IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolution for various CIDs in 27.5 | | | | |
| Date: April 23, 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 |
| Bin Tian | Qualcomm Inc. |  |  |  |

Abstract

This submission proposes resolutions for comments received from TGax LB230 (20 CIDs):

12742, 12103, 11097, 12642, 11309, 11310, 12503, 12500, 11711, 13746, 12055, 12056, 13008, 12057, 11101, 12790, 12058, 11103, 11157, 13145

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: updated resolution text for 11310 based on offline feedback.
* Rev 2: resolved CID 12642
* Rev 3:
  + Transferred 4 CIDs (13080, 13081, 13070 & 13069) to Stephane
  + Revised resolution for CID 11310
  + Deferred CIDs 11493, 11505, 14333
  + Added sentence to cover RA field rules for QoS Null and Action No Ack frames

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** |
| 12742 | Mark RISON | 242.27 | 27.5.1.1 | It is not clear whether it is permissible to have a DL OFDMA transmission where each RU gets a different Trigger frame | In 27.5.1.1 add "An AP may send different Trigger frames to different STAs in a DL OFDMA PPDU as long as the elicited HE TB PPDUs are compatible." | **Revised**  The spec permits this operation. This covered in 27.5.3.2.3 (see D2.3 P277L1). **TGax editor: No further changes are needed** |
| 12103 | John Coffey | 244.01 | 27.5.3 | How does coexistence with deployed legacy devices, especially those in OBSSs, work? Here it seems that the HE AP transmits an initial trigger frame, which holds all devices within range off the medium for the signaled duration. Perhaps HE devices in OBSSs may still transmit (this is not clear), but certainly legacy devices in OBSSs cannot. These legacy devices may suffer a huge loss of access to the medium if use of this mode becomes prevalent. Essentially, instead of the HE non-AP STAs that take advantage of this mode having to fight their own way to the top via ordinary EDCA, their AP unilaterally seizes the medium with AP priority and these devices then share the rarified space with each other. This is far too favorable to HE devices and some controls are necessary. At the very least recomemnded practices for best behavior need to be specified. | Provide specifications for recommended behavior for APs that use this mode, that will have the effect of allowing fair access to the medium by legacy devices in OBSSs. (Note: a sketch of one approach that would be acceptable can be found in doc. IEEE 802.11/16-0102r1, slides 20-23.) | **Reject**  This comment is same as the CIDs 6711 & 6712 which were rejected by TGax during in D1.0 comment resolution process.  The proposed resolution lacks details. In general, trigger-based access will facilitate managed access for multiple STAs to simultaneously send UL traffic to the AP. This would in turn reduce the overall contention in the medium (several SU access vs one MU). In effect, Trigger-based access should free up the medium and improve the overall system throughput. |
| 11097 | Adrian Stephens | 244.53 | 27.5.3.1 | "An HE AP shall finish configuration to its receiver module withthe parameters of TRIGVECTOR" -- There is no such thing as a receiver module. | Replace with a requirement in terms of PHY service primitives. | **Revised**  In D2.3, section 8.3.5.19.3 P63L3 and 28.3.20 P557L61 covers this action. Therefore, this paragraph can be deleted from clause 27.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 12642 | Mark RISON | 245.30 | 27.5.3.2.1 | "More than one Trigger frame may be aggregated in an A-MPDU. If more than one Trigger frame is aggregated in an A-MPDU, all of them shall have the same content."  This is pointless | Delete the cited text | **Reject**  AP is allowed to aggregate identical MPDUs in an A-MPDU for robustness. |
| 11309 | Alfred Asterjadhi | 245.54 | 27.5.3.2.1 | I don't think there can be a Trigger frame addressed to another STA and another MPDU with UMRS addresed to the STA. SO the rule should be more generic. | Replace this paragraph with: " An A-MPDU shall not carry both a Trigger frame and an MPDU that contains an UMRS Control subfield" | **Revised**  Agree with the comment – an A-MPDU cannot contain both TF and TRS Control (for the same or different STA). The paragraph has been updated as suggested in the comment.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 11310 | Alfred Asterjadhi | 245.54 | 27.5.3.2.1 | I think we can simplify this paragraph. Giving it a try in the proposed change. | Replace the paragraph with: "A Trigger frame, if any is present in an A-MPDU, shall be the first MPDU of the A-MPDU except when the A-MPDU also carries an Ack, BlockAck, or Multi-STA BlockAck frame in which case any Trigger frame shall be included after the Ack, BlockAck, or Multi-STA BlockAck frame." | **Revised**  The paragraph has been updated as suggested in the comment.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 12503 | Liwen Chu | 247.04 | 27.5.3.2 | this is not necessary: Trigger may solicit QoS Null. | Fix the issue mentioned in comment. | **Revised**  The bullet cited by the comment is no longer present in D2.3.  **TGax editor: No further changes are needed** |
| 12500 | Liwen Chu | 246.58 | 27.5.3.2 | When UMRS and Trigger in same PPDU, TX Power and TB PPDU Length in UMRS and related fields in Trigger are missing. | Fix the issue mentioned in comment. | **Revised**  D2.3 P277L7 addresses this.  **TGax editor: No further changes are needed** |
