IEEE P802.11
Wireless LANs

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|  CR on 10.22.2.8 TXOP limits |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs:

* 6189, 7040, 9412

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Including HE sounding case

***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.***

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| CID | Page.line | Comment | Proposed Change | Resolution |
| 6189 | 133.25 | The baseline spec does not allow a transmission that exceeds the TXOP limit for any fragmentable data. TXOP limit rules must be updated for HE STAs capable of dynamic fragmentation. | As per comment | Revised –Agree in principle with the comment.HE fragmentation has different rules on generating fragments. The referred paragraph is revised so that it could be applied properly to HE STAs.TGax editor to make the changes shown in 11-17/0088r0 under the heading that include CID 6189. |
| 7040 | 132.53 | From the dynamic fragmentation capabilities in HE STA, 11ax needs to revise exception rules that allow a STA to exceed the TXOP limit. TXOP limit exception rules should be revised for HE STAs considering dynamic fragmentation capabilities. | As per comment. | Revised –Agree in principle with the comment.HE fragmentation has different rules on generating fragments. The referred paragraph is revised so that it could be applied properly to HE STAs.TGax editor to make the changes shown in 11-17/0088r0 under the heading that include CID 6189. |
| 9412 | 133.25 | In the baseline, there are several exceptions that allows a STA to exceed the TXOP limit which can be avoided in HE BSS (regarding dynamic fragmentation). For better channel utilization of HE AP, the TXOP limit exception rules must be further clarified for HE STAs. | As per comment | Revised –Agree in principle with the comment.HE fragmentation has different rules on generating fragments. The referred paragraph is revised so that it could be applied properly to HE STAs.TGax editor to make the changes shown in 11-17/0088r0 under the heading that include CID 6189. |

**Discussion:**

The following paragraph is quoted from 11mc, D8.0, 10.22.2.8 TXOP limits. In the paragraph, several cases where non-zero TXOP limit value may be exceeded are listed.

*The TXOP holder may exceed the TXOP limit only if it does not transmit more than one Data or Management frame in the TXOP, and only for:*

* *Retransmission of an MPDU, not in an A-MPDU consisting of more than one MPDU*
* *Initial transmission of an MSDU under a block ack agreement, where the MSDU is not in an A-MPDU consisting of more than one MPDU and the MSDU is not in an A-MSDU*
* *Transmission of a Control MPDU or a QoS Null MPDU, not in an A-MPDU consisting of more than one MPDU*
* *Initial transmission of a fragment of an MSDU or MMPDU, if a previous fragment of that MSDU or MMPDU was retransmitted*
* *Transmission of a fragment of an MSDU or MMPDU fragmented into 16 fragments*
* *Transmission of an A-MPDU consisting of the initial transmission of a single MPDU not containing an MSDU and that is not an individually addressed Management frame*
* *Transmission of a group addressed MPDU, not in an A-MPDU consisting of more than one MPDU*
* *Transmission of a null data packet (NDP)*
* *Transmission of a VHT NDP Announcement frame and NDP or transmission of a Beamforming Report Poll frame, where these fit within the TXOP limit and it is only the response and the immediately preceding SIFS that cause the TXOP limit to be exceeded.*
1. The fourth bullet allows a TXOP holder to exceed the TXOP limit value for *Initial transmission of a fragment of an MSDU or MMPDU, if a previous fragment of that MSDU or MMPDU was retransmitted*.
Even if the size of the first fragment was defined under the TXOP limit rules, MAC must be able to rate select down in case of retransmission and that may cause the TXOP limit to be exceeded. In static fragmentation, if any of previous fragments have been retransmitted, MAC cannot change the size of subsequent fragments. Therefore, subsequent fragments with the same size also must be allowed to cause the TXOP limit to be exceeded.
However, in dynamic fragmentation, MAC can resize subsequent fragments so that they could fit into the TXOP limit even with lower rate. Hence the fourth bullet should not be applied to transmission of dynamic fragmentation. Otherwise, HE STA could make subsequent fragments of any sizes without considering the TXOP limit.
2. The fifth bullet allows a TXOP holder to exceed the TXOP limit value for *Transmission of a fragment of an MSDU or MMPDU fragmented into 16 fragments*.
In static fragmentation, once the size of the first fragment of an MSDU is defined, the number of total fragments and the size of each fragment are also defined. Therefore, if the first fragment of an MSDU is generated and it requires the total number of fragments to be 16, then each fragment may cause the TXOP limit to be exceeded including the first fragment.
However, in dynamic fragmentation, MAC may not predict how many fragments will be generated until when the last fragment(MF=0) is generated. Hence, only the 16th fragment may cause the TXOP limit to be exceeded.
(NOTE- 11ax allows fragmentation of an A-MSDU)
3. HE NDP Announcement frame also must be included in the ninth bullet.
4. An originator of dynamic fragmentation must generate the first dynamic fragment of an MSDU thereof the size must be greater than the minimum fragment size specified by the recipient. Since MAC cannot generate the first dynamic fragment of an MSDU smaller than the specified value, transmission of the first fragment may cause TXOP limit to be exceeded. In this case, the originator must make the fragment as small as possible. Therefore, the size of the first fragment must be set to the minimum fragment size.

