IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Proposed resolution for CID 5008 (TXOP limit) | | | | | | Date: 2020-09-11 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Chittabrata Ghosh | Intel | 3600 Juliette Ln, Santa Clara, CA 95054 | +1-415-244-8904 | [chittabrata.ghosh@intel.com](mailto:chittabrata.ghosh@intel.com) | | Robert Stacey | Intel |  |  | [robert.stacey@intel.com](mailto:robert.stacey@intel.com) | | Cheng Chen | Intel |  |  | [cheng.chen@intel.com](mailto:cheng.chen@intel.com) | | Gaurav Patwardhan | HPE |  |  | gaurav.patwardhan@hpe.com | | Eldad Perahia | HPE |  |  | eldad.perahia@hpe.com | | Liang Li | HPE |  |  | liang.li2@hpe.com | | Chuck Lukaszewski | HPE |  |  | Chuck.Lukaszewski@hpe.com | | Malcolm Smith | Cisco |  |  | [mmsmith@cisco.com](mailto:mmsmith@cisco.com) | | Pooya Monajemi | Cisco |  |  | [pmonajem@cisco.com](mailto:pmonajem@cisco.com) | | Brian Hart | Cisco |  |  | [brianh@cisco.com](mailto:brianh@cisco.com) | |

Abstract

Proposed language to address TGmd D4.0 SA2

Changes are referenced to TGmd D4.0.

r0: Initial Draft

r1: Changes based on offline discussions

r2: Included CID 5008, Introduction section, and a Reference section

# CID 5008

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| **CID** | **Clause** | **Page Line** | **Comment** | **Proposed Change** |
| 5008 | 10.23.2.9 | 1830 | Rules in SC 10.23.2.9 (TXOP limits) need to be strict to disallow TXOP bursting with multiple PPDUs within a TXOP in the case when TXOP limit is set to 0.  In addition, rules in SC 10.23.2.9 (TXOP limits) need to be strict for when the TXOP limit can be exceeded for the case when TXOP limit is non-zero     Minor changes might need to be made in SC 10.23.2.2 (EDCA backoff procedure) while describing the transmission of an MPDU in final PPDU within a TXOP. | The text “A TXOP limit of 0 indicates that the TXOP holder may transmit or cause to be transmitted (as responses) the following within the current TXOP:” may be replaced with the following text “A TXOP limit of 0 indicates that the TXOP holder shall not transmit or cause to be transmitted (as responses) more than one of the following within the current TXOP, at any rate, subject to the rules in 10.6 (Multirate support)”    The text “The TXOP holder may exceed the TXOP limit only if it does not transmit more than one Data or Management frame in the TXOP, only if it does not transmit a DL-MU-MIMO(M101) PPDU in the TXOP,(#163) and only for the following situations:” may be replaced with “The TXOP holder shall not exceed the TXOP limit if any of the following situations apply:  — Transmission of more than one PPDU containing at least Data or Management frame in the TXOP  — Transmission of a DL-MU-MIMO(M101) PPDU in the TXOP,(#163) ” |

### Introduction

The original mechanisms as in [1] do have limiting conditions on the number of PPDUs that are allowed by a non-AP STA device within a TXOP duration when the tXOP limit is 0. However, based on the conclusions in [2], it is observed that a burst of PPDUs are transmitted within a TXOP duration when the TXOP limit is 0.

In addition, for non-zero value of TXOP limit, it is observed in [2] that a STA device does not restrict its set of PPDU transmissions within the advertised non-zero TXOP limit. We believe that the rules in [1] are not strict enough to prohibit a non-AP STA device from over-ruling the advertised TXOP limit.

This contribution attempts to resolve the conclusions made in [2] by restricting the rules for TXOP limit [1] based on changes proposed by the Commenter in CID 5008.

### Changes required for the negotiation extensions

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 TGmd Draft. This introduction is not part of the adopted material.

