IEEE P802.11
Wireless LANs

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| CIDs related to Random Access |
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Abstract

This submission proposes resolutions for the following 37 CIDs received for TGax LB225:

8172, 10016, 3236, 6000, 6154, 7181, 7651, 8389, 7409, 8141, 7425, 6139, 3073, 5023, 5860, 6711, 6712, 6008, 5676, 7419, 9956, 6038, 6108, 7204, 9578, 5740, 5738, 5507, 5508, 9740, 4787, 9741, 9957, 6043, 9742, 4788, 8288

Revisions:

* Rev 0: Initial version of the document.

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

***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** | **Commenter** | **Section** | **Pg / Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 8172 | Osama Aboulmagd | 167.59 | 17.5.2.3 | There is one occurance of "TBD" on page 167 | TBD has to be either deleted or resolvced | RevisedDoc 11-17/229r2 resolved the TBD and it is not present in the current draft. **TGax editor: No further changes are required.** |
| 5023 | Chao Chun Wang |  | 27.5.2.6.2 | There are a couple of issues with the unrestricted use of UL OFMA RA in trigger-access opportunity. (a) Un-associated STA can't send data frame while associated STA may send both data and management frames. (b) The management functions for associated, and un-associated STA are different and the size of frames may be very different. (c) It is unclear why an AP would schedule RUs for un-associated STAs and not using all available RUs for associated STAs to send UL data. (d) Mixing UL OFMA RA opportunities in one triggered-access duration for associated and un-associated STAs makes little sense. There are many parameters need to consider by AP in order to decide the suitable duration for the UL transmission slot. Any remedy to address the duration issue tends to increase the complexity of the feature. |  | RevisedAgree with the comment. The latest draft separates RA for associated and unassociated STAs. Doc 11-17/0229r2 (approved during March 2017 meeting) defined a separate AID (2045) for indicating RA for unassociated STAs only. AID=0 is used to addressed associated STAs for RA. Keeping RA for associated and unassociated STAs would enable the AP to trigger each type separately – thus providing fair opportunity to unassociated STAs. **TGax editor: No further changes are required.** |
| 3073 | Abhishek Patil | 173.38 | 27.5.2.6.2 | Condition for when the STA should use random access needs to be defined. In the absence of such restriction there will be a lot of un-necessary random access attempts | As in the comment | RevisedAgree with the comment. The current draft has specified reasonable criteria to restrict random access. For example, separation of RA for associated and unassociated STA, STA needs to have pending traffic for the AP, STA needs to meet all the requirements in Common Info and User Info etc. Therefore, no further restrictions are required at this point.**TGax editor: No further changes are required.** |
| 10016 | Yuichi Morioka | 172.28 | 27.5.2.6 | It should be beneficial if the AP can allocate part of the random access RUs for BSRP and partly for other UL small data. | Define a field within the trigger frame that indicates which RU set is intended for BSRP. | RejectThe spec permits a non-AP STA to send unsolicited BSR in a TB PPDU via random access in response to a TF carrying one or more random access RUs (see 27.5.2.5 in D1.4). We don’t need a separate field to indicate RUs for BSRP. Further defining a new kind of multi-type TF would add unnecessary complexities. |
| 7651 | Liwen Chu | 172.35 | 27.5.2.6.1 | It seems reasonable to add BQRP here. | As in comment | RevisedAgree with the comment. The current spec already allowed TF of Basic and BSRP variant to carry RUs for random access. Further, the current spec permits a non-AP STA to send unsolicited BSR or BQR in a TB PPDU via random access in response to a TF carrying one or more random access RUs (see 27.5.2.5 and 27.5.1.3 in D1.4).* Added text to indicate that TF of BQRP variant can carry RUs for random access.
* Added a note to clarify that no other TF variants can carry RUs for random access.
* Added text to specify that TF variant BQRP and BSRP are only allowed to carry random access RUs for associated STAs.
* Added note in 27.5.1.3 to provide clarification with respect to unsolicited BQR operation (similar note exists in 27.5.2.5 to cover unsolicited BSR).

