IEEE P802.11
Wireless LANs

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| Comment Resolution on MU Acknowledgement Procedure |
| Date: 2016-09-12 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D0.1 with the following CIDs (19 CIDs) :

* 2313
* 1410, 1454, 1728, 1897, 1411, 1729, 1898, 1899
* 1730, 1731, 1403
* 1427, 1409, 20
* 1732, 1733, 17, 133

**CID 2313**

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| CID | Clause Number | Page | Line | Comment | Proposed Change | Resolution |
| 2313 | 10.3.2.11.1 | 42 | 02 | No text for 10.3.2.11.1 General ? | The subclause "10.3.2.11.1 General" may be removed if we do not have any text for this subclause. | Revised:"10.3.2.11.1 General" is already removed in Draft 0.3 by TGax editor. |

**CID 1410, 1454, 1728, 1897, 1411, 1729, 1898, 1899**

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| CID | Clause Number | Page | Line | Comment | Proposed Change | Resolution |
| 1410 | 10.3.2.11.2 | 42 | 06 | It says "for DL MU PPDU in SU format". This seems self-contradictory | Delete "in SU format" | Revised:Already discussed and addressed in 16/862r1. To avoid confusion, the title should be slightly modified (see below). |
| 1454 | 10.3.2.11.2 | 42 | 06 | Subclause title appears wrong. What is a 'DL MU PPDU in SU format'? | Please clarify text |
| 1728 | 10.3.2.11.2 | 42 | 06 | I don't understand DL MU PPDU in SU format. How MU PPDU is mapped to SU format? | Clarify |
| 1897 | 10.3.2.11.2 | 42 | 06 | "MU acknowledgement procedure for DL MU PPDU" creates the impression that both the PPDU and the acknowledgement are in MU. In fact, the acknowledgement is in SU. | Replace "MU acknowledgement procedure for DL MU PPDU in SU format" with "SU-format acknowledgement procedure for DL MU PPDU" |
| 1411 | 10.3.2.11.3 | 42 | 34 | It says "for HE MU PPDU in MU format". This seems pleonastic | Delete "in MU format" |
| 1729 | 10.3.2.11.3 | 42 | 34 | This clause seems to address HE DL MU PPDU | replace HE MU PPDU by HE DL MU PPDU |
| 1898 | 10.3.2.11.3 | 42 | 34 | Title is confusing | Replace "MU acknowledgement procedure for DL MU PPDU in MU format" with "MU-format acknowledgement procedure for DL MU PPDU" |
| 1899 | 10.3.2.11.4 | 43 | 6 | Title is confusing | Replace "MU acknowledgement procedure for an UL MU transmission" with "Acknowledgement procedure for an UL MU transmission" | Accept:See below |

***TGax editor: Change the titles of 10.3.2.11.2 and 10.3.2.11.3 as follows:***

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

10.3.2.11.2 Acknowledgement procedure for DL MU PPDU in MU format

10.3.2.11.3 **Acknowledgement procedure for an UL MU transmission**

**CID 1730, 1731, 1403**

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| CID | Clause Number | Page | Line | Comment | Proposed Change | Resolution |
| 1730 | 10.3.2.11.3 | 42 | 51 | Figure 10-ax4: Unicast Trigger needs to be defined | define Unicast Trigger | Revised:See below |
| 1731 | 10.3.2.11.3 | 42 | 51 | Figure 10-ax4 needs further explanation. For example is every rectangle in the DL PPDU represents a 20 MHz channel? Does the TXOP consists only of just one MU PPDU and immediate ACKs? Are BAs are transmitted at the same Russ as in the MU PPDU? etc. | as in comment | Revised:See below  |
| 1403 | 10.3.2.11.3 | 42 | 49 | Presumably each of the BA boxes is for one of STA 0-6, but this is not stated | Add "from STA <n>" in each of the boxes | Revised:See below |

**Discussion:**

CID 1730:

The purpose of Figure 10-ax4 is not to explain about trigger frames, and it is not necessary to define “unicast trigger”. It should be changed to “A-MPDU with trigger containing UL trigger information” .

CID 1731:

The purpose of Figure 10-ax4 is not to explain about bandwidth or RU allocation and it should be simplied to avoid confusion as follows:

* In the current draft, no specific rules are defined on trigger frame bandwidth. In this figure, no bandwidth information is needed.
* The number of DL MU transmissions in a TXOP period is not limited to 1. In this figure, descriptions on TXOP are not necessary and should be removed.
* There is no text on RU allocation in this subclause. In this figure, RU allocation is not needed.

CID 1403:

Figure 10-ax4 is simplified and it is not necessary to identify the STAs. Therefore proposed changes are not necessary.

***TGax editor: Change Figure 10-ax4 and the caption as follows:***



Figure 10-ax4—An example of an HE MU PPDU transmission with an immediate UL OFDMA acknowledgement

**CID 1427, 1409, 20**

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| CID | Clause Number | Page | Line | Comment | Proposed Change | Resolution |
| 1427 | 10.3.2.11.4 | 43 | 17 | What we get here is a bunch of examples. Where are the actual rules? | Does the first para contain all the rules? If not, give them all. If so, explain how each example covers each of the rules | Accept in principle. Revised: See below. |
| 1409 | 10.3.2.11.4 | 43 | 05 | The rules for acknowledgement should be folded into the subclauses on the acknowledgement procedure in the baseline | As it says in the comment | Rejected:Descriptions on MU Acknowledgment for HE should be included only in this subclause (10.3.2.11) and 25.4 (Block acknowledgement). Other subclause (10.3.2.10) should not be changed to avoid confusion. |
| 20 | 10.3.2.11.4 | 43 | 45 | The benefit of enumerating the four cases of M-BA in Figures 10-ax5, -ax6, ax7, and ax8 is not clear. Depending on the number of STAs in the DL MU PPDU, there could be other combinations. | Suggest to combine these four figures into one and provide a simpler and more general concept of the M-BA frame. | Rejected:The figures are necessary to explain the rules of M-BA transmissions. It is difficult to combine them into one figure and explain the rules clearly. |