| 11711 | Evgeny Khorov | 248.52 | 27.5.3.2.4 | the duration of Immediate response is not define | Specify the time needed to receive immediate response. For example, "If an AP does not receive an immediate response within aSIFSTime + aSlotTime + aPHY-RX-START-Delay or this response is not valid," | **Revised**  D2.3 already covers this. See 27.5.3.2.4 (D2.3 P278L59) and 10.22.2.2 (D2.3 P216L1)  **TGax editor: No further changes are needed** |
| 13746 | Woojin Ahn | 249.10 | 27.5.3.3 | If the CS required field is set to 0, the AP is soliciting an immediate response from the STA. In this case, the STA shall not transmit any MPDU soliciting an immediate response in the HE TB PPDU. It is necessary to specify the mentioned normative behavior in this subclause. | As in comment | **Revised**  D2.3 already covers this. See 27.5.3.2.3 (D2.3 P278L52)  **TGax editor: No further changes are needed** |
| 12055 | Jerome Vanthournout | 249.21 | 27.5.3.3 | Setting of Doppler bit in TX Vector for a non-AP HE STA transmitting an HE TB PPDU in response to a Trigger frame. | "Proposed to add : ""The DOPPLER parameter is set to the value indicated by the Doppler subfield of the User Info subfield of the Trigger frame""" | **Revised**  Agree with the comment.  The missing bullet on Doppler parameter is added to the list.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 12056 | Jerome Vanthournout | 249.21 | 27.5.3.3 | Setting of Doppler bit in TX Vector for a non-AP HE STA transmitting an HE TB PPDU in response to a Trigger frame. | "Proposed to add : ""The MIDAMBLE\_PERIODICITY parameter is set to the value indicated by the Midamble Periodicity subfield of the User Info subfield of the Trigger frame""" | **Revised**  Agree with the comment.  The missing bullet on Midamble periodicity parameter is added to the list.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 13008 | Massinissa Lalam | 249.64 | 27.5.3.3 | What is the purpose of "HE\_SIGA\_RESERVED"? So far it is not clear what benefit(s) setting some reserved bits to a given value in HE-SIG-A2 can help in achieving a higher efficiency in dense deployment. Please provide a clarification and an example on why this can be useful. | As in comment | **Reject**  HE SIG\_A2 is one of the fields present in the preamble of the HE TB PPDU and it is important that all the responding STAs set the field to the same value. TGax had discussed on this topic in the past and decided that AP should provide the value to keep it consistent across all the responding STAs as this design aids future extensibility. The reason why these bits are set to 1 is for better PAPR of HE-SIG-A of HE TB PPDU (please see 11-16/914) |
| 12057 | Jerome Vanthournout | 250.24 | 27.5.3.3 | How to set Doppler and Midamble bits in TX Vector for a non-AP HE STA transmitting an HE TB PPDU in response to a frame containing a UMRS Control field. | The Doppler and Midamble periodicity of the HE TB PPDU could be the same than in the RX VECTOR of the frame containing the UMRS Control field | **Revised**  Added a bullet to cover Doppler (set to 0) and Midamble Periodicity parameter (absent).  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 11101 | Adrian Stephens | 250.30 | 27.5.3.2.4 | "parameter is set based on NSYM" -- lazy specification. | Add an equation or reference to a clause where the relationship is defined. | **Revised**  Agree with the comment. The bullet was updated to refer to 28.4.3 which describes how the length is computed.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 12790 | Mark RISON | 250.49 | 27.5.3.3 | "The DEFAULT\_PE\_DURATION parameter is set to the default PE duration value for UL MU response scheduling, which is indicated by the AP in the Default PE Duration subfield of the HE Operation element it transmits and the pre-FEC padding factor is set to 4 (see 28.3.12 (Packet extension))" -- the bit from "and the pre-FEC" onwards is broken. It's set where? How does this relate to the TXVECTOR parameters (which is what the list is about)? | Delete "and the pre-FEC padding factor is set to 4 (see 28.3.12)" from the cited text | **Reject**  The text cited by the comment is required as the receiver needs to know the precoding factor to correctly decode the packet. In case of HE TB PPDU in response to Trigger frame, this is based on Table 9-25g but for TB PPDU in response to a frame carrying TRS Control subfield, since this is not specified, the pre-FEC factor is assumed to be 4. |
| 12058 | Jerome Vanthournout | 250.63 | 27.5.3.3 | What is the value of Num of HE-LTF in TXVector for HE TB PPDU respons to a frame contianing a UMRS Control field? | "Proposed to add : ""The num of HE\_LTF field is set to 0""" | **Revised**  Agree with the comment.  The missing bullet on NUM\_HE\_LTF is added to the list.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 11103 | Adrian Stephens | 250.65 | 27.5.3.3 | "is assumed to be 0" -- 1. passive voice 2. Anthopomorthic verb | Reword to avoid both of these evils. | **Revised**  The note was revised as suggested by the comment  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 11157 | Adrian Stephens | 251.06 | 27.5.3.3 | "The RA field of the Data frames and Management frames sent in response to a Trigger frame shall beset to the MAC address of the destination AP."  -- this is either a duplicate of or conflicts with clause 9. | Turn into a NOTE or delete. | **Revised**  Reference to corresponding section in clause 9 are provided.  **TGax editor, please make changes as shown in doc 11-18/0741r3** |
| 13145 | Po-Kai Huang | 249.58 | 27.5.3.3 | How about the condition for NDP feedback response? NDP feedback is also one type of HE TB PPDU as described in 28.3.17. | Add corresonding rule about NDP feedback response. | **Reject**  Section 27.5.6.2.1 provides the rules |