**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 6154 | Jinjing Jiang | 172.35 | 27.5.2.6.1 | It seems only basic trigger and BSRP trigger could initiate random acess OFDMA, how about other variants, such as BQRP? | Please clarify | RevisedAgree with the comment that random access should be permitted for BQRP. Please resolution to CID 7651.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 7181 | kaiying Lv | 172.35 | 27.5.2.6.1 | Could BQRP variant Trigger frame be used to allocate RA RU? Since BQRP frame is the same as basic trigger frame╥╟Θ | Please clarify it | RevisedAgree with the comment that random access should be permitted for BQRP. Please resolution to CID 7651.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 3236 | Ahmadreza Hedayat | 172.35 | 27.5.2.6 | In D1.0, random access RUs are only allowed to be within a Basic Trigger frame; "An HE AP may transmit a Basic Trigger frame or a BSRP Trigger frame that contains one or more RUs for random access." | Either remove the reference to BSRP, or update the spec so that RA RUs can be included withion a BSRP Trigger frame (and if so then any other variant should be included?) | RevisedAgree with the comment. Please resolution to CID 7651.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 6000 | Jarkko Kneckt | 172.35 | 27.5.2.6.1 | 27.5.2.6.1 states that only basic variant or BSRP variant trigger may contain random access opportunities. 27.5.1.3 has a contradiction stating that BQR variant Trigger may include Rus for random access. The random access should be possible for all Trigger variants except MU-RTS. | Delete the sentence in lines 35 and 36 and add the following sentence:" One or more RUs for UL OFDMA random access may be included to all trigger frame variants, except to MU-RTS variant." | RevisedAgree with the comment. Please resolution to CID 7651.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 8389 | Po-Kai Huang | 172.35 | 27.5.2.6 | An HE AP may transmit a Basic Trigger frame or a BSRP Trigger frame that contains one or more RUs for random access. However, a STA only maintains one counter for OFDMA random access. Assume the same system behavior for two different types of solicitation is awkward. Specifically, a STA that intends to transmit data to AP may get its chance at the slot of BSR random access allocation and needs to backoff again. | Make clear separation between operation of regular random access allocations and BSR random access allocations by separating into two backoff counters for OFDMA random access based on trigger type. | RejectThe UORA procedure provides means for a STA to access a random access RU. Upon expiration of the timer the STA sends whatever feedback or data it is being requested. It is up to the AP to determine the prioritization of the resources (be it for short data, BSRP, or BQRP feedback). Adding multiple counters for OFDMA would further add to the complexity to the mechanism which is intended to simply provide random resources for STAs to UL.  |
| 7409 | Lei Huang | 172.35 | 27.5.2.6.1 | There is currently no rule regarding how RUs are assigned for random access in a Trigger frame by an AP. Without such a rule, it is possible that no any RUs assigned for random access in a Trigger frame are available to 20MHz operating STAs. In order for 20MHz operating STA to always get an opportunity to reach AP via random access procedure, every Trigger frame for random access shall include at least one RU for random access which is available to 20MHz operating STAs. | Add the following statement at the end of the second paragraph of section 27.5.2.6.1:"Every Trigger frame for random access transmitted by the HE AP shall include at least one RU for random access which is available to 20MHz operating STAs. In other words, every Trigger frame for random access shall contain at least one RU for random access which is in the primary 20MHz channel and unrestricted to be used for 20MHz operating STAs." | RejectGenerally agree with the comment but this need not be specified in the spec. An AP has global knowledge of its BSS and it can decide to allocate a random access RU in primary 20MHz if there is at least one associated STA that operates as a 20MHz only STA and is not the recipient of a directed RU in the Trigger frame. Further, if the random access RU is for unassociated STA(s), the AP may make the decision based on several factors (i.e., how congested its 20MHz primary is and whether it prefers to have higher BW STAs etc) |
| 8141 | Matthew Fischer | 173.01 | 27.5.2.6.2 | A more efficient random access FB mechanism should be defined. | Change to a feedback mechanism that uses an HTF like sequence with small tone allocations mapped to AID values to allow at least binary feedback indication or even multiple bit FB indication (e.g. I have UL data, I request DL data, etc.) | RejectWe already have NDP feedback mechanism (27.5.5) for providing short feedback to the AP. We don’t need another scheme with the same end goal in mind. |