**Discussions**

CID 1427:

Regarding the rules of acknowledgment for UL MU transmissions, the following motions passed:

* The amendment shall define a mechanism for multiplexing DL acknowledgments sent in response to UL MU transmissions. [MU Motion 1, January 2015]
* The spec shall allow DL OFDMA transmission of Multi-STA Block ACK frame in response to UL MU PPDUs. [MAC Motion 44, November 2015]
* When an AP selects rate, MCS, NSS of M-BA or OFDMA BA that acknowledges the UL OFDMA, the AP may ignore the MCS, NSS of UL OFDMA PPDU that elicits the DL acknowledgement. The AP shall transmit the M-BA using one of rate, MCS, NSS that all of the acknowledgement receivers support. [MAC Motion 45, November 2015]

Therefore the rules of acknowledgment for UL MU should be the following:

* DL OFDMA BA transmissions are allowed (MAC Motion 45)
* M-BA transmissions are allowed : (MAC Motion 45)

- M-BA in DL OFDMA (MAC Motion 44)

- M-BA in a PPDU of non-HT duplicate, HT, VHT and HE-SU(including HE extended range SU) formats (There is no need to exclude any of them.)

***TGax editor: Change the text of 10.3.2.11.3 as follows:***

**10.3.2.11.3 Acknowledgement procedure for an UL MU transmission**

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. Multi-STA BlockAck transmissions are allowed in a non-HT (duplicate) PPDU, HT PPDU, VHT PPDU, HE SU (including HE extended range SU) PPDU and OFDMA HE MU PPDU. 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.

An example of DL OFDMA BA is shown in Figure 10-ax5 (An example of a TXOP containing an UL MU transmission with an immediate DL MU transmission containing unicast BlockAck frames acknowledging the frames received from the respective STAs).

An xample for Multi-STA BlockAck frame acknowledge­ment in a non-HT, HT, VHT or HE SU PPDU is given in Figure 10-ax6 (An example of a TXOP containing UL MU transmis­sions with an immediate Multi-STA BlockAck (M-BA) frame acknowledging the MPDUs that were correctly received from each STA. The UL MU transmission may be OFDMA or MU-MIMO).An example for Multi-STA BlockAck frame acknowledge­ment in a non-HT duplicate PPDU is given in Figure 10-ax7 (An example of a TXOP containing UL MU transmissions with an immediate DL non-HT duplicate PPDU containing the M-BA frame. The UL MU transmissions may be OFDMA or MU-MIMO) ,

An example for Multi-STA BlockAck frame acknowledge­ment in an OFDMA HE MU PPDU is given in Figure 10-ax8 (An example of a TXOP containing UL MU transmissions with an immediate OFDMA HE MU PPDU containing Multi-STA BlockAck frames. The UL MU transmissions may be OFDMA or MU-MIMO).

**CID 1732, 1733, 17, 133**

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| CID | Clause Number | Page | Line | Comment | Proposed Change | Resolution |
| 1732 | 10.3.2.11.4 | 43 | 36 | Figure 10-ax5 is confusing. Why is the need for all these TF? Shouldn't one broadcast TF be sufficient? | replace the many TFs by a single TF as in Figure 10-ax6. | Accept:See below |
| 1733 | 10.3.2.11.4 | 44 | 24 | Figure 10-ax7 is confusing. I think the intention is to show that M-BA frame can be transmitted in non-HT duplicate format. However the Figure can be understood as multiple M-BAs, one for each UL MU Data STA. | replace Figure 10-ax7 with one that illustrate the intended message. | Revised:In Figure 10ax-7, the size of the letters “non-HT duplicate transmission” should be larger.  |
| 17 | 10.3.2.11.4 | 43 | 45 | The IFS in Figures 10-ax5, -ax6, ax7, and ax8 is not specified. | Specify the IFS values. | Revised:xIFS is changed to SIFS. (as discussed in 16/0067r1 and approved in MU Motion 44) |
| 133 | 10.3.2.11.4 | 61 | 45 | The title of these Figures is very long. Provide concise titles and remove any normative text (these are examples at the end). Also do not use shading for the figures. | As in comment. | Revised:The titles of the figures are simplified. Shading in the figures is removed. |

**Discussions**

CID 1732:The rules on bandwidth or format for Trigger frame transmissions are not specified in the draft. In the examples on Figures 10ax-5,6,7 and 8, the conditions of Trigger frame transmissions should be the same to avoid confusion. Therefore the format of Trigger frame in Figure10ax-5 should be the same as used in Figures 10ax-6,7,8.

***TGax editor: Change the figures of 10-ax5, 10-ax6, 10-ax7 and 10-ax8 as follows:***



Figure 10-ax5—An example of an UL MU transmission with an immedi­ate DL MU transmission containing unicast BlockAck frames acknowledging



**Figure 10-ax6—An example of UL MU transmissions with an immediate Multi-STA BlockAck frame**(#1407) **acknowledging the MPDUs**



Figure 10-ax7—An example of UL MU transmissions with an immediate DL non-HT duplicate PPDU containing the M-BA frame.



**Figure 10-ax8—An example of UL MU transmissions with an immediate OFDMA HE MU PPDU containing Multi-STA BlockAck frames.**