IEEE P802.11
Wireless LANs

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| Comment Resolution on MU acknowledgment procedure |
| Date: 2016-07-27 |
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Abstract

This submission proposes resolutions of comments received from TGax comment collection (TGax Draft 0.1).

* CIDs: 2608, 2607, 2606, 2488, 2605, 2604, 2487, 2396, 2395, 1399, 2262, 2841 (12 CID)

Note- The resolution of CID 2454, 2457 and 1734 will be submitted later.

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 TGah 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** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| 2608 | 43.08 | 10.3.2.11.4 | Ack in DL MU manner does not need to be limited to OFDMA format. | Modify the text to "... an AP may send multiple BlockAck frames (or ACK frames) in HE MU PPDU or ..." | Revised- Agree in principal. TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2607 | 43.01 | 10.3.2.11.3 | UL MU OFDMA Capable and UL MU MIMO Capable subfields are not defined in the HE Capabilities element (9.4.2.213). | Add UL MU OFDMA Capable and UL MU MIMO Capable subfields in subclause 9.4.2.213. | Revised-  “An AP shall not set Ack Policy to "01" in the QoS Control field in MPDUs of the HE MU PPDU if both the UL OFDMA Capable(#1515) subfield and the UL MU-MIMO(#1507) Capable subfield of the HE Capabilities element of the receiver of the MPDUs are set to 0(#1404).”Because UL MU OFDMA is a mandatory feature, the above condition is not happened. Delete that sentence.TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2606 | 42.37 | 10.3.2.11.3 | Not all MPDU has QoS Control field | Modify the text to "A non-AP STA that is the recipient, within a HE MU PPDU, of a QoS Data MPDU that solicits an immediate response with Ack Policy '01' in QoS Control field, ..." | Revised- Agree in principal. Only QoS Data or QoS Null MPDU can have the Ack Policy field set to 01. TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2488 | 43.01 | 10.3.2.11.3 | "An AP shall not set Ack Policy to "01" in QoS Control field in MPDUs of HE MU PPDU if both UL MU OFDMA Capable subfield and UL MU MIMO Capable subfield of the HE Capabilities element of the receiver of the MPDUs are set to 0."When the HE AP transmits the VHT MU PPDU that is destined to VHT STAs and HE STAs, the VHT MU PPDU can also solicit immediate responses from the target HE STAs with Ack Policy '01'.Change the corresponding sentence as the following:"An AP shall not set Ack Policy to "01" in QoS Control field in MPDUs of VHT MU PPDU and HE MU PPDU if both UL MU OFDMA Capable subfield and UL MU MIMO Capable subfield of the HE Capabilities element of the receiver of the MPDUs are set to 0." | As per comment | Revised- Agree in principal. Only QoS Data and QoS Null MPDU can have the Ack Policy field set to 01. TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2605 | 42.26 | 10.3.2.11.2 | For VHT MU PPDU sent to HE STA, MU-BAR frame can additionally be used for soliciting non-immediate responses. | Modify the text to "BlockAckRequest or MU-BlockAckRequest frames related to A-MPDUs within a VHT MU PPDU or an HE MU PPDU can be transmitted in a TXOP separate from the one that contained the VHT MU PPDU or the HE MU PPDU.". | Revised- Agree in principal. TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2604 | 42.16 | 10.3.2.11.2 | For VHT MU PPDU sent to HE STA, MU-BAR frame can additionally be used for soliciting non-immediate responses. | Modify the text to "Responses to A-MPDUs within a VHT MU PPDU or an HE MU PPDU that are not immediate responses to the VHT MU PPDU or the HE MU PPDU are transmitted in response to explicit BlockAckReq or explicit MU-BlockAckReq frames by the AP.". | Revised- Agree in principal.TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2487 | 42.37 | 10.3.2.11.3 | "A non-AP STA that is the recipient, within a HE MU PPDU, of an MPDU that solicits an immediate response with Ack Policy '01' in QoS Control field, shall send the immediate response according to the scheduling information defined by the UL trigger information that is carried either in the Trigger frame(s) or in MAC header."When the HE AP transmits the VHT MU PPDU that is destined to VHT STAs and HE STAs, the VHT MU PPDU can also solicit immediate responses from the target HE STAs with Ack Policy '01'.Change the corresponding sentence as the following:"A non-AP STA that is the recipient, within a VHT MU PPDU or an HE MU PPDU, of an MPDU that solicits an immediate response with Ack Policy '01' in QoS Control field, shall send the immediate response according to the scheduling information defined by the UL trigger information that is carried either in the Trigger frame(s) or in MAC header." | As per comment | Rejected- VHT MU PPDU can not solicit immediate responses in UL MU format from the target HE STAs. It makes additional complexity to the receiver.  |