| 7425 | Lei Huang | 174.16 | 27.5.2.6.3 | The retransmission procedure for random access is not clearly defined. | 1. define a local MIB variable "dot11RARetryLimit",which indicates the maximum number of successive retransmission attempts.2. Change the sentence in L52-L54 of P172 as follows:"The non-AP STA with dot11OFDMARandomAccessOptionImlemented set to true shall maintain an internal OFDMA backoff (OBO) counter and an internal random access retry (RAR) counter.3. Change the second paragraph of 27.5.2.6.3 as follows:"If the HE trigger-based PPDU is not successfully transmitted in the randomly selected RU, the HE STA shall update its OCW to 2\*OCW+1 for every retransmission, until the OCW reaches OCWmax, and shall also increment its RAR counter by one and initialize its OBO counter to a random value in the range of 0 and OCW for every retransmission. Once the OCW reaches OCWmax for successive retransmission attempts, the OCW shall remain at the value of OCWmax until the OCW is reset. If the RAR counter has reached dot11RARetryLimit, there is no more retransmission attempt. "4. Change the third paragraph of 27.5.2.6.2 as follows:"For an initial HE trigger-based PPDU transmission or following a successful HE trigger-based PPDU transmission or following an unsuccessful HE trigger-based PPDU transmission for which there is no more retransmission attempts, when an HE STA obtains the value of OCWmin from the HE AP indicated in the RAPS element, it shall set the value of OCW to the OCWmin, and shall initialize its RAR counter to zero, and shall initialize its OBO counter to a random value in the range of 0 and OCWmin. | RejectRandom access mechanism is quite different from traditional EDCA based mechanism. Random access is AP controlled and the AP decides how may RUs to assign for RA in a TF and also the frequency with which a TF containing random access RUs is transmitted. If the retry counter for random access hits maximum and the STA decides to drop the frame and reset the counter to 0, it doesn’t change the situation for the next frame. In fact, if OBO counter is also reset, it will make the situation worst since the collision situation has likely not changed but now the STA would find itself with a lower OBO counter and as such being more aggressive, potentially leading to more collisions. |
| 6139 | Jing Ma | 174.17 | 27.5.2.6.3 | Clarify whether the short & long retry counter should be updated or not for every retransmission in random access operation | as the comment | RejectNo short and long retry counters are not updated. Random access mechanism is different from traditional EDCA mechanism and having a retry counter does not help improve the changes of a successful transmission of subsequent frames. Please see resolution to CID 7425. |
| 5860 | Hyunhee Park | 173.54 | 27.5.2.6.2 | If the selected RU size for random access is quite small, the STA cannot send frames in random access through the selected RU. For clarification, an RU selection rule should be defined in random access.When the selected RU size is small in random access, how the STA operate to send frames? There are many candidate optoins, for example, re-selection, fragmentation, non-transmission, etc. For clarification, an RU selection rule should be defined in random access. | Define an RU selection rule considering the RU size in random access. | RejectThe current random access feature is sufficient and doesn’t require the proposed changes which will add unnecessary complexities to this feature. Random access mechanism should be used for short frame exchanges potentially followed by a directed TF from the AP to solicit larger data (if required). A STA can make decisions on how much data to UL to the data in a random access RU. Further, the STA can send BSR to the AP in its UL frame to the AP to let the AP know the STA’s buffer status. |
| 6711 | John Coffey | 174.19 | 27.5.2.6.2 | How does coexistence with deployed legacy devices, especially those in OBSSs, work? Here it seems that the HE AP transmits an initial trigger frame, which holds all devices within range off the medium for the signaled duration. Perhaps HE devices in OBSSs may still transmit (this is not clear), but certainly legacy devices in OBSSs cannot. These legacy devices may suffer a huge loss of access to the medium if use of this mode becomes prevalent. Essentially, instead of the HE non-AP STAs that take advantage of this mode having to fight their own way to the top via ordinary EDCA, their AP unilaterally seizes the medium with AP priority and these devices then share the rarified space with each other. This is far too favorable to HE devices and some controls are necessary. At the very least recomemnded practices for best behavior need to be specified. | Provide specifications for recommended behavior for APs that use this mode, that will have the effect of allowing fair access to the medium by legacy devices in OBSSs. (Note: a sketch of one approach that would be acceptable can be found in doc. IEEE 802.11/16-0102r1, slides 20-23.) | RejectThe comment seems to apply to the general concept of Triggered access and not specific to random access. The situation would be quite the opposite to what the comment is pointing out. Trigger based access is expected to help facilitate a more controlled access for multiple STAs all at once. Instead of many non-AP STAs contending to grab the medium (leading to collisions and loss of opportunities), a few APs can now content and provide MU access to several non-AP STAs in the same TXOP. This reduces the medium access times for HE STAs, which in turn increases the available time for legacy STAs. |
