? | Change "Receive" to "receive". | **Accepted** |
| 6409 | 80 | 47 | Why "Receive" rather than "receive"? Is this a defined term? | Change "Receive" to "receive". | **Accepted** |
| 7056 | 79 | 42 | In "Table 9-262z--Subfields of the HE MAC Capabilities Information field", for "Maximum AMPDU Length Exponent", there is no definition or encoding explanation. | Add explanations | **Revised**  **See CID 8672** |
| 7370 | 79 | 10 | The name of the subfield is "MU Cascading Support", rather than "MU Cascading Supported", according to Figure 9-589ck. | Replace "MU Cascading Supported" with "MU Cascading Support". | **Accepted** |
| 7372 | 79 | 42 | There is neither description nor encoding for the Maximum A-MPDU Length Exponent subfield. | Move the two paragraphs in 80.26 to 80.54 into these two entries. | **Revised**  **See CID 8672** |
| 7408 | 79 | 38 | "random RUs" should be changed to "random access RUs" or "RUs for random access" | as per comment | **Revised**  **TGax editor to change “random RUs” to “random access RUs” in P79L38 of D1.0** |
| 7536 | 79 | 42 | Maximum A-MPDU Length Exponent definition and encoding are missing | moves p80.26~39 to the table | **Revised**  **See CID 8672** |
| 7554 | 78 | 50 | STA is the transmitter of A-BSR. It is not necessary to indicate whether a STA can transmit A-BSR. | As in comment | **Revised**  **Discussion: The commenter is right. It is not necessary to know whether a STA can transmit BSR Control field. The normative text in 27.5.2.5 only applies BSR Support to an AP.**  **TGax editor to make changes in 11-17/1285r2 under CID 7554** |
| 7555 | 79 | 21 | There is no such thing of non-broadcast RU for group-addressed frame | Remove the capability bit | **Revised.**  **Discussion: generally gagree with the commenter. There is no protocol to describe about the RU ID other than broadcast RU for group-addressed frame. Another observation is that Multicast address is not allowed in 9.3.1.9.7. The solution are: 1), to transmit group addressed M-BA in DL MU is only through broadcast RU as mentioned in subclause 27.4.4.5**, 2) to allow group-addressed M-BA in 9.3.1.9.7.  TGax editor to make changes in 11-17/1285r2 under CID 7555 |
| 7556 | 79 | 42 | The definition of "Maximum AMPDU Length Exponent" field is missing. | Add the definition. | **Revised**  **See CID 8672** |
| 7761 | 78 | 21 | Can refers to normative permission, not appropriate here | Change "can aggregate" to "is capable of aggregating" | **Rejected**  **Discussion:the word “can” is widely used in 802.11 spec in the tables which include the definitions of the subfields.** |
| 7764 | 78 | 13 | Clarify what "additional time needed to process" means. | Change the Definition column entry to: "Indicates the amount of time needed from the end of the User Info field with an AID indicating this STA until the end of the PPDU that contains a Trigger frame, for the STA to be able to process a received Trigger frame." | **Revised**  **TGax editor to make changes in 11-17/1285r2 under CID 7764** |
| 7766 | 80 | 28 | Can refers to normative permission, not appropriate here | Change "can Receive" to "is capable of receiving". Same thing in next sentence, and two similar sentences in the next paragraph. | **Rejected**  **Discussion:the word “can” is widely used in 802.11 spec in the tables which include the definitions of the subfields.** |
| 7767 | 80 | 36 | "is" for normative requirement | Change "is 7" to "is set to 7" | **Rejected**  **Discussion: in 802.11 spec, the word “is” is widely used in the tables which include the definitions of the subfields.** |
| 8041 | 79 | 42 | In Table 9-262z, the row for "Maximum AMPDU Length Exponent" is empty. Please fill it. | As in comment. | **Revised**  **See CID 8672** |
| 8119 | 76 | 47 | B24 Group Addressed Multi-STA BlockAck In DL MU Support is indicated as being 4 bits in width, but it is probably only 1 bit in width | Change width of 4 bits to width of 1 bits in the diagram for the MAC Capabilities field for B24 | **Revised**  **Tis isalready changed in D1.4. No further change is needed.** |
| 8120 | 78 | 13 | Multi-TID aggregation support - this bit is not well described - is this the number of TIDs that the STA supports on the receive side? If so, state it explicilty. | Indicate that the level of Multi-TID support signaled is on the receive side. | **Revised**  **See CID 8672** |
| 8121 | 83 | 34 | Within more than one row in the "encoding" column of the table for MAC Capabilities, there are multiple statements of "if supported" and the implied reference of the implied "what" is the information in the second column, but the second column in many instances describes multiple different features that are optionally supported, so confusion is quite possible as to which bit indicates what - sure, the bit numbers appear in both columns to allow some sort of association, but really, this is pretty lazy wording. You only have to write the information out once and then it is done for all future revisions. Just write out what must be supported for each of these bits explicitly in the third column. | As stated in the comment | **Rejected**  **Discussion:the word “supported” is coding column is clear enough, and the 802.11 baseline uses it widely.** |