* **UL MU operation**
* **General**

TGax Editor: Please delete the following paragraph from this section:

[11097]

* **Rules for soliciting UL MU frames**
* **General**

TGax Editor: Please replace the following paragraph as shown below:

An A-MPDU shall not carry both a Trigger frame and an MPDU that contains an TRS Control subfield.[11309]

TGax Editor: Please replace the following paragraph as shown below:

When one or more Trigger frames are aggregated with other frames in an A-MPDU, a Trigger frame shall be the first MPDU of the A-MPDU except when the A-MPDU also carries an Ack or BlockAck frame in which case a Trigger frame shall be included immediately following the Ack or BlockAck frame.[11310]

* **STA behavior for UL MU operation**

TGax Editor: Please make the following changes to the following paragraph in this section as shown below:

A STA transmitting an HE TB PPDU in response to a Trigger frame shall set the TXVECTOR parameters as follows:

* The FORMAT parameter is set to HE\_TB
* The TRIGGER\_METHOD parameter is set to TRIGGER\_FRAME
* The TXOP\_DURATION parameter is set as defined in 27.11.5 (TXOP\_DURATION)
* The BSS\_COLOR parameter is set as follows:
* If the Trigger frame was received in an HE PPDU, then set to the value of the RXVECTOR parameter BSS\_COLOR of the HE PPDU
* If the Trigger frame was received in a non-HE PPDU, then set to the value of the active BSS color as defined in 27.11.4 (BSS\_COLOR)
* The L\_LENGTH parameter is set to the value indicated by the UL Length subfield in the Common Info field of the Trigger frame
* The GI\_TYPE and HE\_LTF\_TYPE parameters are set to the value indicated by the GI and LTF Type subfield of the Common Info field of the Trigger frame
* The NUM\_STS parameter is set to the number of space-time streams indicated by the Number Of Spatial Streams subfield of the SS Allocation field of the User Info field and STBC field in the Common Info field of the Trigger frame
* The CH\_BANDWIDTH parameter is set to the value of the BW field in the Common Info field of the Trigger frame
* The HE\_LTF\_MODE parameter is set to the value indicated by the MU-MIMO LTF Mode subfield of the Common Info field of the Trigger frame
* The NUM\_HE\_LTF parameter is set to the value indicated by the Number Of HE-LTF Symbols And Midamble Periodicity subfield of the Common Info field of the Trigger frame
* The STBC parameter is set to the value indicated by the STBC subfield of the Common Info field of the Trigger frame
* The LDPC\_EXTRA\_SYMBOL parameter is set to the value indicated by the LDPC Extra Symbol Segment subfield of the Common Info field of the Trigger frame
* The SPATIAL\_REUSE parameter is set to the value of the UL Spatial Reuse subfield in the Common Info field of the Trigger frame
* The DOPPLER parameter is set to the value of the Doppler subfield in the Common Info field of the Trigger frame[12055]
* The MIDAMBLE\_PERIODICITY parameter is present if the Doppler subfield in the Common Info field of the Trigger frame is set to 1. When present, it is set to the value of the Number Of HE-LTF Symbols And Midamble Periodicity subfield in the Common Info field of the Trigger frame[12056]
* The HE\_SIGA\_RESERVED parameter is set to the value of the UL HE-SIG-A2 Reserved subfield in the Common Info field of the Trigger frame
* The MCS parameter is set to the value of the UL MCS subfield in the User Info field of the Trigger frame
* The DCM parameter is set to the value indicated by the UL DCM subfield of the User Info field of the Trigger frame
