IEEE P802.11
Wireless LANs

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| CIDs related to UORA procedure – part 2 |
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Abstract

Comment resolution with proposed changes to TGax D2.3 for CIDs from the WG LB for TGax related to UORA procedure (subclause 27.5.5).

The resolved CID list is: 13096, 13098, 13652, 13762, 14138, 14139, 14140, 14142, 14209, 14211.

The proposed changes on this document are based on TGax Draft 2.3.

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.***

**CIDs**

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| CID | Commenter | Clause | Page No. | Comment | Proposed Change | Resolution |
| 13096 | Patrice Nezou | 27.5.5.2 | 259 | "The eligible random access RUs for a non-AP HE STA are the K contiguous RUs starting from the RU indicated in the RU allocation subfield belonging to all the User Info fields corresponding to eligible random access RUs where K equals to the value of the Random Access RU Number subfields plus one."This sentence does not consider the other user info fields related to single random access RUs. | Please remove this sentence. The previous sentence is sufficient :" A non-AP HE STA can determine the number of eligible random access RUs by adding the values of the Random Access RU Number subfields plus one belonging to all the User Info fields corresponding to eligible random access RUs." | Revised. Agree in principle.No change is required because the modifications required by the CID were added in the already approved doc360r2. |
| 13098 | Patrice Nezou | 27.5.5.3 | 260 | "The transmission of the HE TB PPDU does not affect QSRC[AC] and QLRC[AC] (see 10.22.2.11 (Retransmitprocedures))."This sentence is not only valid for UORA procedure but more generally for MU UL transmission. | Move the sentence in the clause 27.5.3.3 STA behavior for UL MU operation | Revised. Agree in principle.The sentence was moved to the subclause 27.5.3.3 to be applied for all MU transmissions.TGax editor please make change as shown in the 11-18-0694r0 under all headings that include the CID 13098. |
| 13652 | Tomoko Adachi | 27.5.5.2 | 258 | The title of the subclause is "UORA procedure" but it's to general. In the contrast to 27.5.5.3 (Retransmission procedure for UORA), it's better to be "Transmission procedure for UORA". | As in comment.Also change the first sentence in the first para to "In this subclause, the transmission procedure for UORA is described." | Revised. Agree in principle.The title and the description of the subclause 27.5.5.2 has been modified.TGax editor please make change as shown in the 11-18-0694r0 under all headings that include the CID 13652. |
| 13762 | Xiaofei Wang | 27.5.5 | 257 | I disagree with the resolution of CID 9448. Using just one OBO counter, a STA can directly search for the random access RU, though in the case of a second random selection process, a STA must first generate another random number, and then search for the appropriate random access RU, which adds one more step. In addition, using a second random number would not decrease collision probabilities. | Using just the OBO counter for selection of random access RU and simplify the UORA process.  | Rejected. The number of RA-RUs per Trigger frame is not the same. So using the OBO counter for the selection of the RA-RU increases the collision rate for the first RA-RUs of the Trigger frame. Moreover, if the OCWmin is smaller than the number of available RA-RUs, some RA-RUs cannot be selected. |
| 14138 | yujin noh | 27.5.5.1 | 257 | the name of subfield with "UL OFDMA RA Supports" subfield is not existed in HE MAC Capabilities Information field. "UL OFDMA RA Supports" => "OFDMA RA Supports" to be consistent throught the spec. | as in comment | Accepted.TGax editor please make change as shown in the 11-18-0694r0 under all headings that include the CID 14138. |
| 14139 | yujin noh | 27.5.5.1 | 257 | the name of subfield with "UL OFDMA RA Supports" subfield is not existed in HE MAC Capabilities Information field. "UL OFDMA RA Supports" => "OFDMA RA Supports" to be consistent throught the spec. | as in comment | AcceptedTGax editor please make change as shown in the 11-18-0694r0 under all headings that include the CID 14139. |
| 14140 | yujin noh | 27.5.5.2 | 259 | RU Allocatoin/Random Access RU Information subfield is the correct name in User Info field of the Trigger frame. RU allocation subfield -> RU Allocatoin/Random Access RU Information subfield | as in comment | Rejected.“RU Allocation” is the correct name of the subfield. |
| 14142 | yujin noh | 27.5.5.2 | 259 | Looking at the part of sentense with "the number of eligible random accress RUs in the Trigger frame", "the number of eligible random access" seems to be not clear.The number of eligible random access RU could be from Random Access RU Number in Figure 5-52i where RU assigned for both AID0 and AID 2045 together. But with the exmaple with Figure 27-5, depending on whether AP associated or not, HE STA decrements its OBO counter by the number of eligible random access RUs assigned to AID0 or the number of eligible random access RUs assigned to AID2045. | as in comment | Revised. Agree in principle.Same resolution as CID13096. |
| 14209 | Yunbo Li | 27.5.5.2 | 258 | OCW can not be any integer in the range [OCWmin, OCWmax] | change to wording to make it more accurate | Rejected. OCW is an integer between OCWmin and OCWmax. The only way to update it is by using the formula OCW=2xOCW+1 in case of failed transmission. All integer values in the range [OCWmin,OCWmax] cannot be selected but only some. No need for additional information. |
| 14211 | Yunbo Li | 27.5.5.2 | 259 | The sentence "If the OBO counter is greater than the number of eligible random access Rus, then the STA resumes with its OBO counter in the next Trigger frame with Rus assigned for random access" is not clear. The OBO counter that will be resumes in the next Trigger frame will decrease or not in the previous Trigger frame? | change "If the OBO counter is greater than the number of eligible random access Rus" to "If the OBO counter doesn't decrements to 0"  | Revised. Agree in principle.The sentence has been modified and the paragraph related to the description of the Figure 27-5 was clarified.TGax editor please make change as shown in the 11-18-0694r0 under all headings that include the CID 14211. |