| 8388 | 76 | 42 | Currently, the 32 bit BA Bitmap support capability bit is written as a capability bit for reception of 32 bit BA bitmap in Table 9-262z. However, it is generally agreed that 32 bit BA Bitmap is an option feature. Hence, 32 bit BA Bitmap should be an optional feature for transmission as well. | Two options. Option 1: Change description of Bit 21 to 32 bit BA Bitmap Support Rx. Add one capability bit in reserved field for 32 bit BA Bitmap Tx. Option 2: Change description of Bit 21 to 32 bit BA Bitmap Support Tx & Rx. Change the description in Table 9-262z correspondingly. | **Rejected**  **Discussion: it is not necessary for the receiver to know a transmitter’s capability.** |
| 8399 | 70 | 42 | Description for Maximum A-MPDU Length Exponent is empty. Understand that there are corresponding descriptions after the table, but it is weird that the table is empty. | Fill in the description. | **Revised**  **See CID 8672** |
| 8429 | 80 | 4 | The BSRP A-MPDU Aggregation capability is unclear. What does it mean for a STA to accept a BSRP Trigger frame? If the software doesn't crash does that constitute acceptance? What exactly is the condition for setting the field? The STA must be able to "accept" the BSRP Trigger frame when it is aggregated with at least one control frame AND at least one Data frame and at least one Management frame? What if it "accepts" the BSRP Trigger frame but only in a S-MPDU. Or Only if aggregated with data (not control and nt management)? | Clarify the conditions for indicating support | **Revised**  **TGax editor to make changes in 11-17/1285r2 under CID 8429** |
| 8431 | 80 | 16 | Why do we need to signal a capability for generating a BQR? If a STA is capable of generating a BQR it could just generate one. We don't have capability settings for all the things STAs are capable of generating. Why is this one special? | Remove reference to non-AP STA usage. Change to "Indicates that the AP is will use information in the BQR A-Control subfied when scheduling STAs for UL operation" | **Rejected.**  **Discussion: the reason for a STA to announce TX capability of BQR is that the AP know whether it can transmit to BQRP to the STA.** |
| 8514 | 80 | 38 | aPSDUMaxLength is 6,500,631 octets. But 2^22-1 is only 4,194,303 octets. Allow the A-MPDU to reach the PSDU limit. | Allow values 1, 2 and 3 | **Revised**  **Discussion: generally agree with the commenter.**  **TGax editor to make changes in 11-17/1285r2 under CID 8514** |
| 9507 | 79 | 41 | "Maximum AMPDU Length Exponent" in the Table 9-262z--Subfields of the HE MAC Capabilities Information field:  Definition and Encoding for this entry is blank. | Definition and Encoding for this entry should be provided. | **Revised**  **See CID 8672** |
| 9668 | 79 | 4 | "Indicates whether the STA supports reception of a Multi-STA BlockAck frame that has a 32-bit BlockAck Bitmap intended to it." In additional to 32-bit Block Ack Bitmap, 128-bit Block Ack Bitmap and 256-bit Block Ack Bitmap also need a capability field. | As per comment. | **Rejected**  **Discussion: the bitmap support other than 64 is implied through BA negotiation.** |
| 9669 | 79 | 42 | For the Maximum AMPDU Length Exponent field, explain the definition and encoding way. | As per comment. | **Revised**  **See CID 8672** |
| 9670 | 79 | 26 | "Indicates support by a non-AP STA for the reception of a group-addressed Multi-STA BlockAck frame that is sent in a DL MU PPDU in a non-broadcast RU." A group-addressed Multi-STA BlockAck frame is not sent in a non-broadcast RU of an HE MU PPDU. Change it as the following: "Indicates support by a non-AP STA for the reception of a group-addressed Multi-STA BlockAck frame that is sent in a broadcast RU of a DL MU PPDU." | As per comment. | **Revised.**  **Generally agree with the commenter.**  **See CID 7555** |
| ~~9671~~ | ~~79~~ | ~~14~~ | ~~The below subfield name is wrong. "Ack-enabled Multi-TID Aggregation Support" It shall be replaced with the following: "Ack Enabled Multi-TID A-MPDU Support"~~ | ~~As per comment.~~ | **~~Revised~~**  **~~TGax editor replaces “~~**~~Ack-Enabled Multi-TID A-MPDU~~**~~” with “~~**~~Ack Enabled Multi-TID A-MPDU~~**~~” through the draft.~~** |
| ~~9672~~ | ~~79~~ | ~~14~~ | ~~Regarding the "Ack Enabled Multi-TID A-MPDU Support" subfield, TGax draft 1.0 says the following: "An HE transmitter shall not aggregate MPDU that asks for Ack in a multiple-TID A-MPDU to the HE recipient unless the recipient sets Ack Enabled Multi-TID A-MPDU Support subfield to 1 in its announced HE Capabilities element."  The definition of subfield should be changed as the following: "Indicates support by a STA to receive a multi-TID A-MPDU that can solicit Ack, as described in 27.10.4 (A-MPDU with multiple TIDs)."~~ | ~~As per comment.~~ | **~~Revised~~**  **~~TGax editor to make changes shown in 11-17/1285r2 under CID 9672~~** |
| ~~10073~~ | ~~76~~ | ~~48~~ | ~~There is no agreed HE link adaptation operation such that it's not clear whether to have unsolicited HE MFB. Depending on the decision, the number of bits corresponding link adaptation capability needs to be modified.~~ | ~~As in the comment.~~ | **~~Revised~~**  **~~TGax editor to make changes in 11-17/1285r2 under CID 10073~~** |

