IEEE P802.11
Wireless LANs

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| Remaining CIDs on MU operation  |
| Date: 2016-11-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D0.1 with the following CIDs (18):

* 37, 38, 171, 759, 761, 763, 764, 815, 950, 1219, 1540, 2273, 2320, 2449, 2467, 2636, 2656, 2910

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Changes based on discussions on the floor (changes in green).

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.***

# PARS I

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 37 | Ahmadreza Hedayat | 57.39 | When multiple Trigger frames and/or HEC feilds with UL MU response scheduling (Trigger Info) in the MAC header of MPDU(s) are carried within the same PPDU, some of the fields of the Common Info of the Trigger frame(s) and the HEC field should be the same. For instance, the duration of the upcoming trigger-based UL MU should be the same across all Trigger frame(s) and HEC fields with UL MU response scheduling (Trigger Info) in the MAC header of MPDU(s). Similarly, the LTF-type and number and GI duration should be the same across all the control fields that carry Trigger info. | Add the described behavior of the STA that aggregates multiple Trigger frames and/or HEC fields with UL MU response scheduling (Trigger Info) in MAC header of MPDU(s) within the same PPDU. | Revised – Agree in principle with the commenter. Proposed resolution accounts for the suggested change. TGax editor to make the changes shown in 11-16-1361r1 under all headings that include CID 37. |
| 38 | Ahmadreza Hedayat | 57.39 | Other behaviors of a STA that schedules UL MU transmission via HEC field with UL MU response scheduling should be included, such as: (a) in a unicast frame the content of HEC field with UL MU response scheduling across an AMPDU should be the same, (b) within a multicast frame there should not be any HEC field with UL MU response scheduling (since it'd not be clear which of the recepinets of the multicast frame should respond), etc | As in the comment. | Revised –This comment is already resolved in 11-16-929r3 and its respective changes are present in TGax D0.5, though the CID was not updated in the spreadsheet as resolved. Note: Already accounted for in D0.5 so no further action is required by the TGax editor.TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 38. |
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| 171 | Alfred Asterjadhi | 75.36 | What is the common address when dot11MultiBSSIDActivated is true? Replace the TBD with the address that will be used in this case for the Trigger frame. Also to say that "to which all recipient STAs are associated" is not correct since the AP can allocate a random RU at which non-associated STAs can transmit. And finally normative behavior on how to set the Padding field of the Trigger frame is missing. | As in comment. | Revised –Agree in principle with the comment. The proposed resolution defines the TA setting rules for the Trigger frame when the MIB variable is false, when the MIB variable is true and one BSSID is targeted, and when the MIB variable is true and at least two BSSIDs are targeted. Regarding the normative behavior for Padding field this has been already addressed as part of comment resolution for CID 1634 in D0.5.TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 171. |
|  |  |  |  |  |  |
| 759 | Jarkko Kneckt | 57.07 | UL MU Capable is not defined. | Make UL MU Capable as a Mib parameter. | Revised –Agree in principle with the commenter. This issue has been solved in D0.5 (dot11ULMUMIMOOptionImplemented has been defined). Actually there has been some duplications in terms of defined capabilities, since UL MU capabilities now appear in both the HE PHY Capabilities field (as UL MU) and in the HE MAC Capabilities field (as UL MU MIMO). Proposed resolution is to fix these inconsistencies by removing the duplicate. TGax editor to make the changes shown in 11-16-1361r1 under all headings that include CID 759. |
| 761 | Jarkko Kneckt | 57.21 | What does it mean that following frames are present at the same time in an A-MPDU. | Relax the rule and say that they cannot be in the same A-MPDU. | Revised –Agree in principle with the commenter that the paragraphof D0.1 was confusing as the items that followed that statement were not dependent of it. The proposed resolutions provided by 11-16-929r3 resolved this issue.Note: Already accounted for in D0.5 so no further action is required by the TGax editor.TGax editor to make the changes shown in 11-16-929r3 under all headings that include CIDs 595, 1520, 1525, 1. |
| 763 | Jarkko Kneckt | 57.53 | Not clear what is meant with MPDU/A-MPDU. By definition the HE transmits only A-MPDUs. | Change MPDU/A-MPDU to A-MPDU. | Revised –Agree in principle witht the commenter. That sentence has been removed from the draft as part of the comment resolutions of several CIDs in 11-16-929r3. Note: Already accounted for in D0.5 so no further action is required by the TGax editor.TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 1535, 172, 173, 593. |