| 6712 | John Coffey | 174.19 | 27.5.2.6.2 | In some ways the random access OFDMA modes are an odd fit for the 11ax project: one of the main benefits of OFDMA is the potential increase in efficiency from the removal of most contention-based overhead (collisions, RTS, CTS, unused backoffs slots). This potential increase in efficiency may provide a net gain even after accounting for the new, considerably longer, HE preambles. But with random access OFDMA we still have the contention overhead but now with the new, longer, preambles as well. Perhaps there's an arguable potential range difference, but once again range extension isn't part of the project. A stronger justification is that 11ax will involve OFDMA as a major component, and it's difficult to jump straight from contention-based access to fully scheduled operation; perhaps there should be a way of bridging the two modes of operation. However even accepting that, we really must do something to keep the contention overhead under tcontrol. There are ways of doing this: it's possible for the AP to send out an optional supplemetary frame identifying RUs and devices (via MAC address or Partial AID), in which the first few slots are assigned to thoe devices in order, if they use them (and the remaining devices just freeze their OCW backoff counters). See 15/1115r1, 16/0102r1, and 16/0394r0 for a similar scheme (a little more elaborate than what's suggested here). | Permit the AP to send an immediate supplementary frame identifying RU's and for each RU a list of STAs. These STAs may access the RU if it's not already in use. If none on the list does (or are seen to do so), other STAs start counting down their OCW backoff counters as in the current draft. | RejectIn general, trigger based access is expected to help facilitate a more controlled access for multiple STAs all at once. Further, via random access RUs, the AP can provide access to STAs that are not listed in the directed. Random access also enables STAs to report their buffer status, which lets the AP make decisions on allocation of RUs in future TFs. In addition, random access for unassociated STAs permits several unassociated STAs to exchange of management frames in MU fashion with the AP. |
| 6008 | Jarkko Kneckt | 174.24 | 27.5.2.6.3 | The clause 27.5.2.7 seems relate to the clause 27.6. The clause 27.5.2.7 is unclear and difficult to understand. | Please merge clause 27.5.2.6.3 with the clause 27.6 and delete the clause 27.5.2.7. | RejectClause 27.6 relates to HE Sounding while clause 27.5.2.7 (27.5.5 in D1.4) relates to NDP short feedback mechanism. There is no relation between the two. Further, 27.5.2.6.3 (27.5.4.3 in D1.4) relates to random access (UORA). No relation with HE Sounding or NDP feedback. |
| 5676 | Guoqing Li | 199.60 | 27.14.2 | As I understand, TWT element does not containt "start time of the trigger frame", it contains start time of the TWT SP. And contains indication for trigger-enabled SP and indication for random access RU. As such, the sentence here is not accurate. |  | RevisedAgree with the comment. The text in the paragraph and figure 27-12 has been updated to clarify that that broadcast TWT element provides start time of one or more TWT SPs and other fields in the element indicate whether the SPs will include Trigger frames with random access.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 7419 | Lei Huang | 199.60 | 27.14.2 | Broadcast TWT element actually does not indicate start times for Trigger frames with random access allocations. Instead it indicates start time of broadcast TWT SP which contains Trigger frames with random access allocations. | 1. Change"An HE AP may indicate one or more start times for Trigger frames with random access allocations in the broadcast TWT element that is included in the Beacon frame or a management frame ..."to"An HE AP may indicate start time for broadcast TWT SP containing Trigger frames with random access allocations in the broadcast TWT element that is included in the Beacon frame or a management frame ..."2. Change Figure 27-7 accordingly. | RevisedAgree with the comment.Please see resolution to CID 5676 **TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 9956 | Young Hoon Kwon | 199.60 | 27.14.2 | Not sure how an HE AP indicate the start times for Trigger frames. Even within a Trigger-enabled TWT SP, the AP does not specifically indicate the start time of each Trigger frame, if I remember correctly. Further clarification is needed. | As in the comment. | RevisedAgree with the comment.Please see resolution to CID 5676 **TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 6038 | Jarkko Kneckt | 200.05 | 27.14.2 | The Figure 27-7 is hard to understand. The trigger frame start time is shown to be long and the transmission of the Trigger frame is not started in the beginning of the trigger frame start time. There is a trigger frame that is transmitted before the TF Start time. | Please clarify the figure. The Trigger Frame start time does not look like correctly drawn to the figure. | RevisedAgree with the comment.A new (hi-res) figure has been provided (document 11-17/1280r0). The new figure fixes the inaccuracies in the earlier figure and also depicts the functionality of Cascade Indication field.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 6108 | Jian Yu | 200.05 | 27.14.2 | Replace the figure with a high resolution one | As in comment | RevisedPlease see resolution to CID 6038**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 7204 | kaiying Lv | 200.06 | 27.14.2 | the figure27-7 is not clear | Please re-draw it | RevisedPlease see resolution to CID 6038**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 9578 | Yonggang Fang | 199.60 | 27.14.2 | An HE AP can schedule a TWT SP for TWT scheduled STA and TWT for random access. It is not clear whether the TWT STA should wake up at both scheduled TWT SP and TWT RA period? | Need to clarify in the spec | RejectWhile it is true that AP can setup different types of broadcast TWT SPs, it is up to the STA to subscribe to (i.e., wake-up for) all or a subset of the SPs. This section describes the behavior for a STA in power save mode which goes to doze state for an extended period until a TWT SP that is expected to have random access TFs so that the STA can use one of the random access RU to send UL to the AP (which also serves as an indicator to the AP that the STA is awake during this SP and can receive DL traffic during that SP). |