**9.3.1.9.7 Multi-STA BlockAck variant**

***TGax editor: change the second paragraph in 9.3.1.9.7 as follows:***

An HE AP that transmits a Multi-STA BlockAck frame with different values of the AID11 subfield(#7728) in Per AID TID Info subfields(#7734) sets the RA field to the broadcast address or multicast address (#7555). An HE AP that transmits a Multi-STA BlockAck frame with a single Per AID TID Info subfield(#9623) or with the same values of the AID11 subfield(#7728) in Per AID TID Info subfields(#7734) sets the RA field to the address of the recipi-ent STA that solicited the BlockAck frame(#Ed, #3161). A non-AP HE STA(#6256) that(#9624) transmits a Multi-STA BlockAck frame with a single AID subfield or with the same values of the AID subfield in Per AID TID Info subfields(#7734) and sets the RA field to the TA field of the soliciting frame or the address of the recipient STA whose data or management frames(#3110) are acknowledged.(#7727)

**9.4.2.237 HE Capabilities element**

**9.4.2.237.1 General**

***TGax editor: change the last paragraph in 9.4.2.237.1 as follows:***

The HE MAC Capabilities Information, HE PHY Capabilities Information, Tx Rx HE-MCS NSS Support(# 7718), and PPE Thresholds fields are defined in 9.4.2.237.2 (**HE MAC Capabilities Information field**), 9.4.2.237.3 (**HE PHY Capabilities Information field**), 9.4.2.237.4 (**Tx Rx HE MCS Support field**), and 9.4.2.218.5 (**PPE Thresholds field**) respectively (#8671).