* The STARTING\_STS\_NUM parameter is set to the value of the Starting Spatial Stream subfield in the SS Allocation field in the User Info field of the Trigger frame
* The FEC\_CODING parameter is set to the value indicated by the UL FEC Coding Type subfield of the User Info field of the Trigger frame
* The RU\_ALLOCATION parameter is set as follows:
* If the RU is not an RA-RU or an RA-RU with Number Of RA-RU subfield of the User Info subfield of the Trigger frame set to 0, it is set to the value indicated by the RU Allocation subfield of the User Info subfield of the Trigger frame
* If the RU is the *k*-th RU of a set of contiguous RA-RUs starting with an RA-RU with Number Of RA-RU subfield of the User Info subfield of the Trigger frame set to a nonzero value, it is set to the value indicated by the RU Allocation subfield of the corresponding User Info subfield of the Trigger frame plus *k* minus 1.
* The TXPWR\_LEVEL\_INDEX parameter is set to a value based on the computed transmission power (see 28.3.14.2 (Power pre-correction)) for HE TB PPDU and based on the value of the AP Tx Power subfield in the Common Info field and the UL Target RSSI subfield in the User Info field of the Trigger frame.

TGax Editor: Please make the following changes to the following paragraph in this section as shown below:

A STA transmitting an HE TB PPDU in response to a frame containing a TRS Control subfield shall set the TXVECTOR parameters as follows:

* The FORMAT parameter is set to HE\_TB
* The TRIGGER\_METHOD parameter is set to TRS
* The L\_LENGTH parameter is computed as described in Equation (28-11) using the TXTIME value defined by Equation (28-134) where *NSYM* is set to *FVAL* + 1, where *FVAL* is the value of the HE TB PPDU Length subfield of the TRS Control subfield[11101]
* The RU\_ALLOCATION and MCS parameters are set to the values of the RU Allocation and UL MCS subfields of the TRS Control subfield, respectively.
* The CH\_BANDWITDTH parameter is set to the value of the RXVECTOR parameter CH\_BANDWIDTH of the soliciting DL HE PPDU
* The BSS\_COLOR and DCM parameters are set to the values of the RXVECTOR parameters BSS\_COLOR and DCM of the soliciting DL HE PPDU, respectively
* The DOPPLER parameter is set to 0 and the MIDAMBLE\_PERIODICITY parameter is absent[12057]
* The NUM\_HE\_LTF parameter is set to 1[12058]
* The HE\_LTF\_MODE, STBC, and NUM\_STS parameters are set to 0
* The CODING\_TYPE parameter is set to 0 if the RU Allocation subfield indicates less than 484-tone RU; otherwise set to 1
* The LDPC\_EXTRA\_SYMBOL parameter is not present if the RU Allocation subfield indicates less than a 484-tone RU; otherwise set to 1
* The SPATIAL\_REUSE parameter is set to SRP\_AND\_NONSRG\_OBSS-PD\_PROHIBITED
* The DEFAULT\_PE\_DURATION parameter is set to the default PE duration value for UL MU response scheduling, which is indicated by the AP in the Default PE Duration subfield of the HE Operation element it transmits and the pre-FEC padding factor is set to 4 (see 28.3.12 (Packet extension))
* The TXOP\_DURATION parameter is set as defined in 27.11.5 (TXOP\_DURATION)
* The HE\_SIGA\_RESERVED parameter is set to 511 (all 1s)
* If the RXVECTOR parameters HE\_LTF\_TYPE and GI\_TYPE of HE MU PPDU carrying the frame with the TRS Control subfield are either 4xHE-LTF and 3.2µs, respectively, or 2xHE-LTF and 1.6µs, respectively, then the HE\_LTF\_TYPE and GI\_TYPE parameters are set to 4xHE-LTF and 3.2µsGI, respectively. Otherwise, the HE\_LTF\_TYPE and GI\_TYPE parameters are set to 2xHE-LTF and 1.6µs, respectively.