| 5740 | Guoqing Li | 200.22 | 27.14.2 | I think this subsection (power save with UL OFDMA-based random access) only apply to the case when this Beacon doesn't beong to the beacon that the STA is supposed to monitor. Otherwise, if this is a Beacon that the STA is supposed to wake up and monitor based on braodcast TWT Setup, then the STA need to wake up at the start of the TWT SP anyway no matter whether it will contain random RU or not in order to get triggered by AP. | Clarify | RejectThis section describes behavior for a power-save STA that would be in PS mode for an extended period. The TWT SP with random access TF serves as a means for the STA to use random access RUs to send UL to AP. This behavior also helps let the AP know that the STA is awake to receive DL from the AP. The section also covers the case of an unassociated monitoring management frames from a candidate AP (to receive broadcast TWT element pointing to TWT SPs with random access TFs) so that the STA can send management frames to the AP via random access RUs |
| 5738 | Guoqing Li | 200.22 | 27.14.2 | Even if the TWT flow identifier indicates that this TWT doesn't contain random RU, I think the STA can still go to doze until the start of the SP if the AP doesn't indicate presence of DL traffic in TIM, right? If so, then there is no need to mention the ramdom access here. | Clarify | RejectSection 27.14.2 is more general covers the case where a STA may not have explicitly indicated to the AP which TWT SP it intents wake-up for. In such case, the STA is able to use random access to send UL frame to the AP and also let the AP know that it is awake to receive DL frames from the AP. Further, please see resolution to CIDs 9578 & 5738. |
| 5507 | Graham Smith | 200.21 | 27.14.2 | "value of 1 in the Broadcast subfield a value of 2 in the TWT Flow Identifier subfield". Is there a missing 'and', or a missing 'or". Which is it? | Add an "and" or "or" as appropriate. | RevisedAgree with the comment. The missing ‘and’ was fixed in an earlier revision of the draft and no longer appears in D1.4. Added a new condition that the Trigger subfield in the broadcast TWT element should be set to 1. Minor editorial revision to the sentence.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 5508 | Graham Smith | 200.25 | 27.14.2 | "If random access allocations are made in a sequence of Trigger frames within a trigger-enabled TWT SP, then all the Trigger frames in the sequence shall have the Cascade Indication field set to 1, except for the last Trigger frame in the sequence, which shall have the Cascade Indication field set to 0." THis definitive requirement, I assume, is repeated somewhere else as this is not a requirement of the power save idea. A STA may choose to use the Cascade Indication field to enter the doze state, but how the and what the Cascade Indication fields are set should be in the appropriate place not here. | Either delete the cited text or make it a note, or make a reference.after "Cascade Indication field" in line 30. | RevisedAgree with the comment. The sentence describing how the value of Cascade Indication field is set has been deleted and replaced with a new sentence referencing section 27.7.3.3.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 9740 | Yongho Seok | 200.25 | 27.14.2 | "If random access allocations are made in a sequence of Trigger frames within a trigger-enabled TWT SP, then all the Trigger frames in the sequence shall have the Cascade Indication field set to 1, except for the last Trigger frame in the sequence, which shall have the Cascade Indication field set to 0."The same normative text is already included in 27.7.3.2 (Rules for TWT scheduling STA).Please remove the corresponding paragraph. | As per comment. | RevisedAgree with the comment. Please see resolution to CID 5508.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 4787 | Alfred Asterjadhi | 200.00 | 27.14.2 | Some of this text applies to the Cascade Indication setting for the Trigger frame from the AP side, which would be more appropriate to be in the TWT subclause. It is appropriate to clarify that the reception of this Trigger frame for random access is classified as an early termination period. | Please organize the subclause such that the normative behavior from AP side is contained in one subclause and the normatvie behavior from STA side is contained in one subclause (in terms of early termination events). If necessary add declarative statements to indicate where such a behavior is defined. Similar considerations for power save in congested environment. | RevisedAgree with the comment. Agree with the comment. The sentence describing how the value of Cascade Indication field is set has been deleted and replaced with a new sentence referencing section 27.7.3.3. Further, a