**9.4.2.237.2 HE MAC Capabilities Information field**

***TGax editor: Change Figure 9-589ck as follows:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 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 | Minimum Fragment Size | Trigger Frame MAC Padding Duration | Multi-TID Aggregation Support |
| Bits: | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 3 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B15     B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24 |
|  | HE Link Adaptation Support(#7879) | All Ack Support | UMRS Support(#4727) | BSR Support(#4727) | Broadcast TWT Support | 32-bit BA Bitmap Support | MU Cascading Support(#9479) | Ack-Enabled Multi-TID Aggregation Support | Group Addressed Multi-STA BlockAck In DL MU Support |
| Bits: | 2~~1(#10073)~~ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1(#4467) |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B25 | B26 | B27    B28 | B29 | B30 | B31 | B32 |
|  | OM Control Support(#4727) | OFDMA RA Support | Exponent Extension(8672) | A-MSDU Fragmentation Support | Flexible TWT Schedule Support | Rx Control Frame to MultiBSS | BSRP A-MPDU Aggregation |
| Bits: | 1 | 1 | 2 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B33 | B34 | B35 | B36 | B37 | B38  B39 |
|  | QTP Support | BQR Support(#4727) | SR Responder | NDP Feedback Report Support(#6144) | OPS Support(17/325r4) | Reserved |
| Bits: | 1 | 1 | 1(#8087) | 1 | 1 | 2 |