NOTE 1—When transmitting an HE TB PPDU in response to a frame carrying TRS Control subfield, both physical CS and virtual CS are ignored as CS Required is considered to be 0 (see 27.5.3.5 (UL MU CS mechanism)).[11103]

TGax Editor: Please make the following changes to the following paragraph in this section as shown below:

The RA field of the frames sent in response to a MU-RTS Trigger frame is set as defined in 9.3.1.3 (CTS frame format). The RA field of the MPDUs sent in response of a GCR MU-BAR Trigger frame or MU-BAR Trigger frame is set as defined in 9.3.1.9 (BlockAck frame format). BlockAck frame and Data frames whose RAs are different shall not be aggregated in one A-MPDU in responding to a GCR MU-BAR Trigger frame or MU-BAR Trigger frame. The RA field of the QoS Null frames, QoS Data frames and Management frames sent in response to a Trigger frame shall be set to the MAC address of the destination AP (see 9.3.2.1 and 9.3.3.2)[11157]. The RA field of QoS Null frames or Action No ACK frames sent in response to a frame carrying TRS Control subfield shall be the MAC address of the destination AP (see 9.3.2.1 and 9.3.3.2).

* **Padding for Trigger frame or frame containing TRS Control subfield**

TGax Editor: Please make the following fixes to the paragraphs in this section as shown below:

An AP transmitting a PPDU that contains a Trigger frame or frame containing a TRS Control subfield shall ensure that the duration of the PPDU that follows *BSYM* is greater than or equal *MinTrigProcTime* indicated by the solicited non-AP STA (see Table 9-262z (Subfields of the HE MAC Capabilities Information field)). *BSYM* is the OFDM symbol of the PPDU that contains either the last bit of *SCH* when BCC is used to encode the PSDU or the last coded bit of the LDPC codeword that encodes the last bit of *SCH* when LDPC is used to encode the PSDU, where *SCH* is either:

* The User Info field addressed to the STA of the last or only Trigger frame, or
* The TRS Control subfield of the last or only frame.

An AP transmitting a Trigger frame that contains at least one User Info field with AID12 subfield set to 0 (i.e., anRA-RU for associated STAs) shall ensure that the duration of the PPDU that follows *AssocUoraBSYM* is greater than or equal to the largest *MinTrigProcTime* of all associated HE STAs. *AssocUoraBSYM* is the OFDM symbol of the PPDU that contains either the last bit of *SCH* when BCC is used to encode the PSDU or the last coded bit of the LDPC codeword that encodes the last bit of *SCH* when LDPC is used to encode the PSDU, where *SCH* is the last User Info field with AID12 subfield equal to 0.

An AP transmitting a Trigger frame that contains at least one User Info field with AID12 subfield set to 2045 (i.e., an RA-RU for unassociated STAs) should ensure that the duration of the PPDU that follows *UnassocUoraBSYM* is at least 16 µs. *UnassocUoraBSYM* is the OFDM symbol of the PPDU that contains either the last bit of *SCH* when BCC is used to encode the PSDU or the last coded bit of the LDPC codeword that encodes the last bit of *SCH* when LDPC is used to encode the PSDU, where *SCH* is the last User Info field with AID12 subfield equal to 2045.

* Trigger frame format

TGax Editor: Please make the following fixes to the two paragraphs as shown below (D2.3 P103):

For a non-HT PPDU, HT PPDU and VHT PPDU, the length of the Padding field (in octets)), which depends on the *MinTrigProcTime* as indicated by the solicited non-AP STA (see Table 9-262z (Subfields of the HE MAC Capabilities Information field)), is given by Equation (9-0b).

For an HE PPDU, the length of the Padding field (in octets), which depends on the *MinTrigProcTime* as indicated by the solicited non-AP STA (see Table 9-262z (Subfields of the HE MAC Capabilities Information field)), is given by Equation (9-0c).