IEEE P802.11
Wireless LANs

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| Comment resolution for CID 13084 |
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Abstract

This submission proposes resolution for CID 13084 of TGax Draft 2.3

**Revisions :**

* Rev 0 : Initial version of the document
* Rev 1 : adaptation to draft 2.3
* Rev 2 : Changes in section **27.7.5** to capture the comments during MAC ad-hoc 5/2 PM1

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| **CID** | **Pg, Li** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 13084 | 92,32 | 9.3.1.23 | "The No Further RA RU subfield is set to 1 to indicate that random access RUs are not allocated in subsequentTrigger frames that are sent before either the end of the current TWT SP or the end of the currentTXOP in the case of no TWT SP."This information is not sufficient for a non-AP STA to decide going in doze state or not. If a scheduled RU is assigned to a STA after the "No further random RUs" was set to 1, if it is in doze state, it cannot answer to a scheduled RU. Moreover this bit seems to be limited for the TWT usage. But why not extend for others cases ? | Add another bit to drive the status "No further scheduled RU" and remove the words "before either the end of the current TWT SP or the end of the current TXOP in the case of no TWT SP" | RevisedAgree with the comment. For the power saving of UORA STAs, a new field “No More Scheduled RU” (in addition to No More RA-RU field) shall be added to determine an early TWT SP termination event.TGax editor makes changes as shown in 11-18/0388r1 that are marked with CID 13084. |

**Discussion:**

Although a trigger frame indicates no available random RUs in subsequent trigger frames by using the “No More RA-RU” subfield, some scheduled RUs can be allocated for a given station by the AP in subsequent trigger frames. Indeed, as soon as the trigger frame is not intended for a given station and contains one or more RA-RUs, the given station can gain access according to 27.5.5 (UL OFDMA-based random access (UORA)).

*[27.7.5 Power save operation during TWT SPs*

*NOTE 2—A Trigger frame, sent by the TWT scheduling AP, is defined as intended for the TWT scheduled STA when the Trigger frame contains the AID of the STA in one of its Per User Info fields (see 27.5.3 (UL MU operation)), and can have in the TA field the MAC address of the AP or the transmitted BSSID under the conditions defined in 27.5.3.2.3 (Allowed settings of the Trigger frame fields and UMRS Control subfield(#14137)). Otherwise, the Trigger frame is not intended for the STA. If the Trigger frame contains one or more RA-RUsfor which the STA can gain access according to 27.5.5 (UL OFDMA-based random access (UORA)) then the STA can follow the rules defined in 27.14.2 (Power save with UORA) to determine an early TWT SP termination event.]*

*[27.5.5.2 UORA procedure*

*For an HE STA that has a pending frame for the AP, upon the reception of a Trigger frame containing at least one eligible RA-RU(#11033), if the OBO counter of an HE STA is not greater than the number of eligible RA-RUs(#11033) in a Trigger frame from that AP, then the HE STA shall decrement its OBO counter to zero. Otherwise, the HE STA decrements its OBO counter by the number of eligible RA-RUs(#11033) in the Trigger frame.]*

Consequently, if the station enters in anticipated manner in doze mode (due to the value of the subfield “No More RA-RU”) and neitheless received a subsequent trigger frame intended for it, the station (in doze mode) is not able to transmit a HE TB PPDU in the scheduled RUs assigned by the AP which is not compliant with the section 27.5.3.3 STA of the IEEE 802.11ax standard.

[*section 27.5.3.3 STA behavior for UL MU operation :*

*A STA shall transmit an HE TB PPDU a SIFS after a received PPDU, if both the following conditions are met:*

*— The received PPDU contains either a Trigger frame (that is not an MU-RTS variant) with a User Info field addressed to the STA, or an MPDU addressed to the STA that contains an UMRS Control field. The User Info field in the Trigger frame is addressed to a STA if one of the following conditions are met:*

*• The AID12 subfield is equal to the 12 LSBs of the AID of the STA and the STA is associated with the AP]*

Consequently, a STA shall take into account both the value of the “No More RA-RU” subfield and the value of a "No More scheduled RU" subfield to determine an early TWT SP termination event.

The Proposed text changes are as follows.

* Basic Trigger variant

The Trigger Dependent Common Info subfield is not present in the Basic Trigger frame. The Trigger Dependent User Info subfield of the Basic Trigger frame is defined in Figure 9-52j (Trigger Dependent User Info subfield for the Basic Trigger variant).

**TGax Editor: *Make the following changes in section 9.3.1.23.1, page 104, D2.3.***

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|  | B0                       B1 | B2                    B4 | B5 | B6               B7 |
|  | MPDU MU Spacing Factor | TID Aggregation Limit |  No More Scheduled RU(#13084) (#3018) | Preferred AC |
| Bits: | 2 | 3 | 1 | 2 |
| * Trigger Dependent User Info subfield(#7324) for the Basic Trigger variant
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The MPDU MU Spacing Factor subfield is used for calculating *MSF*, the value by which the minimum MPDU start spacing is multiplied (see 10.13.3 (Minimum MPDU Sstart Sspacing field rules)). *MSF* is equal to 2MPDU MU Spacing Factor. (#9640)

The TID Aggregation Limit subfield indicates the MPDUs allowed in an A-MPDU carried in the HE TB PPDU and the maximum number of TIDs that can be aggregated by the STA in the A-MPDU and is set as defined in 27.5.3.2.3 (Allowed settings of the Trigger frame fields and UMRS Control field(#14137)).