| 2396 | 43.11 | 10.3.2.11.4 | The OFDMA BA cannot be sent within EIFS duration in 20MHz bandwidth for MCS0 and Nss=1, even in single user case. Specific rules to transmit BlockAck frames or Multi-STA BlockAck frames need to be determined. | Insert the following sentence in the paragraph as below:When receiving multiple frames from more than one STA that are part of an UL MU transmission (Clause 9.42.2) and that require an immediate acknowledgement, an AP may send multiple BlockAck frames (or ACK frames) in an OFDMA HE MU PPDU or a Multi-STA BlockAck (M-BA) frame. The AID field carries the AID of the STA for which the Per STA Info field is intended. 'If BlockAck or Multi-STA BlockAck frames are transmitted, it should be transmitted using appropriate Ack mechanism with proper MCS and Nss which does not exceed EIFS duration.' Additional conditions to transmit multiple BlockAck frames (or ACK frames) in an OFDMA HE MU PPDU or Multi-STA BlockAck are TBD. | Rejected- Regarding the below proposed wording, “If BlockAck or Multi-STA BlockAck frames are transmitted, it should be transmitted using appropriate Ack mechanism with proper MCS and Nss which does not exceed EIFS duration.”It is an implementation issue.  |
| 2395 | 43.11 | 10.3.2.11.4 | When all MPDUs are received sucessfully, the multi STA Block Ack can be sent without Block Ack Starting Sequence Control subfield and Block Ack bitmap by using the predetermined AID value(e.g. 2047) and setting ACK Type field to 0 to reduce the Ack duration. | Insert the following sentence in the paragraph as below:When receiving multiple frames from more than one STA that are part of an UL MU transmission (Clause 9.42.2) and that require an immediate acknowledgement, an AP may send multiple BlockAck frames (or ACK frames) in an OFDMA HE MU PPDU or a Multi-STA BlockAck (M-BA) frame. 'When the all MPDUs from allocated STAs are sucessfully received, the AID field of Multi-STA BlockAck is set to 2047 and ACK Type field is set to 0.' | Rejected- Such optimization can have a minor performance gain but the implementation complexity can be significantly increased. At least, need to show the performance gain.   |
| 1399 | 42.16 | 10.3.2.11.2 | "Responses to A-MPDUs within a VHT MU PPDU or an HE MU PPDU that are not immediate responses to the VHT MU PPDU or the HE MU PPDU are transmitted in response to explicit BlockAckReq frames by the AP. Examples of VHT MU PPDU frame exchange sequences are shown in Figure 10-11 (An example of a TXOP containing a VHT MU PPDU transmission with an immediate acknowledgment to the VHT MU PPDU) and Figure 10-12 (An example of a TXOP containing a VHT MU PPDU transmission with no immediate acknowledgment to the VHT MU PPDU)." adds nothing of value | Delete the cited text | Revised- Agree in principal. Sub-clause 10.3.2.11.2 is the revised text of sub-clause 10.3.2.11 in 802.11 REVmc. Since the editing instruction is wrong, change the editing instruction for 10.3.2.11.2 as shown in this document. TGax editor makes changes as shown in the as specified in 11-16/0861r1. |
| 2262 | 44.47 | 10.3.2.11.4 | When a DL ACK of an UL STA is multiplexed in an RU larger than the RU where the UL transmission occurs, AID information in SIG-B of HE MU PPDU cannot calls the multiple DL ACK recipients. | Insert the following at 10.3.2.11.4 line 31."When a Multi-STA BlockACK frame is sent in an OFDMA HE MU PPDU format, AP shall assign an AID for a group of DL ACK recipients temporarily. The temporary AID shall be included in the Trigger Frame that solicits the UL MU PPDU." | Rejected- Clause 10 contains only for the behavior of the STA. Setting of the field of the MAC frame is described in Clause 9.  |
| 2841 | 42.35 | 10.3.2.11.3 | To support the efficient UL MU explicit BA, "HE reception status feedback operation for UL MU" should be defined by using the texts of "HE buffer status feedback operation for UL MU" for efficient UL MU PPDU as reference. | Add following texts which includes some modification from the original HE buffer status feedback operation texts.(Underlined parts were mainly modified from texts in 25.5.2.5)"25.5.2.x HE reception status feedback operation for UL MU"The reception status report from HE STAs may be utilized to support the efficient UL MU explicit BA operation. An AP may poll HE STAs for reception status reports using the frame carrying the trigger information. The frame may be a broadcast Trigger frame, a unicast Trigger frame, a Trigger frame for random access, or a Data type of frame carrying the trigger information. An AP may request an HE STA to send its reception status information by TBD indication in the Trigger frame or in the HE A-Control field in a Data type of frame. In this case, an AP may indicate TBD indicator of the reception status for an HE STA to report (signaling method TBD). Upon reception of the frame including the TBD indication in the Trigger frame or in the HE A-Control field, the HE STA may respond with the frame including the Reception Status information. To report the reception status for a given TID, an HE STA shall report the Reception Status information with the amount of received traffic belonging to the TID."Reception Status information can be throughput, the number of received packets, number of packets loss or what means reception status of STAs. | Rejected- Sub-clause 10.3.2.11.3 is MU acknowledgement procedure for HE MU PPDU in MU format. The HE buffer status feedback procedure is not related with MU acknowledgement procedure.  |

