### IEEE P802.11Wireless LANs

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| 11ax D0.1 Comment Resolution for Clause 25.5.3 |
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Abstract

This submission proposes resolutions for comments in clause

* 25.5.3 of TGax Draft 0.1 with the following CIDs: 53, 54, 56, 57, 604, 1553, 1554, 1555, 1557, ~~2656,~~ 2655

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Add resolution to CID 1554 and 2655.
* Rev 2: Remove 2656 and make some editorial changes.

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 D0.1 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D0.1 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.***

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| **CID** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 1557 | 61.08 | 25.5.3 | What does the "(s)" in "UL MU PPDU(s)" mean? You can have a bunch of back-to-back UL MU PPDUs without an intervening DL PPDU? | Delete the "(s)" | Revised – “UL MU PPDU” is not an appropriate term. Change it to “HE trigger-based PPDU”. “(s)” means the number of transmitters of “HE trigger-based PPDU” can be larger than 1. |
| 57 | 61.10 | 25.5.3 | Fig 25-2 seems to suggest that there are multiple UL MU PPDUs after the DL MU PPDUs, which is not the concept of cascading. Perhaps the figure should be revised, or at least change the "UL MU PPD(s)" to "UL MU PPDU". | As in the comment. | Revised – “UL MU PPDU” is not an appropriate term. Change it to “HE trigger-based PPDU”. “(s)” means the number of transmitters of “HE trigger-based PPDU” can be larger than 1. |

**Discussion:**

To be consistent, change “UL MU PPDU” to “HE trigger-based PPDU”. “(s)” means the number of transmitters of “HE trigger-based PPDU” can be larger than 1.

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| 1555 | 61.16 | 25.5.3 | This figure is not clear. What are the ellipsises at each end? | Show a full cascading sequence example | Accepted – Modified the figure as below. |

**Discussion:**

Change the term of “DL MU PPDU” to “HE MU PPDU” and “UL MU PPDU” to “HE Trigger-based PPDU” in this clause, respectively.

Besides, the origininal figure is not clear enough. The figure needs to be redrawn.

**Propose:**

Revised for 1557, 57.

Accepted for 1555.

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| 1554 | 61.01 | 25.5.3 | "A HE AP can initiate a cascading sequence of MU PPDUs in a TXOP, allowing alternating HE MU PPDUs and HE trigger-based PPDUs starting with a DL MU PPDU in the same TXOP," -- does the TXOP have to start with a DL MU PPDU? Why can't it start with a Trigger frame? | Delete the "starting with a DL MU PPDU" | Revised – TXOP is not nessary to start with DL MU PPDU, but a cascading sequence needs to start with DL MU PPDU.However, the capability bit for cascading MU has been defined already; we need to put the text on how the bit works. |
| 2655 | 61.01 | 25.5.3 | There's no reason that cascading sequence sarts with a DL MU PPDU in the same TXOP. For example, DL\_SU (Trigger) - UL MU - DL MU - UL MU is one possible sequence that should be supported. As long as an AP is TXOP holder, it is not important which MU PPDU comes first. | Modify the sentence to "... allowing alternating HE MU PPDUs and HE trigger-based PPDUs in the same TXOP, as illustrated ...". | Revised – TXOP is not nessary to start with DL MU PPDU, but a cascading sequence needs to start with DL MU PPDU. However, the capability bit for cascading MU has been defined already; we need to put the text on how the bit works. |

**Discussion:**

A cascading sequence is a sequence inside its TXOP; it can be part of a TXOP or a whole TXOP.

The case that an AP transmits a trigger frame is just for UL MU procedure; AP can reply the HE Trgger-based PPDUs with an M-BA inside a DL MU PPDU. In this case, cascading sequence starts from AP’s DL MU PPDU if there is a trigger frame/field in this DL MU PPDU.

The definition of such DL MU PPDU is also needed.

Besides, since we already defined the capability bit for cascading MU, the behaviour of this bit also needs to be added here.

**Propose:**

Revised for 1554, 2655

Change the referrd text and add a new figure for this case.

If MU Cascading Support bit in the HE MAC Capabilities Information field is set to 1 by both HE AP and HE non-AP STA(s), ~~An~~ the HE AP can initiate a cascading sequence of MU PPDUs in a TXOP, allowing alternating HE MU PPDUs and HE trigger-based PPDUs starting with an ~~DL~~HE MU PPDU in the same TXOP, as illustrated in Figure 25-2 (An example of cascading sequence of MU PPDUs).

An HE MU PPDU transmitted by the AP, SIFS, after an HE Trigger-based PPDU has the following A-MPDU contents:

-          At most one Ack, BlockAck or multi-STA BlockAck for the preceding HE Trigger-based PPDU and,

-          Zero or more MPDUs and,

-          One or more Trigger frames or UL MU Response Scheduling A-Control fields if this is not the last PPDU of the MU cascading sequence.

If MU Cascading Support bit in the HE MAC Capabilities Information field is set to 0 by an HE AP, the HE AP shall not initiate a cascading sequence of MU PPDUs in its TXOP(s).

If MU Cascading Support bit in the HE MAC Capabilities Information field is set to 0 by an HE non-AP STA, the HE AP associated by the HE non-AP STA shall not initiate a cascading sequence of MU PPDUs to the HE non-AP STA in its TXOP(s).

