IEEE P802.11
Wireless LANs

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| Comment resolution on SU\_MU ACK procedure |
| Date: 2016-09-07 |
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Abstract

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

* 129,130,131,132,405,406,407,408,672

Revisions:

* Rev 0: Initial version of the document.

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.***

# DL MU ACK procedure

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| **CID** | **P.L** | **Comment** | **Proposed Change** | Resolution |
| 129 | 60.06 | Why do we have a whole subclause to simply say that the AP can solicit responses in SU mode for DL MU PPDUs? Remove this subclause and add the following sentence at the beginning of the first subclause related to HE MU ack procedures: An HE AP can use the acknowledgement procedure defined in 10.3.2.11 (MU acknowledgement procedure) to solicit responses for HE DL MU PPDUs. And then start describing what the alternative is (i.e., solicitation wiht Ack Policy equal to MU Ack). | As in comment. | RevisedAgree in principle with the comment.The comment is resolved in 16/861r2.In 16/861r2, instead of inserting the whole subclause, the word 'HE MU PPDU' is included in the related texts of the sublcause 10.3.2.11.2.See the proposed text of 16/1157r0. |
| 130 | 60.38 | By the way how does the AP solicit a response in DL MU PPDU for action ack frames? There is no ack policy for mgmt frames hence you should explicitly state the rule (i would say MU?). Also add a refence to the UL MU operation where the determination of the UL MU response parameters is done (for both trigger and UL response scheduleing in the HE variant HT Control field). | As in comment. | RevisedAgree in principle with the comment.The related references (see 9.3.1.23 (Trigger frame format), see 9.2.4.6.4.2 (UL MU response scheduling)) need to be included in the related sentence.The ACK TX rule of a management frame (MMPDU) needs to be defined when the MMPDU is sent in HE MU PPDU as the proposed text.See the proposed text of 16/1157r0 |
| 131 | 60.01 | Multi-STA BlockAck is going to be used from both AP and non-AP STAs for multi-TID operation and UL MU operation. As such that acknowledgement behavior needs to be defined and respective references to that subclause need to be added in each of these subclauses. | As in comment. | RevisedAgree in principle with the comment.Multi-STA Block Ack can be used to acknowledge the A-MPDU with multi-TIDs. When the acknowledgement of HE MU PPDU is sent through SU format, the BAR frame with Multi-TID variant will be able to trigger the Multi-STA Block ACK for the multi-TID operation.And, when the acknowledgement of HE MU PPDU is sent through MU format, the MU-BAR frame with multi-TID BAR variant will be able to trigger the Multi-STA Block ACK for supporting the multi-TID operation.See the proposed text of 16/1157r0. |
| 132 | 61.13 | The list of conditions for the MU acknowledgement procedure for UL MU transmissoins is not complete. Add all missing conditions (including that M-BA can be sent as a response to an multi-TID A-MPDU from a single STA) and cases ensuring that they provide concise instructions to the recipient generating these responses. | As in comment. | RevisedAgree in principle with the comment.Multi-STA Block Ack can be used for UL MU procedure and Multi-TID operation. The comment is resolved by CID80. The related text that M-BA can be sent as a response to an multi-TID A-MPDU from a single STA is already included in the 9.3.1.9.7 Multi-STA BlockAck variant in D4.0 as follows:“Multi-STA BlockAck(#Ed) frames shall be supported if either UL MU or multi-TID A-MPDU operation is supported.(#80)”“NOTE—One or more Per STA Info subfields with same value of the AID subfield and different values of the TID subfields can be present in the Multi-STA BlockAck frame.(#80)” |
| 405 | 42.06 | in SU format appears in header but not text | Limit the text in line with the heading | RevisedAgree in principle with the comment.‘In SU format’ is added in the related text as shown in the proposed text of 16/1157r0 |
| 406 | 42.10 | HE MU PPDU is a terrible name since an HE trigger-based PPDU is a multi-user PPDU defined by HE also | Rename HE MU PPDU to HE DL MU PPDU | RevisedAgree in principle with the comment.However, there is no HE DL MU PPDU in 11ax spec. There are olny four HE PPDU formats in 11ax spec (HE SU PPDU, HE MU PPDU, HE extended range PPDU, and HE trigger-based PPDU). We can rename HE MU PPDU to 'HE MU PPDU for DL transmission' instead of 'HE DL MU PPDU'.See the proposed text of 1157r0. |
| 407 | 42.40 | Not clear if scheduling can be present in both places | Add note with xref to indicate that scheduling can only be present in one but not both places | RevisedAgree in principle with the comment.The related references need to be included in the indicated text as proposed text. However, the original text already indicates that the scheduling can only be present in one (by using ‘either’). |
| 408 | 43.02 | UL MU OFDMA Capable and UL MU MIMO capable ... HE Capabilities .. But a) these don't exist and b) at least one UL tech needs to be mandatory (e.g. UL OFDMA) for 11ax to be relevant | Add 1 (but not 2) capability indications | RevisedAgree in principle with the comment.Because UL OFDMA is mandatory, the condition does not happen and so, the indicated sentence was deleted in 16/861r2 and the text is not present in 11ax D0.4. The comment is resolved by 16/861r2. |
| 672 | 43.12 | Restrict Multi-STA BA to use SU format (non-HT, non-HT duplicate, HT, VHT SU, HE SU): ithere is no need to send per user Multi-STA BA in OFDMA or MU format (a technical contribution will be followed later) | Add: if AP chooses to send Multi-STA BA in response to UL-MU frames, then it should use one of the SU formats: non-HT, non-HT duplicate, HT, VHT SU, or HE SU | Reject. After sending UL OFDMA PPDUs, Multi-STA BA TX using SU PPDU in all cases may reduce the reliability of M-BA reception because the OBSS TX could be sent through the unused channel during UL PPDU duration as explained in 15/1330r0. |

