IEEE P802.11  
Wireless LANs

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| TXOP Return in MU-RTS TXS | | | | |
| Date: 2021-01-20 | | | | |
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r0: initial version

r1: change the base line to draft 1.5

r2: two modifications according to feedback during the presentation (in blue)

1. Add the capability bit for AP side
2. Add a sentence to clarify that if the TXOP return frame fails, the non-AP STA may retransmit the return frame.

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5027 | Evgeny Khorov | 35.2.1.3 | 243.54 | When the EHT STA receives more channel time with an MU-RTS TXS Trigger frame than it needs, it shall be able to return back the remaining channel time by sending a QoS-Null frame | Add the described rule | Revised.  Agree with the commenter in principle.  TGbe editor to make changes in 11-22/0186r2 under CID 5027 |
| 5235 | Ilya Levitsky | 35.2.1.3 | 243.53 | Add an ability to the EHT STA that receives channel time with an MU-RTS TXS Trigger frame to return back the remaining channel time by sending a QoS-Null frame or CF-End | As in comment | Revised.  Agree with the commenter in principle.  TGbe editor to make changes in 11-22/0186r2 under CID 5027 |
| 6384 | Morteza Mehrnoush | 35.2.1.3.2 | 244.34 | In TXOP Sharing mode=2, after time allocation, AP doesn't have any machanism to recalim the medium during the allocated time; this may result in medium usage inefficiency if there is no UL/DL TX between P2P pair. Please add a recovery mechanism for the AP so that it could reclaim the medium if it's idle for X duration. | as in comment | Revised.  Agree with the commenter in principle.  TGbe editor to make changes in 11-22/0186r2 under CID 5027 |
| 8194 | Yunbo Li | 35.2.1.3.3 | 245.59 | The procedure of Triggered TXOP sharing is not complete, a termination signaling from allocated STA should be provided. Otherwise, the unused time period of the allocated STA will be wasted and the OBSS STA may jump in the TXOP. | Define a termination signaling mechanism for the STA that be allocte time in Triggered TXOP sharing. | Revised.  Agree with the commenter in principle.  TGbe editor to make changes in 11-22/0186r2 under CID 5027 |
| 5962 | Liwen Chu | 35.2.1.3 | 243.53 | The recovery of STA idle within the duration allocated to STA is not defined. | Add the related text. | Revised.  For the TXOP Sharing mode=1, the P802.11be D1.4 already clarifies that AP could transmit when “the medium is idle at the TxPIFS slot boundary after the end of either the transmission of an immediate response frame sent to that STA or the reception of a frame from that STA that did not require an immediate response”.  For the TXOP Sharing mode=2, agree with the commenter in principle.  TGbe editor to make changes in 11-22/0186r2 under CID 5027 |
| 4738 | Chunyu Hu | 35.2.1.3.3 | 245.59 | In the Triggered TXOP sharing procedure, AP allocates some time (TXOP) to the non-AP STA, however the non-AP STA may or may not have pending traffic to transmit, or it knows already the txop it needs and it is less than the time allocated. Should introduce a signaling to allow non-AP STA as receiver of the MU-RTS TXS Trigger frame to indicate so. | As commented | Revised.  CIDs 5027, 5235, 6384, 8194, and 5962 state more general cases, the proposed solution also can address the issue mentioned in this comment.  TGbe editor to make changes in 11-22/0186r2 under CID 5027 |

**Discussion:**

This topic was discussed in doc 11-21/0552, several potential solutions of the signaling were proposed. Technically, each solution could work, but the group can not reach consensus due to different preference and concerns of each individual member.

* Command and Status (CAS) A-control
* A new A-control type
* More Data subfield in Frame Control field

Among all potential solutions, CAS control looks like a relative better place to carry the signalling. It just resue the current signalling in RDG procedure, which is a minor change for the spec. So the proposed resolution is based on CAS control.

During the offline discussion, some members mentioned that whether a STA sending the TXOP return signalling should be under AP’s control. This could be a separate open question that the group can discuss. It can be added on top of the TXOP return procedure later after the group reach consensus on this point. So it is not included in the resolution here.