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| 604 | 61.12 | 25.5.3 | Interframe space was already defined (Fig.25-2) | Replace xIFS with SIFS | Accepted |
| 56 | 61.10 | 25.5.3 | Specfiy the IFS value in Fig 25-2. | Change the xIFS to IFS. | Accepted |

**Discussion:**

Based on 11ax Draft 0.5, xIFS between DL MU PPDU and its followed HE Trigger-based PPDU is SIFS.

**Propose:**

Accepted for 604, 56.

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| 54 | 61.20 | 25.5.3 | This is not clear: "The cascading sequence may have a different set of transmitters in HE trigger-based PPDUs as compared to the DL HE MU PPDU that follows the HE trigger-based PPDUs within the same TXOP." In a TXOP, an AP may trigger one set of STAs and at anotehr time within the same TXOP trigger another set of STAs. Therefore, the distiction made regarding the cascading is not clear here. | Revise and clarify as in the comment. | RevisedCompared to the previous triggered PPDUs, AP can transmit to different set of non-AP STAs in the immediate followed MU PPDU; meanwhile, compared to the previous DL MU PPDU, AP can immediately trigger different set of non-AP STAs.  |

**Discussion:**

The existing statement only mentioned the case that DL MU can have different set of destination from the set of transmitters in the previous triggered PPDUs. And it does not mention the time between DL MU PPDU and trigger-based PPDUs.

**Propose:**

Revised. Change the sentence to:

The cascading sequence may have a different set of transmitters in HE trigger-based PPDUs as compared to the DL HE MU PPDU that immediately follows the HE trigger-based PPDUs within the same TXOP. The cascading sequence may have a different set of transmitters in DL HE MU PPDU as compared to the HE Trigger-based PPDUs that immediately follows the DL HE MU PPDU within the same TXOP.

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| 53 | 61.19 | 25.5.3 | By definition, there is only one DL transmitter in a BSS at any time! This is redundant "The cascading sequence has only one DL transmitter." | Remove "The cascading sequence has only one DL transmitter." | Agreed |

**Discussion:**

Based on current rule, only one DL transmitter is allowed even in a TXOP. The case of multiple DL transmitters never happens.

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| ~~2656~~ | ~~61.01~~ | ~~25.5.3~~ | ~~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.~~~~Addressed by Alfred in doc 16/1361~~~~The AC rule of trigger frame has been defined already. Please refer to the resolution to CID 593 in 16/0929r3.~~ |

**~~Discussion:~~**

~~Based on the resolution to CID593 in 16/0929r3, The AC rule for trigger frame has been defined in 25.5.2.2.3 of 11ax Draft 0.5.~~

~~“~~*~~An AP may send the Trigger frame using any access category and follows the rules defined in 10.22.2 (HCF contention based channel access (EDCA)) for obtaining and sharing the TXOP~~*~~.”~~

**~~Propose:~~**

~~Revised for 53, 2656.~~

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| 1553 | 61.01 | 25.5.3 | "A HE AP can initiate a cascading sequence of MU PPDUs in a TXOP, allowing alternating HE MU PPDUs and HE trigger-based PPDUs starting with a DL MU PPDU in the same TXOP," -- I don't understand the last bit | Delete the "in the same TXOP" | RejectedSince a cascading sequence does not allowing alternating HE MU PPDUs and HE trigger-based PPDUs in different TXOPs, it is necessary to have “in the same TXOP”. |

**Discussion:**

Since a cascading sequence does not allow alternating HE MU PPDUs and HE trigger-based PPDUs in different TXOPs, we need “in the same TXOP”.

**Propose:**

Rejected for 1553

***TGax editor: Modify the Paragraphs on section 25.5.3 as the following:***

***Replace the current Figure 25-2 into the following figure.***



**Figure 25-2—An example of cascading sequence of MU PPDUs**

**25.5.3 HE MU cascading operation**

A TXOP can include both DL MU and UL MU transmissions.

If MU Cascading Support bit in the HE MAC Capabilities Information field is set to 1 by both HE AP and HE non-AP STA(s), ~~An~~ the HE AP can initiate a cascading sequence of MU PPDUs in a TXOP, allowing alternating HE MU PPDUs and HE trigger-based PPDUs starting with an ~~DL~~HE MU PPDU in the same TXOP, as illustrated in Figure 25-2 (An example of cascading sequence of MU PPDUs).

An HE MU PPDU transmitted by the AP, SIFS, after an HE Trigger-based PPDU has the following A-MPDU contents:

-          At most one Ack, BlockAck or multi-STA BlockAck for the preceding HE Trigger-based PPDU and,

-          Zero or more MPDUs and,

-          One or more Trigger frames or UL MU Response Scheduling A-Control fields if this is not the last PPDU of the MU cascading sequence.

If MU Cascading Support bit in the HE MAC Capabilities Information field is set to 0 by an HE AP, the HE AP shall not initiate a cascading sequence of MU PPDUs in its TXOP(s).

If MU Cascading Support bit in the HE MAC Capabilities Information field is set to 0 by an HE non-AP STA, the HE AP associated by the HE non-AP STA shall not initiate a cascading sequence of MU PPDUs to the HE non-AP STA in its TXOP(s).

~~The cascading sequence has only one DL transmitter.~~ The cascading sequence may have different UL transmitters within each HE trigger-based PPDU(#1556). The cascading sequence may have a different set of transmitters in HE trigger-based PPDUs as compared to the ~~DL~~ HE MU PPDU that immediately follows the HE trigger-based PPDUs within the same TXOP. The cascading sequence may have a different set of receivers in DL HE MU PPDU as compared to the HE Trigger-based PPDUs that immediately follows the DL HE MU PPDU within the same TXOP.