| 764 | Jarkko Kneckt | 57.55 | Why the TXOP needs to start with the Trigger frame in order to consider an A-MPDU reception as a response as succesfull exchange? | Consider also cases where Trigger frame is following RTS-CTS exchange. | Revised –Generally agree with the commenter. The proposed changes that are introduced as result of comment resolution for CIDs 172, 173, 1535, 39, 1531, and 593 solve this issue by providing references to the baseline rules on when the exchange is considered successful.**Note: Already accounted for in D0.5 so no further action is required by the TGax editor.**TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 172, 173, 1535, 39, 1531, and 593. |
| 815 | Jinsoo Ahn | 57.57 | EDCA mechanism need to be applied on AP access procedures for UL MU | Insert the following"An AP shall transmit its trigger frame with EDCA parameters defined for UL MU Trigger frame, regardless of access category of UL PPDU contents." | Revised –Agree in principle with the comment that the EDCA mechanism was not specified. The rules for selecting the AC of sending the Trigger frame are included in D0.5 as part of the comment resolution for CID 593, MAC motion #90. **Note: Already accounted for in D0.5 so no further action is required by the TGax editor.**TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 593, as instructed by MAC Motion #90. |
| 950 | Junichi Iwatani | 56.12 | In the current draft specification, if a non-HE (lagacy) transmission uses the primary channel (20MHz or 40MHz), the secondary channels (up to 140MHz) are not available for HE transmissions. This is a waste of frequency resources and degrades the performance when non-HE STAs and HE-STAs coexist. This problem should be solved since non-HE STAs may be used for many years especially for home appliances. | For the better utilization of the frequency channels, the 11ax specifications should have a mechanism that allows a non-HE transmission and HE transmissions at the same time, at least for DL transmissions from an HE-AP. | Rejected –This subclause defines the MAC protocols that enable the underlying PHY functionality, and the HE PHY does not allow simultaneous non-HE/HE transmissions. Please submit a contribution to show results regarding frequency resource wastage and performance degradation due to the lack of such mechanism. |
| 1219 | Liwen Chu | 58.43 | The Ack Policy of MPDU other than Trigger Type is not clear. Addthe related rules. | As in comment. | Revised –Agree in principle with the commenter. Proposed resolution is to clarify the expected behaviour for this frame exchange, by explicitly referring to the A-MPDU construction rules and the related rules and exceptions that govern the creation of a Trigger-based PPDU that is sent as a response to a PPDU that contains a Trigger frame or an UL MU Response Scheduling A-Control field.TGax editor to make the changes shown in 11-16-1361r1 under all headings that include CID 1219. |
| 1540 | Mark RISON | 58.44 | "one MPDU of the required type" -- where are the required types specified? Table 9-ax2 just says what the trigger type is, not what MPDUs are required in response | Add something to Table 9-ax2 giving the required response type | Revised –Agree in principle with the commenter. Proposed resolution is to clarify the expected behaviour for this frame exchange, by explicitly referring to the A-MPDU construction rules and the related rules and exceptions that govern the creation of a Trigger-based PPDU that is sent as a response to a PPDU that contains a Trigger frame or an UL MU Response Scheduling A-Control field.TGax editor to make the changes shown in 11-16-1361r1 under all headings that include CID 1540. |
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| 2273 | Xiaofei Wang | 11.59 | The changes for 9.2.4.5 is missing for the agreements of QoS control fields (e.g. DL MU PPDU ack policy, BSR) | add the missing insert to the clause | Revised –Agree in principle with the comment. These changes have been added as part of the comment resolution of CID 2445 in D0.5.**Note: Already accounted for in D0.5 so no further action is required by the TGax editor, except for amending the first sentence of the 2nd column “PSMP Ack, or MU Ack”.**TGax editor to make the changes shown in 11-16-1131r2 under all headings that include CID 2273. |
| 2320 | Yasuhiko Inoue | 56.31 | In the current draft specification, if a non-HE transmission uses the primary channel (20MHz or 40MHz), the secondary channels are not available for HE transmissions. This is a waste of frequency resources and degrades the system level performance. It is necessary to solve this problem since non-HE (legacy) STAs will be used for many years. | For the better utilization of the frequency channels, the 11ax specifications should have a mechanism that allows a non-HE transmission and HE transmissions at the same time (at least for DL transmissions from an HE-AP). | Rejected –This subclause defines the MAC protocols that enable the underlying PHY functionality, and the HE PHY does not allow simultaneous non-HE/HE transmissions. Please submit a contribution to show results regarding frequency resource wastage and performance degradation due to the lack of such mechanism. |