**Discussion:**

**None**

TGax Editor: Change the subclause 10.3.2.11 in TGax D0.4 as follows

**10.3.2.11 MU acknowledgement procedure**

***Insert a new subclause heading before the first paragraph as follows:***

**10.3.2.11.1 Acknowledgement procedure for DL MU PPDU in SU format**

***Change the subclause as follows:***

The acknowledgment procedure performed by a STA that receives MPDUs that were transmitted within a VHT MU PPDU or an HE MU PPDU for DL transmission(#129, 406) is the same as the acknowledgment procedure for MPDUs that were not transmitted within a VHT MU PPDU or an HE MU PPDU for DL transmission (#129, 406).

NOTEAll MPDUs transmitted within a VHT MU PPDU or an HE MU PPDU for DL transmission(#129, 406) are contained within A-MPDUs, and the rules specified in 9.7.3 (A-MPDU contents) prevent an immediate response carried in SU format to more than one of the A-MPDUs.

Responses to A-MPDUs within a VHT MU PPDU or an HE MU PPDU for DL transmission(#129, 406) that are not immediate responses to the VHT MU PPDU or the HE MU PPDU for DL transmission(#129, 406) 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 carried in SU format(#405) to the VHT MU PPDU) and Figure 10-12 (An example of a TXOP containing a VHT MU PPDU transmission with no immediate acknowledgment carried in SU format(#405) to the VHT MU PPDU).

Recovery within the TXOP that contains a VHT MU PPDU or an HE MU PPDU for DL transmission (#129, 406) 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 for DL transmission (#129, 406) can be transmitted in a TXOP separate from the one that contained the VHT MU PPDU or the HE MU PPDU for DL transmission (#129, 406).

NOTE1A BlockAck frame ~~or~~, an Ack frame is sent in immediate response carried in SU format (#405) to the BlockAckReq frame for HT-immediate or HT-delayed Block Ack, respectively. An Ack frame might be sent in immediate response carried in SU format (#405) to a ~~VHT~~ ~~s~~Single MPDU in the VHT MU PPDU or the HE MU PPDU for DL transmission (#129, 406). A Multi-STA Block Ack frame is sent in immediate response to the BlockAckReq frame with multi-TID BAR variant or MU-BAR frame with multi-TID BAR variant (#131).

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.

***Insert a new subclauses 10.3.2.11.2 and 10.3.2.11.3 as follows:***

**10.3.2.11.2 Acknowledgement procedure for HE MU PPDU in MU format**

A non-AP STA that is the recipient, within an(#2829) HE MU PPDU, of a QoS Data or QoS Null(#2606) MPDU that solicits an immediate response with Ack Policy equal to MU Ack in QoS Control field, or of an MMPDU that solicits an immediate response (#130) 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) (see 9.3.1.23 (Trigger frame format))(#130, 407) or in the(#1402) MAC header (see 9.2.4.6.4.2 (UL MU response scheduling))(#130, 407). 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).

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