reference to TWT SP termination has been added. *[Note, doc 11-17/1138r2 is proposing to add a new section 27.7.5 to describe TWT SP termination and PS operation]***TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 9741 | Yongho Seok | 200.30 | 27.14.2 | "If the OBO counter decrements to a non-zero value with the random access procedure in a Trigger frame with Cascade Indication field set to 0, it may enter the doze state immediately."The OBO counter having a non-zero value does not mean that a STA did not exchange a PS-Poll frame or an APSD trigger frame with an AP.After exchanging a PS-Poll frame or an APSD trigger frame, the STA still can continoue to be in the UL OFDMA-based random access if it has some pending frame.So, it is very odd that a STA is permitted to enter the doze state immediately after receiving a Trigger frame with Cascade Indication field set to 0.Please remove the corresponding sentence. | As per comment. | RevisedAgree with the comment. Added a text to clarify that the STA may not go to sleep if there are other conditions that require the STA to remain awake.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 9957 | Young Hoon Kwon | 200.32 | 27.14.2 | Even when Cascade Indication field is set to 0 and there's non-zero OBO counter, the STA cannot go to doze state because there's still a chance that the serving AP may send DL data to the STA. Further clarification is needed. | As in the comment. | RevisedAgree with the comment. Added a text to clarify that the STA may not go to sleep if there are other conditions that require the STA to remain awake.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 6043 | Jarkko Kneckt | 200.30 | 27.14.2 | A Cascade Indication set to 0 indicates the last Trigger frame that contains UL OFDMA random access RUs. Clause 27.7.3.3 P185 L54 has a different logic for Cascade Indication handling: A non-AP STA may return to Doze, if the Trigger has Cascade Indication set to 0 and there is no RU allocated to the STA. The definition in P185 would allow a STA to continue TWE SP if it receives a Trigger with Cascade Indication set to 0 and has RUs allocated for the STA, in definition P200, the TWT SP will be terminated regardless of the allocated RUs. | Please unify the handling of the Cascade indications in TWT SPs. The TWT SP should be terminated if Cascade Indication has value 0 and there is no allocated Rus for the STA. | RejectBoth the sections are correct. 27.7.3.3 indicate that STA may go to sleep if this is the last TF (i.e., Cascade Indication = 0) and the STA has not been the intended recipient and the TF doesn’t contain any random access RUs. Section 27.14.2 captures the case where the TF contains random access RU(s). In such case, if the OBO count is non-zero, then the STA can’t access via the random access RU. In which case, it may go to sleep unless there is any other condition that requires it to remain in awake state. |
| 9742 | Yongho Seok | 200.32 | 27.14.2 | The following is a behavior of the TWT scheduled STA (see 27.7.3.3)"The TWT scheduled STA shall be in the awake state for AdjustedMinimumTWTWakeDuration time that corresponds to that TWT parameter set, except that the STA may go to doze state when a TWT SP termination event occurs."And, the following is not listed in the TWT SP termination event."If the OBO counter decrements to a non-zero value with the random access procedure in a Trigger frame with Cascade Indication field set to 1..."So, please change "may" to "shall" as the following:"..., it shall remain awake for random access in the cascaded Trigger frame." | As per comment. | RejectThe ‘shall’ condition cited by the comment is no longer present in section 27.7.3.3 in the latest (D1.4) draft. Further, when Cascade Indication is 1, it is up to the STA on whether it wants to remain awake or go to sleep. |
| 8288 | Pascal VIGER | 200.23 | 27.14.2 | Power save with UL OFDMA may make the STA waking up at the same time. They "may enter the doze state until the start of that TWT SP". If the TF is collided or delayed due to contention, STA s may miss the TWT SP (can not use TWT SP). | The Trigger Frames having a targeted wake time schedule (trigger-enabled SPs) shall be prioritized for being transmitted by HE AP.This will ensure the timing contract with TWT scheduled stations is respected for trigger-enabled TWT agreement, which is beneficial for medium usage efficiency. | RevisedThe text in D1.0 was inaccurate. The broadcast TWT element indicates the time when TWT SP would begin – it doesn’t point to the start time of a TF as described in this section under D1.0. The text has been fixed as a resolution to CIDs 5676, 7419, 9956 covered in this document. The condition mentioned by this comment should not occur anymore as STAs that wake up during the TWT SP may go to sleep under certain conditions. Further text was added to indicate that the STA can go to sleep after AdjustedMinimumTWTWakeDuration time has elapsed if no TF was received. **TGax editor: Please make changes as shown in doc 11-17/1276r0** |
| 4788 | Alfred Asterjadhi | 200.30 | 27.14.2 | The other condition is missing. Specify that when the OBO counter is 0 the STA transmits a Trigger-based PPDu in the selected resource (and provide a subclause reference where the norm behavior is defined. | As in comment. | RevisedAgree with the comment. Added a text to capture the case when OBO counter decrements to 0.**TGax editor: Please make changes as shown in doc 11-17/1276r0** |