**10.3.2.11 MU acknowledgment procedure**

**10.3.2.11.1 General**

***TGax editor: change the following editing instruction:

~~Insert a new subclauses at the end of 10.2.3.11:~~***

***Change the subclause 10.2.3.11 as the follwoing:***

10.3.2.11.2 ~~MU a~~Acknowledgement procedure for DL MU PPDU in SU format

***TGax editor: change the 10.3.2.11.2 as the following:***

The acknowledgment procedure performed by a STA that receives MPDUs that were transmitted within a VHT MU PPDU or an HE MU PPDU is the same as the acknowledgment procedure for MPDUs that were not transmitted within a VHT MU PPDU or an HE MU PPDU.

NOTEAll MPDUs transmitted within a VHT MU PPDU or an HE MU PPDU are contained within A-MPDUs, and the rules specified in 9.7.3 (A-MPDU contents) prevent an immediate response to more than one of the A-MPDUs.

Responses to A-MPDUs within a VHT MU PPDU or an HE MU PPDU that are not immediate responses to the VHT MU PPDU or the HE MU PPDU are transmitted in response to explicit BlockAckReq frames by the AP. Examples of VHT MU PPDU frame exchange sequences are shown in Figure 10-11 (An example of a TXOP containing a VHT MU PPDU transmission with an immediate acknowledgment to the VHT MU PPDU) and Figure 10-12 (An example of a TXOP containing a VHT MU PPDU transmission with no immediate acknowledgment to the VHT MU PPDU).

Recovery within the TXOP that contains a VHT MU PPDU or an HE MU PPDU can be performed according to the rules of 10.22.2.7 (Multiple frame transmission in an EDCA TXOP). BlockAckRequest frames related to A-MPDUs within a VHT MU PPDU or an HE MU PPDU can be transmitted in a TXOP separate from the one that contained the VHT MU PPDU or the HE MU PPDU.

NOTE1A BlockAck frame or an Ack frame is sent in immediate response to the BlockAckReq frame for HT-immediate or HT-delayed Block Ack, respectively. An Ack frame might be sent in immediate response to a ~~VHT~~ ~~s~~Single MPDU in the VHT MU PPDU or the HE MU PPDU.

NOTE 2—A BlockAckRequest frame would typically not be sent to a STA in the case where the A-MPDU to the STA contained no MPDUs requiring acknowledgment. It could be sent if MPDUs in a previous A-MPDU remain unacknowledged.

10.3.2.11.3  ~~MU a~~Acknowledgement procedure for ~~HE~~ DL MU PPDU in MU format

A non-AP STA that is the recipient, within an(#2829) HE MU PPDU, of a~~n~~ QoS Data or QoS Null (#2606) MPDU that solicits an immediate response with Ack Policy '01' in QoS Control field, shall send the immediate response according to the scheduling information defined by the UL trigger information that is carried either in the Trigger frame(s) or in the(#1402) MAC header. If no valid Trigger frame(s) or MAC header containing UL trigger information is received, then the STA shall not respond. An example of UL OFDMA acknowledgement to an HE MU PPDU is shown in Figure 10-ax4 (An example of a TXOP containing an HE MU PPDU transmission with an immediate UL OFDMA acknowledgement).

~~An AP shall not set Ack Policy to "01" in the QoS Control field in MPDUs of the HE MU PPDU if both the UL OFDMA Capable(#1515) subfield and the UL MU-MIMO(#1507) Capable subfield of the HE Capabilities element of the receiver of the MPDUs are set to 0(#1404).~~ (#2607)

10.3.2.11.4. ~~MU a~~Acknowledgement procedure for an UL MU transmission

When receiving frames(#409) from ~~more than~~ one or more STAs that are part of an UL MU transmission (see(#1406) 9.42.2) and that require an immediate acknowledgement, an AP may send either ~~multiple~~ one or more BlockAck frames (or Ack(#1408) frames) in an ~~OFDMA~~ HE MU PPDU (#2608), or a Multi-STA BlockAck frame(#1407)(#1424) (see 25.4 (Block acknowledgement)). ~~Additional conditions to transmit multiple BlockAck frames (or Ack(#1408) frames) in an OFDMA HE MU PPDU or Multi-STA BlockAck are TBD.~~ After a successful reception of an UL frame requiring acknowledgment, transmission of the DL acknowledgement shall commence after a SIFS, without regard to the busy/idle state of the medium.