**Figure 589ck----** HE MAC Capabilities Information field format

***TGax editor: Change the second paragraph in as follows:***

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

***TGax editor: change Table 9-262z as follows:***

**Table 9-262z ----Subfields of the HE MAC Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| Subfield | Definition | Encoding |
| +HTC-HE Support | Indicates support for the reception of an HE variant HT Control field carried in a QoS Data, QoS Null, or Management frame.(#6364) | Set to 1 if the STA supports reception of an HE variant HT Control field.  Set to 0 otherwise. |
| TWT Requester Support | Indicates support for the role of TWT requesting STA as described in 27.7 (TWT operation)(#8511)).(#6364) | Set to 1 if dot11TWTOptionActivated is true and the STA supports TWT requesting STA(#9978) functionality (see 27.7 (TWT operation)(#8511)).  Set to 0 otherwise. |
| TWT Responder Support | Indicates support for the role of TWT responder STA as described in 27.7 (TWT operation)(#8512)).(#6364) | Set to 1 if dot11TWTOptionActivated is true and the STA supports TWT responder STA functionality (see 27.7 (TWT operation)(#8512)).  Set to 0 otherwise. |
| Fragmentation Support | Indicates the level of dynamic fragmentation that is supported by a STA as a recipient. | Set to 0 for no support for dynamic fragmentation.  Set to 1 for support for dynamic fragments that are contained within an MPDU or S-MPDU(#9371), no support for dynamic fragments within an A-MPDU that is not an S-MPDU(#9331).  Set to 2 for support for dynamic fragments that are contained within an MPDU or S-MPDU(#3213, #9371) and support for up to one dynamic fragment for each MSDU, each A-MSDU if supported by the recipient, (#8159) and each MMPDU within an A-MPDU or multi-TID A-MPDU that is not an MPDU or S-MPDU(#3213, #9371).  Set to 3 for support for dynamic fragments that are contained within an MPDU or S-MPDU(#3213, #9731) and support for multiple dynamic fragments for each MSDU and for each A-MSDU if supported by the recipient(#8159) within an A-MPDU or multi-TID AMPDU and up to one dynamic fragment for each MMPDU in a multi-TID A-MPDU that is not an S-MPDU(#3213). |
| Maximum Number Of Fragmented MSDUs | Indicates the maximum number of fragmented MSDUs that the STA is capable of receiving concurrently.(#7759, #7760) | If the Fragmentation Support subfield(#Ed) is greater than 0:  The maximum number of fragmented MSDUs, *Nmax*, defined by this field is *Nmax* = 2Maximum Number Of F-MPDUs, except that a value 7 in the Maximum Number Of Fragmented MSDUs subfield indicates that there is no restriction.(#7363)  Reserved if the Fragmentation Support subfield(#Ed) is 0.(#5134) |
| Minimum Fragment Size | Indicates the minimum payload size in octets of the first fragment of an MSDU that is supported by the STA. | If the Fragmentation Support subfield(#Ed) is greater than 0:  Set to 0 to indicate no restriction on the minimum payload size.  Set to 1 to indicate a minimum payload size of 128 octets.  Set to 2 to indicate a minimum payload size of 256 octets.  Set to 3 to indicate a minimum payload size of 512 octets.  Reserved if the Fragmentation Support subfield(#Ed) is 0.(#5135) |
| Trigger Frame MAC Padding Duration | Indicates the amount of time needed from the end of the User Info field addressed to the STA until the end of the PPDU that contains a Trigger frame, for the STA to be able to process a received Trigger frame(#7764) | **For a non-AP STA(#5136)**  Set to 0 to indicate no additional processing time.  Set to 1 to indicate 8 s(#5599) of processing time.  Set to 2 to indicate 16 s(#5600) of processing time.  The value 3 is reserved.(#7365)  Reserved for an AP(#5136), |
| Multi-TID Aggregation Support | In an AP, indicates the number of TIDs minus 1 of QoS Data frames that the AP can receive in a multi-TID A-MPDU as described in 27.10.4 (A-MPDU with multiple TIDs). (#5838)  In a non-AP STA, indicates the number of TIDs minus 1 of QoS Data frames that the non-AP STA can transmit and receive in a multi-TID A-MPDU as described in 27.10.4 (A-MPDU with multiple TIDs). (#5838) | For an AP, set to the number of TIDs minus 1 of QoS Data frames that the AP can receive in a multi-TID A-MPDU. (#5838)  For a non-AP STA, set to the number of TIDs minus 1 of QoS Data frames that the non-AP STA can transmit and receive in a multi-TID A-MPDU. (#5838) |
| HE Link Adaptation Support(#7879) | Indicates support for link adaptation using the HLA Control field (#4727).(#6364) | If +HTC-HE Support is 1:  Set to 0 (No Feedback) if the STA does not provide HE MFB.  Set to 2 (Unsolicited) if the STA provides only unsolicited HE MFB.  Set to 3 (Both) if the STA is capable of providing(#7763) HE MFB in response to HE MRQ and if the STA provides unsolicited HE MFB.  The value 1 is reserved.  Reserved if +HTC-HE Support is 0. |
| All ACK Support | Indicates support for the reception of a Multi-STA BlockAck frame under the all ack context (see 27.4.2 (Acknowledgement context in a Multi-STA BlockAck frame(#8482))(#9128))(#6364) | Set to 1 if supported.(#5894)  Set to 0 otherwise. |