* UL OFDMA-based random access (UORA)
* General

TGax Editor: Please make the following changes to the 4th paragraph in this section (D1.4 P236L37):

An HE AP may transmit a Basic Trigger frame, a BQRP Trigger frame or a BSRP Trigger frame that contains one or more RUs for random access. An HE AP shall not transmit BSRP Trigger frame or BQRP Trigger frame that contains random access RUs for unassociated STAs.[7651, 6154, 7181, 3236, 6000]

Note – Trigger frame variants other than Basic, BSRP or BQRP are not allowed to carry random access RUs.[7651, 6154, 7181, 3236, 6000]

* **HE bandwidth query report operation for MU**

TGax Editor: Please add a note after the 2nd paragraph in this section as shown below (D1.4 P223L36):

A non-AP STA reports its channel availability information (unsolicited BQR) to the AP to which it is associated using the BQR Control field of frames it transmits as defined below:

* The HE STA may report the channel availability information in the BQR Control field of frames it transmits if the AP has indicated its support in the BQR Support subfield of its HE Capabilities element; otherwise the STA shall not report the channel availability information in the BQR Control field.

NOTE—The STA can send an unsolicited BQR in response to certain Trigger frames except MU-RTS and BQRP (with or without random access RUs, as defined in 27.5.2.3 (STA behavior for UL MU operation) and in 27.5.4 (UL OFDMA-based random access (UORA))) or it can send the unsolicited BQR after accessing the WM using EDCA.[7651, 6154, 7181, 3236, 6000]

* HE buffer status feedback operation for UL MU

TGax Editor: Please modify Note 1 in this section as shown below (D1.4 P234L8):

NOTE 1—The STA can send an unsolicited BSR in response to [#Ed]certain Trigger frames except MU-RTS and BSRP (with or without random access RUs, as defined in 27.5.2.3 (STA behavior for UL MU operation) and in 27.5.4 (UL OFDMA-based random access (UORA))) or it can send the unsolicited BSR after accessing the WM using EDCA.