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

***TGmd Editor: Editing instructions preceded by “Tgmd Editor” are instructions to the Tgmd editor to modify existing material in the Tgmd draft. As a result of adopting the changes, the Tgmd editor will execute the instructions rather than copy them to the Tgmd Draft.***

***All changes shown in this document are with reference to Tgmd Draft 4.0.***

**Proposed Changes to TGmd D4.0:**

***TGmd editor: within TGmd D4.0, in 10.23.2.2 EDCA backoff procedure, change the text as shown:***

**10.23.2.2** **EDCA backoff procedure**

The backoff procedure shall be invoked by an EDCAF when any of the following events occurs:

* (M230)(#4365)An MA-UNITDATA.request primitive is received that causes an MPDU corresponding to the EDCAF’s AC to be queued for transmission such that all of the following are true:
* one of the transmit queues associated with that AC has now become non-empty
* any other transmit queues associated with that AC are empty
* the backoff counter has a value of 0 for that AC
* the medium is busy on the primary channel as indicated by any of the following:
* physical CS
* virtual CS
* a nonzero TXNAV timer value
* for a mesh STA that has dot11MCCAActivated true, a nonzero RAV timer value .
* (#4365)For the EDCAF that is the TXOP holder, the transmission of the final PPDU transmitted by the TXOP holder during the TXOP has completed and/or the TXNAV timer has expired, whichever is shorter.

NOTE: The transmission of the MPDU in the final PPDU during the TXOP is subject to the TXOP limit (see

10.23.2.9 TXOP limits)

* (#4365)For the EDCAF that is the TXOP holder, the transmission of an MPDU in the initial PPDU of a TXOP fails, as defined in this subclause.
* (#4365)A transmission attempt by the EDCAF collides internally with another EDCAF of an AC that has higher priority, that is, two or more EDCAFs in the same STA are granted a TXOP at the same time.(#1507)

***TGmd editor: within TGmd D4.0, in 10.23.2.9 TXOP limits, change the text as shown:***

* + - 1. **TXOP limits**

A TXOP limit of 0 indicates that the TXOP holder shall not transmit or cause to be transmitted (as responses) more than one of the following within the current TXOP, at any rate, subject to the rules in 10.6 (Multirate support):

* One or more SU PPDUs carrying fragments of a single MSDU or MMPDU
* An SU PPDU or a VHT MU PPDU carrying a single MSDU, a single MMPDU, a single A‑MSDU, or a single A-MPDU

NOTE: An aggregation of PPDUs that are separated by SIFS is not an SU PPDU or a VHT MU PPDU

* A VHT MU PPDU carrying A-MPDUs to different users (a single A-MPDU to each user)
* A QoS Null frame or PS-Poll frame (11ah)that is not an PS-Poll+BDT frame

In addition, a TXOP limit of 0 indicates that the TXOP holder may transmit or cause to be transmitted (as responses) the following within the current TXOP:

a) Any required acknowledgments

b) Any frames required for protection, including one of the following:

* An RTS/CTS exchange
* CTS to it(#4241)
* Dual CTS as specified in 10.3.2.10 (Dual CTS protection)

c) Any frames required for beamforming as specified in 10.31 (Sounding PPDUs), 10.36.5 (VHT sounding protocol) and 10.42 (DMG beamforming).

d) Any frames required for link adaptation as specified in 10.32 (Link adaptation)

e) Any number of BlockAckReq frames

The TXOP holder shall not exceed the TXOP limit if any of the following situations apply:

* Transmission of more than one PPDU containing a Data or Management frame in the TXOP
* Transmission of a DL-MU-MIMO(M101) PPDU in the TXOP (#163)

The TXOP holder may exceed the TXOP limit for the following situations:

* Retransmission of an MPDU, not in an A-MPDU consisting of more than one MPDU
* Transmission of an MSDU or MMPDU less than 600 octets by an S1G non-sensor STA(M72)
* Transmission of a fragment of an MSDU or MMPDU, the fragment being less than 256 octets, by an S1G non-sensor STA(M72)
* 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 frame or a QoS Null frame(#1444) , 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 dataPPDU(#1379) (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.

**References:**

1. P802.11 Tgmd Draft 4.0
2. Liang Li, “Non-AP STA TXOP Frame Bursting Testing**,”** IEEE802.11-20/1076r1, 2020-07-13