**10.22.2.8 TXOP limits**

**TGax Editor: *Insert the following paragraphs below before the last paragraph of subclause 10.22.2.8*** *in page 133 of D1.0 (#CID 6189, 7040, 9412)*

The TXOP holder may exceed the TXOP limit only if it does not transmit more than one Data or Management frame in the TXOP, and only for:

* Retransmission of an MPDU, not in an A-MPDU consisting of more than one MPDU
* Initial transmission of an MSDU under a block ack agreement, where the MSDU is not in an A-MPDU consisting of more than one MPDU and the MSDU is not in an A-MSDU
* Transmission of a Control MPDU or a QoS Null MPDU, not in an A-MPDU consisting of more than one MPDU
* Initial transmission of a static fragment of an MSDU or MMPDU, if a previous fragment of that MSDU or MMPDU was retransmitted
* Transmission of a static fragment of an MSDU or MMPDU fragmented into 16 fragments
* Transmission of the 16th dynamic fragment of an MSDU or MMPDU or A-MSDU
* Transmission of an A-MPDU consisting of the initial transmission of a single MPDU not containing an MSDU and that is not an individually addressed Management frame
* Transmission of a group addressed MPDU, not in an A-MPDU consisting of more than one MPDU
* Transmission of a null data packet (NDP)
* Transmission of a VHT/HE NDP Announcement frame and NDP or transmission of a Beamforming Report Poll frame, where these fit within the TXOP limit and it is only the response and the immediately preceding SIFS that cause the TXOP limit to be exceeded.
* Transmission of the first dynamic fragment of an MSDU or MMPDU, if the minimum fragment size specified by the receiver STA causes the TXOP limit to be exceeded. The size of the fragment shall be set to the minimum fragment size.

Except as described above, a STA shall fragment an individually addressed MSDU or MMPDU so that the

initial transmission of the first fragment does not cause the TXOP limit to be exceeded.

NOTE 3—The TXOP limit is not exceeded for:

* Initial transmission of an MPDU containing an unfragmented though fragmentable (see 10.2.7 (Fragmentation/ defragmentation overview)) MSDU/MMPDU
* Initial transmission of the first static fragment of a fragmented MSDU/MMPDU, except for an MSDU/MMPDU fragmented into 16 fragments
* Initial transmission of dynamic fragments of a fragmented MSDU/MMPDU/A-MSDU, except for, either the 16th fragment, or the first fragment of a fragmented MSDU/MMPDU when the minimum fragment size specified by the receiver STA causes the TXOP limit to be exceeded
* Initial transmission of an A-MSDU
* Initial transmission of a fragment of a fragmented MSDU/MMPDU, if no previous fragment of that MSDU/ MMPDU was retransmitted, except for an MSDU/MMPDU fragmented into 16 fragments
* Transmission of an A-MPDU consisting of a single MPDU containing an A MSDU or individually addressed Management frame, unless this is a retransmission of that MPDU
* Transmission of an A-MPDU consisting of more than one MPDU, even if some or all of the MPDUs are retransmissions