| UMRS Support(#4727) | Indicates support for(#6364) receiving an MPDU that contains a UMRS Control field(#Ed). | If +HTC-HE Support is 1:  Set to 1 if the STA supports reception of the UMRS Control field(#Ed).  Set to 0 otherwise.  Reserved if +HTC-HE Support is 0. |
| BSR Support(#4727) | Indicates support for receiving an (A-)MPDU that contains a BSR Control field. (#4727).(#6364)(#7554) | For an AP with +HTC-HE Support equal to 1:  Set to 1 if the AP supports reception of the BSR Control field(#4727).  Set to 0 otherwise.  Reserved if +HTC-HE Support is 0 or for a non-AP STA(#7554). |
| Broadcast TWT Support(#7369) | For a non-AP STA, indicates support for the role of TWT scheduled STA. For an AP indicates support for the role of TWT scheduling AP(#6919) as described in 27.7.3 (Broadcast TWT operation).(#6364) | Set to 1 when the STA supports broadcast TWT functionality.  Set to 0 otherwise. |
| 32-bit BA Bitmap Support | Indicates support for the(#6364) reception of a Multi-STA BlockAck frame that has a 32-bit BlockAck Bitmap intended to it. | Set to 1 if the STA supports reception of a Multi-STA BlockAck frame that has a 32-bit Block Ack Bitmap subfield intended to it.  Set to 0 otherwise. |
| MU Cascading Supported | Indicates support for(#6364) participating in an MU cascading sequence(#7371) (see 27.6 (HE sounding protocol)). | Set to 1 if the STA supports MU cascading operation.  Set to 0 otherwise. |
| Ack-enabled Multi-TID Aggregation Support | Indicates support by a STA to receive a multi-TID A-MPDU that solicits(#7765) either Ack or BlockAck, or both, as described in 27.10.4. (A-MPDU with multiple TIDs). | Set to 1 when the STA supports reception of this multi-TID A-MPDU format.  Set to 0 otherwise. |
| Group Addressed Multi-STA BlockAck In DL MU Support | For a non-AP STA, indicates support for the reception of a group-addressed Multi-STA BlockAck frame that is sent in a DL MU PPDU in a broadcast RU.(#6364) (#7555) | Set to 1 when the STA supports its reception.  Set to 0 otherwise. |
| OM Control Support(#4727) | Indicates support for (#6364)receiving an MPDU that contains an OM Control field(#4727). | If +HTC-HE Support is 1:  Set to 1 if the STA supports reception of the OM Control field(#4727).  Set to 0 otherwise.  Reserved if +HTC-HE Support is 0. |
| OFDMA RA Supports | For a non-AP STA, indicates support for the OFDMA random access procedure. For an AP, indicates support for sending Trigger frames that allocate random access RUs.(17/646r4) See 27.5.4 (UL OFDMA-based random access (UORA)).(#6364) | Set to 1 if supported.  Set to 0 otherwise. |
| A-MSDU Fragmentation Support | The A-MSDU Fragmentation Support subfield indicates support for the reception of fragmented A-MSDUs. | If Fragmentation Support subfield(#Ed) is greater than 0 (#4678)  Set to 1 to indicate support for the receipt of fragmented A-MSDUs. Set to 0 to indicate that reception of fragmented A-MSDUs is not supported.  Otherwise, reserved.(#4678) |
| Flexible TWT Schedule Support | Indicates support for the reception of TWT Information frames with any nonzero value in the Next TWT field. | If TWT Responder Support, TWT Requester Support, or Broadcast TWT Support is 1(#4678)  Set to 1 if the STA supports reception of a TWT Information frame with a nonzero value in the Next TWT field.  Set to 0 otherwise.  Otherwise, reserved. (#4768) |
| Rx Control Frame to MultiBSS | Indicates whether the non-AP STA when associated with a BSS corresponding to a nontransmitted BSSID supports reception of a control frame with TA equal to the transmitted BSSID | **For an non-AP STA:**  Set to 1 if supported.  Set to 0 otherwise.  Reserved for an AP(#5138) |
| BSRP A-MPDU Aggregation | Indicates whether or not the STA accepts a BSRP Trigger frame that is aggregated with other control, data and management frames in an A-MPDU destined to the STA as described in **27.5.2.5 HE buffer status feedback operation for UL MU (#8429)** | Set to 1 if supported.  Set to 0 otherwise. |
| QTP Support | Indicates support for quiet time period (QTP) operation(#7374) as described in 27.16.4 (Quiet(#6797) HE STAs in an HE BSS)(#9108).(#6364) | Set to 1 if supported.  Set to 0 otherwise.(#9111) |
| BQR Support | For an AP, indicates support for receiving an MPDU that contains a BQR Control field. For a non-AP STA, indicates support for generating an MPDU that contains a BQR Control field.(#6364)(#8430) | If +HTC-HE Support is 1: Set to 1 if the STA supports the BQR Control field(#4727) functionality. Set to 0 otherwise. Reserved if +HTC-HE Support is 0. |
| SR Responder(#8087) | Indicates support for the role of SR Responder.(#6364) | Set to 1 if the STA supports the role of SR Responder.  Set to 0 otherwise. |
| NDP Feedback Report Support(#6144) | For a non-AP STA, indicates support for the NDP feedback report procedure and responding to the NDP Feedback Report Poll Trigger frame.(#6364) | Set to 1 if supported.  Set to 0 otherwise. |
| OPS Support(17/325r4) | For an AP, indicates support for encoding OPS information in the TIM element of FILS Discovery frames or TIM frames as described in 27.14.3.2 (AP operation for opportunistic power save). For a non-AP STA, indicates support for receiving the opportunistic power save encoded TIM elements.(#6364) | If Broadcast TWT Support is 1 (#4678)  Set to 1 if supported.  Set to 0 otherwise.  Otherwise, reserved (#4678) |