| 2449 | Yongho Seok | 57.34 | "If dot11MultiBSSIDActivated is true and at least two of the Trigger frame recipient STAs are associated with two different BSSIDs, then the TA shall be set to a common address TBD;"When at least two of the Trigger frame recipient STAs are associated with two different BSSIDs and they receives the Trigger frame having the TA field set to a common address, what is the value of the Address 1 field in the HE trigger-based PPDU?If the value of the Address 1 field in the HE trigger-based PPDU is set to the common address (TA field of the Trigger frame), the problem is that the PSDU carried in the HE trigger-based PPDU shall be re-encrypted. Because the ADD used in the CCMP encryption has been changed.Please clarify the value of the Address 1 field in the HE trigger-based PPDU.Proposed solution is to use the STA's associated BSSID for the Address 1 field in the HE trigger-based PPDU. | As per comment | Revised –Agree in principle with the comment. The intention is to use baseline selection rules for the contents of Address 1, Address 2 and so on. Since we are not changing these rules a simple note suffices to add some clarity. Proposed resolution is to add a note specifying that the baseline rules apply for the Address 1 setting.TGax editor to make the changes shown in 11-16-1361r1 under all headings that include CID 2449. |
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| 2467 | Yongho Seok | 56.43 | According to the following STA-ID definition (refer Table 26-19) in an HE DL MU PPDU ,"For single BSS AP, the STA-ID for Broadcast will be 0;For Multiple BSS AP, the STA-ID for Broadcast to a specific BSS will follow the group addressed AID assignment in the TIM according to the existing Multi-BSSID TIM operation;For Multiple BSS AP, the STA-ID for Broadcast to all BSS of the AP will have a special STAID value reserved."It seems that the number of the groupcat RU in an HE MU PPDU has limited as the following:For single BSS AP, the number of the groupcat RU in an HE MU PPDU is limited to one;For Multiple BSS AP, the number of the groupcat RU in an HE MU PPDU is limited to the number of the multiple BSSs;Specify a constraint for number of the groupcat RU in an HE MU PPDU. | As per comment | Revised –Agree in principle with the commenter. Proposed resolution clarifies this aspect in subclause 25.11. We also propose to organize the subclause in separate subclauses for different settings for improving readability.TGax editor to make the changes shown in 11-16-1361r1 under all headings that include CID 2467. |
| 2636 | Young Hoon Kwon | 56.53 | There is an exception: MU-RTS/CTS exchange. | Modify the sentence to "... in either UL MU OFDMA UL MU-MIMO, or both, except for CTS frame transmission in response to a MU-RTS frame in which case soliciting MU-RTS frame indicates the frame type". | Revised –Agree in principle with the comment. This issue has been solved in TGax D0.5 as part of the comment resolution for CID 1184.**Note: Already accounted for in D0.5 so no further action is required by the TGax editor.**TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 1184. |
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| 2656 | Young Hoon Kwon | 61.01 | In current spec. (REVmc\_D5.2), within a TXOP if a TXOP holder has in its transmit queue an additional frame of the primary AC and the duration of transmission of that frame plus any expected acknowledgement for that frame is less than the remaining TXNAV timer value, the TXOP holder may commence transmission of that frame a SIFS after the completion of the immediately preceding frame exchange sequence (10.22.2.7). However for HE MU cascading operation to happen as a multiple frame transmission within a TXOP, the access category of the Trigger frame (or corresponding UL MU frames) needs to be the same with the primary AC. But, there's no definition on the access category of Trigger frame or how to handle access category of UL MU frames when an AP initiates a UL MU transmission. Therefore, how to handle access category for UL MU transmission needs to be clarified and the cascading operation also needs to consider the access category of UL MU transmission. | As mentioned in the comment, clarify access category for UL MU transmission and how to consider access category of UL MU transmission in cascading sequence of MU PPDUs, and add description on these features in subcaluse 25.5.3 of the draft spec and 10.22.2.7 of REVmc\_D5.2. | Revised –Agree in principle with the comment that the AC was not specified. The rules for selecting the AC of sending the Trigger frame are included in D0.5 as part of the comment resolution for CID 593, MAC motion #90, and CID 2669. **Note: Already accounted for in D0.5 so no further action is required by the TGax editor.**TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 593, as instructed by MAC Motion #90, and shown in 11-16-938r0 under all headings that include CID 2669 amended by MAC Motion #92. |
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| 2910 | Guido Hiertz | 57.52 | AC of TF is not specified | A Trigger Frame shall apply TBD EDCA parameters. | Revised –Agree in principle with the comment that the AC was not specified. The rules for selecting the AC of sending the Trigger frame are included in D0.5 as part of the comment resolution for CID 593 and MAC motion #90. **Note: Already accounted for in D0.5 so no further action is required by the TGax editor.**TGax editor to make the changes shown in 11-16-929r3 under all headings that include CID 593 and as instructed by MAC Motion #90. |