(#9831)The value in the TID Aggregation Limit subfield in Trigger frame is less than or equal to *MT* + 1, where *MT* is the value indicated in the Multi-TID Aggregation Support subfield subfield(#12379) in the HE MAC Capabilities Information field in the HE Capabilities element transmitted by the AP that is the intended receiver of the User Info field.(#9264, #9832) (#8025)

The No More Scheduled RU subfield is set to 1 to indicate that no RUs will be allocated for the STA for which the User Info field is intended from the end of the PPDU that contains the Trigger frame through the end of the current TWT SP or through the period of time indicated by the Duration/ID field of the Trigger frame. (#13084).

The Preferred AC subfield indicates the lowest AC that is recommended for aggregation of MPDUs in the A-MPDU contained in the HE TB PPDU sent as a response to the Trigger frame. The encoding of the Preferred AC subfield as defined in Table 9-136 (ACI-to-AC encoding).(#11917)

**27.7.5 Power save operation during TWT SPs**

**TGax Editor: *Make the following changes in section 27.7.5, page 319 D2.3.***

When an AP transmits a trigger frame, it sets to 1 the No More Scheduled RU subfield of each User Info field with AID12 subfield corresponding to the TWT requesting STA or TWT scheduled STA if it does not intent to allocate a RU for the TWT requesting STA or TWT scheduled STA in subsequent Trigger frames until either the end of the current TWT SP or the duration indicated by the Duration/ID field. (#13084).

When a TWT SP termination event is detected within a TWT SP by a STA in PS mode that is participating in the TWT SP, the STA may transition to the doze state without waiting for the expiration of the AdjustedMinimumTWTWakeDuration time as described in 10.43.1 (TWT Overview), even if it has previously transmitted a PS-Poll frame or U-APSD trigger frame(#Ed) and has not yet received the expected frames from the AP in response.

(#13793)A TWT requesting STA or a TWT scheduled STA shall classify any of the following events as a TWT SP termination event:

* The successful exchange of a TWT Information frame with the TWT responding STA or the TWT scheduling AP (see 27.7.4 (Use of TWT Information frames)).(#13793)
* The transmission by the TWT requesting STA or TWT scheduled STA of an acknowledgment(#11208) in response to an individually addressed frame sent by the TWT responding STA or TWT scheduling AP, respectively, that had the EOSP subfield equal to 1.
* The transmission by the TWT requesting STA or TWT scheduled STA of an acknowledgment(#11208) in response to an individually addressed frame sent by the TWT responding STA or TWT scheduling AP, respectively with the More Data field equal to 0 when the frame does not contain an EOSP subfield.
* The reception of a frame sent by the TWT responding STA or TWT scheduling AP that does not solicit an immediate response and that had an EOSP subfield present with a value equal to 1.
* The reception of an individually addressed frame sent by the TWT responding STA or TWT scheduling AP that does not solicit an immediate response and that had no EOSP subfield present but had the More Data field equal to 0.
* The reception of a Trigger frame sent by the TWT responding STA or TWT scheduling AP that has the More TF field equal to 0 and is not intended for the TWT requesting STA or TWT scheduled STA provided that the TWT requesting STA or TWT scheduled STA is either awake for an announced trigger-enabled TWT SP but did not transmit an indication that it is in the awake state to the TWT responding STA or TWT scheduling AP or is awake for an unannounced trigger-enabled TWT SP.(#11854, #13927)
1. The reception of a Trigger frame sent by the TWT responding STA or TWT scheduling AP that has the More TF field equal to 1, is intended for the TWT requesting STA or TWT scheduled STA and contains a No More Scheduled RU subfield equal to 1 in the Trigger Dependent User Info field of the User Info field with AID12 subfield corresponding to the TWT requesting STA or TWT scheduled STA. In which case, if the Trigger frame contains one or more RA-RUs for which the STA can gain access according to 27.5.5 (UL OFDMA-based random access (UORA)) then the STA can follow the rules defined in 27.14.2 (Power save with UORA) to determine the TWT SP termination event. (#13084).

The classification of a More Data field equal to 0 in an Ack, BlockAck and Multi-STA BlockAck frame as an event that terminates a TWT SP is only possible when both STAs have indicated support of transmitting or receiving the frame with a nonzero More Data subfield, which is indicated in the More Data Ack subfield of the QoS Info field of frames they transmit (see 11.2.2 (Power management in a non-DMG infrastructure network)).

NOTE 2—A Trigger frame, sent by the TWT scheduling AP, is defined as intended for the TWT scheduled STA when the Trigger frame contains the AID of the STA in one of its Per User Info fields (see 27.5.3 (UL MU operation)), and can have in the TA field the MAC address of the AP or the(#11036, #13794) transmitted BSSID under the conditions defined in 27.5.3.2.3 (Allowed settings of the Trigger frame fields and UMRS Control subfield(#14137)). Otherwise, the Trigger frame is not intended for the STA. (#13084).