***TGax editor: Change the last two paragraphs as follows:***

**27.4.4.5 HE TB PPDU soliciting an HE MU PPDU(#8391) response**

***TGax editor: Change 27.4.4.5 as follows:***

A non-AP STA that sends an HE TB PPDU as a response to a Basic Trigger frame(#8385) that solicits(#6643) an immediate response shall set the Ack Policy to Normal Ack/Implicit Block Ack Request(#5566) (see 10.3.2.10.3 (Acknowledgement procedure for an UL MU transmission)(#7083) for an example of this sequence). If the HE AP intends to send the response in an HE MU PPDU format, then the HE AP shall follow the following acknowledgment procedure:

* If the HE TB PPDU carries an S-MPDU from more than one STA, or (multi-TID) A-MPDU from more than one STA, or a combination of an S-MPDU from some STAs and (multi-TID) A-MPDU from other STAs, then the HE AP shall do one of the following:
* The AP shall respond with an(#6647) Ack frame (#3069)to each of the STAs from which an S-MPDU(#9331) that solicited an immediate response was received, and with a Compressed BlockAck frame (#3069)to each of the STAs from which an A-MPDU that solicited an immediate response was received, or a Multi-STA BlockAck frame to each of the STAs(#6649) from which a multi-TID A-MPDU that solicited an immediate response was received. The control response frame(#3214) for each STA shall be sent in the allocated RU that is identified by the AID of each STA.
* The AP may respond with group addressed Multi-STA BlockAck frame(s) in a broadcast RU of an HE MU PPDU if the receivers of group-addressed Multi-STA BlockAck frame have indicated support the(#6650) reception of MU Multi-STA BlockAck frame by setting to 1 in Group Addressed Multi-STA BlockAck In DL MU Support subfield in the HE MAC Capabilities Information field(#9330, #8551) .(#7555) The Ack Type field shall be set according to the acknowledgement context. An HE AP should only transmit a group addressed Multi-STA BlockAck frame in an HE MU PPDU(#8391) to a non-AP HE STA *n* on the broadcast RU (26/52/106/242/484/996) (see 28.3.10.8.6 (HE-SIG-B per-user content))(#6098, #5807, #7087, #9525) that includes the RU used for receiving the immediately(#6655) preceding HE TB PPDU from STA *n*. There shall be no more than one group addressed Multi-STA BlockAck frame (#Ed)carried in a broadcast RU of the HE MU PPDU(#8391).

**27.10 A-MPDU operation**

**27.10.1 General**

***TGax editor: Insert the following paragraph at the and of this subclause:***

An HE STA that sends a VHT Capabilities element and an HE Capabilities element with Exponent Extension field of 0 shall support in reception an A-MPDU pre-EOF padding with maximum length defined in 10.13.2 (A-MPDU length limit rules).

An HE STA that sends a VHT Capabilities element and an HE Capabilities element with Exponent Extension field greater than 0 shall support in reception an A-MPDU pre-EOF padding as defined in 10.13.2 (A-MPDU length limit rules) except that the maximum length is equal to 2(20 + Exponent Extension)****1. An HE STA that sets the Exponent Extension field of the HE Capabilities element to a value greater than 0 shall set the Maximum A-MPDU Length Exponent subfield of the VHT Capabilities element to 7.

An HE STA that does not send a VHT Capabilities element but sends an HT Capabilities element and an HE Capabilities element with Exponent Extension field of 0 shall support in reception an A-MPDU pre-EOF padding with maximum length defined in 10.13.2 (A-MPDU length limit rules).

An HE STA that does not send a VHT Capabilities element but sends an HT Capabilities element and an HE Capabilities element with Exponent Extension field greater than 0 shall support in reception an A-MPDU pre-EOF padding as defined in 10.13.2 (A-MPDU length limit rules) except that the maximum length is equal to 2(16 + Exponent Extension)****1. An HE STA that sets the Exponent Extension field of the HE Capabilities element to a value greater than 0 shall set the Maximum A-MPDU Length Exponent subfield of the HT Capabilities element to 3.*(#5672, 6403, 5896, 6404, 6405, 6407, 6408, 6410, 6411, 6413, 6412, 6414, 8514)*