**Discussion:** *The proposed changes below also fix some inconsistencies found in these subclauses as well (identified by #FIX).*

**TGax Editor: *Delete UL MU MIMO subfield from Figure 9-589ck (HE MAC Capabilities Information field format) and remove the last row of Table (Subfields of the HE MAC Capabilities Information field) (#CID 759).***

**TGax Editor: *Change the subclauses below as follows:***

* UL MU operation
* General

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 759):***

An HE STA with dot11ULMUMIMOOptionImplemented set to true shall set B22 of the the UL MU subfield of the HE PHY Capabilities Information field of the HE Capabilities element it transmits to 1. Otherwise, the HE STA shall set B22 of the UL MU subfield of the HE PHY Capabilities Information field of the HE Capabilities element it transmits to 0. *(#759)*

A non-AP STA with dot11ULMUMIMOOptionImplemented equal to true is referred to as an UL MU capable STA.

An HE STA shall set the UL MU Response Scheduling Support subfield of the HE Capabilities element it transmits to 1 if its dot11HEULMUResponseSchedulingOptionImplemented is true; otherwise the STA shall set it to 0.

A STA shall not transmit a Trigger frame soliciting an UL OFDMA With MIMO PPDU from a STA from which it has not received an HE Capabilities element with B23 of the UL MU subfield of the HE PHY Capabilities Information field set to 1. *(#759)*

A STA shall not transmit a Trigger frame soliciting a Full BW UL MU MIMO PPDU from a STA from which it has not received an HE Capabilities element with B22 of the UL MU subfield of the HE PHY Capabilities Information field set to 1. *(#759)*

* Rules for soliciting UL MU frames
* General

**TGax Editor: *Change the paragraph below of this subclause as follows (#FIX):***

The following two frames shall not be present in the same A-MPDU:(#595)

* A Trigger frame with a User Info field(#1520) addressed to a STA
* An(#1525) MPDU that contains an UL MU Response Scheduling A-Control subfield and that is addressed to the same STA*(#FIX)*

**TGax Editor: *Change the paragraphs below of this subclause as follows (#ED):***

A transmitted Trigger frame that contains a User Info field with the AID of a non-AP STA may contain a Padding field, whose length shall ensure that at least *MinTrigProcTime*, in microseconds, passes from the end of the User Info field that contains that AID and the end of the PPDU that contains the Trigger frame, where the *MinTrigProcTime* is equal to the value specified by the non-AP STA in the Trigger Frame MAC Padding subfield of the HE Capabilities element it transmits. The AP shall apply the Trigger Frame MAC Padding field with duration corresponding to the longest value among all STAs that have requested extra *MinTrigProcTime* through Trigger Frame MAC Padding Duration capability.

The AP shall ensure that the duration of the symbols that follow the symbol in the Trigger Frame that contains the last bit of the STA’s User Info field is larger than or equal to the *MinTrigProcTime* value specified by the STA.

NOTE 1—The start of the Padding subfield is identified by a User Info field that has a value of the AID equal to 2047, and the remaining subfields of the Padding field are set to 1.

NOTE 2—This rule applies to all variants of the Trigger frame (Basic, MU-BAR, MU-RTS, etc).