1. **Introduction**

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 TGbe Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

1. **Proposed spec text**

The baseline for this text is TGbe D1.5 and REVme\_D1.0

***TGbe editor: Modify the paragraphs in 9.2.4.6.1(General) as follows:***

**9.2.4.6.1 General**

The RDG/More PPDU subfield of the HT Control field is interpreted differently depending on whether it is transmitted by an RD initiator, an RD responder, or the target STA in a MU-RTS TXS Trigger frame as defined in Table 9-15 (RDG/More PPDU subfield values). (#5027)

**Table 9-17—RDG/More PPDU subfield values** (#5027)

|  |  |  |
| --- | --- | --- |
| Value | **Role of transmitting STA** | **Interpretation of value** |
| 0 | Neither an RD responder nor a target STA in a MU-RTS TXS Trigger frame | No reserve grant |
| RD responder | The PPDU carrying the frame is the last transmission by the RD responder |
| Target STA in a MU-RTS TXS Trigger frame | The PPDU carrying the frame is the last transmission by the target STA in a MU-RTS TXS Trigger frame |
| 1 | RD initiator | An RDG is present |
| RD responder or the target STA in a MU-RTS TXS Trigger frame | The PPDU carrying the frame is followed by another PPDU |

***TGbe editor: Modify the paragraphs in 9.4.2.313.2(EHT MAC Capabilities Information field) as follows:***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 |
|  | EPCS Priority Access Supported | EHT OM Control Support | Triggered TXOP Sharing Mode 1 Support | Triggered TXOP Sharing Mode 2 Support | Restricted TWT Support |
| Bits | 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B5 | B6 B7 | B8 | B9 | B10 B15 |
|  | SCS Traffic Description | Maximum MPDU Length | Maximum A-MPDU Length Exponent Extension | TXOP Return Support In TXOP Sharing Mode 2(#5027) | Reserved |
| Bits | 1 | 1 | 1 | 1 | 6 |

**Figure 9-1002af—EHT MAC Capabilities Information field format**

**Table 9-401k—Subfields of the EHT MAC Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| … | … | … |
| Maximum A-MPDU Length Expo-nent Extension | Indicates the exponent extension for the maximum A-MPDU length sup-ported in reception (see 35.6 (A-MPDU operation in an EHT PPDU)). | Set to the value of the maximum A-MPDU exponent extension value. |
| TXOP Return Support In TXOP Sharing Mode 2 | Indicates support for receiving a frame with the RDG/More PPDU subfield in the CAS Control subfield of the HE variant HT Control field from a non-AP STA in TXOP Sharing Mode 2 (see 35.2.1.2 (Triggered TXOP sharing procedure)). | For an EHT AP:  Set to 1 to indicate that the AP is capable of receiving a QoS Data or QoS Null frame with the RDG/More PPDU subfield in the CAS Control subfield of the HE variant HT Control field from a non-AP STA in TXOP Sharing Mode 2.  Set to 0 otherwise.  For an non-AP EHT STA:  Reserved. (#5027) |

***TGbe editor: Change following paragraph in 35.2.1.3.2 (AP behavior) as follows:***

**35.2.1.2.2 AP behavior**

If the EHT AP receives a CTS frame in response to its transmitted MU-RTS TXS Trigger frame to a non-AP EHT STA(#8315) with the TXOP Sharing Mode subfield equal to 2, then the AP shall not transmit any PPDU(#7328) within the allocated time specified in the MU-RTS TXS Trigger frame unless:

* The PPDU carries an immediate response that is solicited by the non-AP STA(#4190)(#5152).The AP with the TXOP Return Support In TXOP Sharing Mode 2 subfield set to 1 received a frame from the non-AP STA, if the RDG/More PPDU subfield in the CAS Control subfield of the HE variant HT Control field is set to 0. (#5027)

***TGbe editor: add following paragraphs at the end of 35.2.1.3.3 (Non-AP STA behavior) as follows:***

**35.2.1.2.3 Non-AP STA behavior**

During the time allocated by an associated AP, the non-AP EHT STA may transmit non-TB PPDUs to the AP or another STA if the TXOP Sharing Mode subfield value is 2(#6530)(#7331). The non-AP EHT STA may transmit a QoS Data or QoS Null frame to an associated AP to terminate the allocated time, if the RDG/More PPDU subfield in CAS Control subfield of the HE variant HT Control field is equal to 0. If the QoS Data or QoS Null frame fails, the non-AP EHT STA may retransmit the QoS Data or QoS Null frame.(#5027)

***End of change***