* **Retransmission procedure for UORA**

TGax Editor: Please modify the 2nd paragraph in section 27.5.4.3 (D1.4 P238L62) as follows:

[#Ed]If the HE TB PPDU is not successfully transmitted in the selected random access RU, then the STA shall update its OCW to 2OCW + 1 when the OCW is less than the value of OCWmax, and shall randomly select its OBO counter in the range of 0 and OCW. Once the OCW reaches OCWmax for successive retransmission attempts, the OCW shall remain at the value of OCWmax until the OCW is reset as described in 27.5.4.2 (UORA procedure).[#Ed]

* **Power save with UORA**

TGax Editor: Please make the following changes to this section (D1.4 P279L8):

This subclause illustrates the power save mechanisms for HE STAs using the UORA procedure (see 27.5.4.2 (UORA procedure)).

[5676, 7419, 9956]An HE AP may indicate one or more start times for broadcast TWT SP containing Trigger frames with random access allocations in the broadcast TWT element that is included in the Beacon frame or a management frame as described in 27.7.3.2 (Rules for TWT scheduling AP). An example of power save operation is shown in Figure 27-12 (Example of power-save operation with UORA).

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|  |
| * **Example of power-save operation with UORA**[5676, 7419, 6038, 6108, 7204]
 |

An associated HE STA that receives a management frame containing a TWT element [5507]with the Broadcast subfield equal to 1, Trigger subfield equal to 1, and the TWT Flow Identifier subfield equal to 2 may enter the doze state until the start of that broadcast TWT SP [#Ed]as described in 27.7.3.3 (Rules for TWT scheduled STA). An associated STA shall follow the procedure defined in 27.5.4 (UL OFDMA-based random access (UORA)) when the AP includes one or more RUs with AID12 value equal to 0 in a Trigger frame transmitted during that broadcast TWT SP.

An unassociated HE STA that receives a Beacon frame, a broadcast Probe Response frame or a FILS Discovery frame containing a TWT element [5507]with the Broadcast subfield equal to 1, Trigger subfield equal to 1, and the TWT Flow Identifier subfield equal to 2 may enter the doze state until the start of that broadcast TWT SP [#Ed]as described in 27.7.3.3 (Rules for TWT scheduled STA). An unassociated STA shall follow the procedure defined in 27.5.4 (UL OFDMA-based random access (UORA)) when the AP includes one or more RUs with AID12 value equal to 2045 in a Trigger frame transmitted during that broadcast TWT SP.

[5508, 9740, 4787]An HE AP that transmits a Trigger frame shall set the Cascade Indication field in the frame as defined in 27.7.3.2 (Rules for TWT scheduling AP) and indicate TWT SP termination event as described in 27.7.5 (PS operation during TWT SP)*[#11-17/1138r2]*.

[4787]An HE STA shall follow the procedure described in 27.7.5 (PS operation during TWT SP)*[#11-17/1138r2]* to determine if a TWT SP termination event has occurred. When a TWT SP termination event occurs, an HE STA may enter doze state [9741, 9957]if no other condition requires the STA to remain awake. The HE STA may go to doze state after AdjustedMinimumTWTWakeDuration time has elapsed from the TWT SP start time if no Trigger frame is received.[8288]

While TWT SP termination event has not occurred, an HE STA may use the value indicated in the Cascade Indication field in a Trigger frame to enter the doze state. [#Ed]An HE STA shall decrement its OBO counter as defined in 27.5.4 (UL OFDMA-based random access (UORA)). If the OBO counter decrements to a non-zero value and the Cascade Indication field is equal to 0, then the STA may enter the doze state if no other condition requires the STA to remain awake[9741, 9957]. If the OBO counter decrements to a non-zero value and the Cascade Indication field is equal to 1, then the STA may remain awake for random access in the cascaded Trigger frame. If the OBO counter decrements to 0 then the STA shall follow the procedure defined in 27.5.4.2 (UORA procedure) to transmit an HE TB PPDU in response to the Trigger frame.[4788]