**TGax Editor: *Change the subclause heading as follows (#37):***

1. Allowed settings of the Trigger frame or of the UL MU Response Scheduling A-Control fields

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 171):***

An AP that transmits a Trigger frame shall set the TA field of the frame to:

* The MAC address of the AP transmitting the frame when dot11MultiBSSIDActivated is false or when dot11MultiBSSIDActivated is true and the Trigger frame is directed to STAs that intend to communicate with the AP,
* The MAC address of the transmitted BSSID when dot11MultiBSSIDActivated is true and the Trigger frame is directed to STAs that intend to communicate with at least two different BSSs of the multiple BSSID set and that have indicated reception support for this Trigger frame in the Multiple BSSID Control Support field of the HE Capabilities element it transmits (see 11.3.8 (Multiple BSSID procedure)).
* (#171)

NOTE—All MPDUs within an A-MPDU carried in a trigger-based PPDU are addressed to the same RA (see 9.7.3 (A-MPDU contents). The settings of the Address fields of MPDUs within the A-MPDU depend on the type and subtype of the MPDU as defined in 9.3 (Format of individual frame types). (#2449)

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 37):***

An AP shall not set any subfields of the Common Info field(#1529) of a Trigger frame(#36) to a value that is not supported by all the recipient STAs of the Trigger frame.

An AP shall set all the subfields, except the Trigger Type subfield, of the Common Info field of a Trigger frame to the same value of the corresponding subfield of the Common Info field of any other Trigger frame that is carried in the same PPDU. An AP shall set the UL PPDU Length and DL Tx Power subfields of an UL MU Response Scheduling A-Control subfield to the same value of the corresponding subfield of any UL MU Response Scheduling A-Control that is carried in the same PPDU. An AP shall set the following subfields of the Common Info field of a Trigger frame accordingly if an UL MU Response Scheduling A-Control subfield is carried in an MPDU within the same PPDU:

* MU-MIMO LTF Mode and STBC are set to 0
* Number of HE-LTF Symbols is set to 1
* Spatial Reuse is set to SR\_Disallowed
* GI and LTF Type is set to 3 if the carrying PPDU TXVECTOR parameter CP\_LTF\_TYPE is 4x LTF + 3.2 µs CP or 2x LTF + 1.6 µs CP; otherwise is set to 2
* CS Required subfield is set to 0

NOTE–STAs obtain the common information either explicitly, or implicitly or both. Explicit information is obtained in the Common Info field of a Trigger frame, or in the UL PPDU Length and DL TX Power subfields of the UL MU Response Scheduling A-Control field contained in the soliciting PPDU. Implicit information is obtained in previously exchanged frames with the AP, e.g., in the BSS Color and the Default PE Duration subfields of the HE Operation element, or from default values specified in 25.5.2.3 (STA behavior).(#37)

**TGax Editor: *Change the paragraphs below of this subclause as follows (#ED, FIX):***

The responding STA shall not aggregate QoS Data frames in the multi-TID A-MPDU with a number of TIDs that exceeds the value indicated by the TID Aggregation Limit subfield in the Trigger Dependent User Info field of a Basic Trigger frame (see 9.3.1.23.1 (Basic Trigger variant(#2219))) intended to it.(#2219)

The AP shall set the value in the TID Aggregation Limit subfield in the Type dependent Per User Information field to 0 or 1 for an HE STA with STA that has indicated a zero value in the Multi-TID Support field of the HE Capabilities element it transmits and is identified by the AID12 subfield of the User Info field of a Basic Trigger frame (see 9.3.1.23 (Trigger frame format)).(#2669) A value 0 indicates to the STA that it shall not solicit any immediate response for the MPDUs that the STA aggregates in the HE trigger-based PPDU.(MAC Motion #92) A value greater than 0 indicates to the STA the number of TIDs it can aggregate in the A-MPDU carried in the HE trigger-based PPDU (see 25.11.4 (A-MPDUs with multiple TIDs).*(#FIX)*

The AP may assign any value between 0 and 7 in the TID Aggregation Limit subfield in the Trigger Dependent User Info field to 1 for an HE STA with STA that has indicated a nonzero value in the Multi-TID Support field of the HE Capabilities element it transmits and is identified by the AID12 subfield of the User Info field of a Basic Trigger frame.(#Ed)(#2669)

The AP may assign any value in the AC Preference Level subfield in the Trigger Dependent User Info field for an HE STA identified by the AID12 subfield of the User Info field of a Basic Trigger frame.(#2669)

The AP may assign any value defined in Table 9-25i (Preferred AC subfield encoding) in the AC Preference Level subfield in the Trigger Dependent User Info field to 1 for an HE STA and identified by the AID12 subfield of the User Info field of a Basic Trigger frame.(#2669)

NOTE—A STA follows the rules in 25.10.4 (A-MPDU with multiple TIDs) for aggregating the QoS Data frames with multiple TIDs in HE trigger-based PPDUs.(#2669)

* STA behavior

**TGax Editor: *Change the paragraphs below of this subclause as follows (#ED, FIX):***

The inter-frame space between a PPDU that contains a Trigger frame or contains an UL MU Response Scheduling A-Control field that solicits an immediate response and the HE trigger-based PPDU is SIFS.(#40)

A STA shall commence the transmission of an HE trigger-based PPDU at the SIFS time boundary after the end of a received PPDU, when all the following conditions are met

* The received PPDU contains either a Trigger frame(#1532) (that is not an MU-RTS variant(#Ed)) with a User Info(#1520) field addressed to the STA, or an MPDU addressed to the STA that contains an UL MU Response Scheduling A-Control subfield(#1). The User Info(#1520) field is addressed to a STA if the AID12(#Ed) subfield(#2685) is equal to the AID of the STA and(#766) the STA is associated with the AP. If the STA is not associated with the AP, **TBD (AA: This TBD needs to be solved)**.
* The CS Required subfield in the Trigger frame is 1 and the(#977) UL MU CS condition described in 25.5.2.4 (UL MU CS mechanism) indicates the medium is idle, or the CS Required subfield in a Trigger frame is 0.
* Otherwise, a STA shall not send an HE trigger-based PPDU

A STA transmitting an HE trigger-based PPDU in response to a Trigger frame sets the TXVECTOR parameter as follows:(#175)

* …
* The NUMBER\_HE\_LTF\_SYM parameter shall be set to the value indicated by the Number Of HE-LTF Symbols(#Ed) subfield of the Common Info field of the eliciting Trigger frame
* …
* The LDPC\_EXTRA\_SYM parameter shall be set to the value indicated by the LDPC Extra Symbol subfield of the Common Info field of the eliciting Trigger frame
* …
* The HE\_SIGA\_RESERVED parameter shall be set to the value of the HE-SIG-A Reserved field in the Common Info field of the eliciting Trigger frame
* …

**TGax Editor: *Change the paragraphs below of this subclause as follows (#1219, 1540):***

The STA that responds to a DL MU PPDU containing MPDU(s) addressed to it that include UL MU Response Scheduling A-Control subfield(s) follows the rules defined in 10.3.2.9 (Ack procedure) for generating the Ack frame, the rules defined in 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA) for generating the BlockAck frame, and the rules defined in 25.4 (Block acknowledgement) for generating the Multi-STA BlockAck frame. The STA shall construct the A-MPDU carried in the trigger-based PPDU as defined in Table 9-428 (A-MPDU contents MPDUs in the control response context) when the A-MPDU containing the UL MU Response Scheduling A-Control subfield solicits an immediate response and as defined in Table 9-426 (A-MPDU contents in the data enabled no immediate response context) when the A-MPDU does not solicit an immediate response. *(#1219, 1540)*

NOTE—The STA additionally follows the rules defined in 25.3.3 (Procedure at the originator(#1484)) when fragments are present in the soliciting (A-)MPDU(s).

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 1219, 1540):***

The content of each A-MPDU(#1537) in an HE Trigger-based PPDU is as defined in 9.7.3 (A-MPDU contents)(#2172), in 25.11.3 (A-MPDU padding for an HE trigger-based PPDU and shall be subject to the following additional constraints:

* If the Trigger Type field(#1539) of a Trigger frame is not Basic Trigger, then the STA shall include in the response A-MPDU at least one MPDU of the required type. A Beamforming Report Poll Trigger frame solicits HE Compressed Beamforming Feedback frames (see 25.6 (HE sounding protocol), an MU BAR Trigger frame solicits BlockAck frames (see 25.4 Block acknowledgment), and a BSRP Trigger frame solicits QoS Null frames (see 25.5.2.5 (HE buffer status feedback operation for UL MU). The MPDUs included in the response shall not solicit a response.(#176)

If the Trigger Type field of the soliciting Trigger frame is equal to Basic Trigger and the STA does not have any frame of the required type, the STA shall either not transmit a response or transmit one or more QoS Null frames.(#1541)(#42)A STA that is an intended receiver of a Trigger frame that is not a Basic Trigger shall construct the A-MPDU carried in the HE Trigger-based PPDU as defined in Table 9-428 (A-MPDU contents MPDUs in the control response context). A STA that is an intended receiver of a Basic Trigger frame may include MPDUs with any TID in the HE trigger-based PPDU subject to the rules defined in 25.10.4 (A-MPDU with multiple TIDs).(#2644)

NOTE 1— An AP can include other MPDUs in a soliciting DL MU PPDU that contains Trigger frames as specified in 9.7.3 (A-MPDU contents).*(#1219, 1540)*

NOTE 2—The frame type of MPDUs may be different across A-MPDUs within a same HE trigger-based PPDU.(#598).**TGax Editor: *Insert one new row in Table 9-428 (A-MPDU contents MPDUs in the control response context) and in (Table 9-426—A-MPDU contents in the data enabled no immediate response context) where the row is as follows (#CID 1219, 1540):***

|  |  |
| --- | --- |
| MPDU Description | Conditions |
| QoS Null frame with Ack Policy set to No Acknowledgment | Zero of more QoS Null MPDUs with Ack Policy set to No Acknowledgment sent by an HE STA. |

* HE buffer status feedback operation for UL MU

TGax Editor: *Change the paragraphs below of this subclause as follows (#FIX):*

An AP can also solicit one or more non-AP STAs for their BSR(s) by sending a BSRP variant Trigger frame (see 9.3.1.23 (Trigger frame format)).(#1062) The non-AP STA responds (solicited BSR) as defined below:

* …
* The STA shall include in the HE trigger-based PPDU one or more QoS Null frames containing one or more*(#FIX)* of the following:

 …

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 2467):***

* TXVECTOR parameters settting for an HE PPDU(#2517)

### 25.11.1 STA\_ID\_LIST

… as follows:

* For an AP with dot11MultiBSSIDActivated equal to false, if the RU is intended for all STAs in the BSS, the STA\_ID\_LIST element is set to 0. The AP may include only one element with this value in a DL MU PPDU.
* For an AP with dot11MultiBSSIDActivated equal to true, if the RU is intended for all STAs in any of its BSSs, the STA\_ID\_LIST element is set to partial virtual bitmap value assigned for the group addressed frame (see 9.4.2.6 (TIM element)). The AP may include only one element for each BSSID of the multiple BSSID set in the DL MU PPDU, and the number of such elements shall not exceed the maximum number of BSSs of the multiple BSSID set.

### For an AP with dot11MultiBSSIDActivated equal to true, if the RU is intended for all STAs on all its BSSs, the STA\_ID\_LIST element is set to 2047. The AP may include only one element with this value in a DL MU PPDU.*(#2467)*25.11.2 UPLINK FLAG

The Uplink Flag is carried in the TXVECTOR parameter UPLINK\_FLAG of an HE SU PPDU, HE extended range SU PPDU, and HE MU PPDU and is set as follows:

…

The TXVECTOR parameter UPLINK\_FLAG is not present for HE trigger-based PPDUs.

### 25.11.3 BEAM\_CHANGE

The TXVECTOR parameter BEAM\_CHANGE of an HE SU PPDU, HE extended range SU PPDU shall be set to 1 if the number of spatial streams is greater(#Ed) than 2 or the PPDU is the first PPDU in a TXOP.(#2517)

### 25.11.3 BSS\_COLOR

The BSS Color is an identifier of the BSS and is used to assist a receiving STA in identifying the BSS from which a PPDU originates so that the STA can use the channel access rules as described in 25.9 (Spatial reuse operation)(#2338) or reduce power consumption as described in 25.15.1 (Intra-PPDU power save for HE non-AP STAs).

…

All APs that are members of a Multiple BSSID Set element shall use the same BSS Color.(#73)(#210)

25.11.4 TXOP\_DURATION(#2596)

TXOP Duration field is carried in the TXVECTOR parameter TXOP\_DURATION of an HE PPDU and indicates duration information for NAV setting and protection of TXOP.

…

The encoding of TXVECTOR/RXVECTOR parameter TXOP\_DURATION for indicating duration information is defined in Table 26-1 (TXVECTOR and RXVECTOR parameters(#1780)).