**Proposed text**

* UL MU operation
* General

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**TGax Editor: *Make the following changes in section 27.5.3.1, D2.3 p274, line 28***

The transmission of the HE TB PPDU does not affect QSRC[AC] and QLRC[AC] (see 10.22.2.11 (Retransmit procedures)). (#13098)

**TGax Editor: *Make the following changes in section 27.5.5, D2.3 p289, line 6***

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

A STA with dot11OFDMARandomAccessOptionImplemented equal to true shall set the (#14138,#14139)OFDMA RA Support subfield in the HE MAC Capabilities Information field of the HE Capabilities element to 1. Otherwise, it shall set the (#14138,#14139)OFDMA RA Support subfield to 0.

NOTE—A STA that does not support UORA can contend for the WM using EDCA for sending UL frames to the AP with which it intends to communicate.

A non-AP STA with dot11OFDMARandomAccessOptionImplemented set to true shall follow the procedure defined in 27.5.5.2 (UORA procedure) to contend for an eligible RA-RU.

An HE AP that transmits a Trigger frame for random access, shall set the AID12 subfield of a User Info field in the Trigger frame to 0 to indicate that the RA-RU is allocated for a STA associated with it, and shall set the AID value 2045 to indicate that the RA-RU is allocated for a STA not associated with it.

An HE AP may transmit a Basic Trigger frame, BQRP Trigger frame or a BSRP Trigger frame that contains one or more RUs for random access.

NOTE—Trigger frame variants other than Basic, BQRP or BSRP are not allowed to carry RA-RUs.

An HE AP that transmits a Basic Trigger frame should set the TID Aggregation Limit subfield in the User Info field indicating an RA-RU to 0 or 1.

The HE AP may include the UORA Parameter Set element (see 9.4.2.239 (UL OFDMA-based Random Access (UORA) Parameter Set element) in Management frames that it transmits. The AP shall indicate the range of OFDMA contention window (OCW) in the UORA Parameter Set element for HE STAs to initiate random access following the Trigger frame transmission.

An HE BSS belonging to a Multiple BSSID set (see 11.11.14 (Multiple BSSID set)) may advertise OCW Range values via the UORA Parameter Set element carried in the Management frames sent by the transmitted BSSID. An HE AP may include the UORA Parameter Set element in a nontransmitted BSSID profile subelement carried in the Multiple BSSID element (see 9.4.2.46 (Multiple BSSID element)) to provide different OCW Range values for STAs associated with that nontransmitted BSSID.

An HE STA shall maintain an internal OCW and an internal OBO counter. OCW is an integer in the range [OCWmin, OCWmax]. A non-AP HE STA shall obtain OCWmin and OCWmax from the most recently received UORA Parameter Set element carried in the Management frames transmitted by its associated AP. A non-AP STA with dot11MultiBSSIDActivated set to true and associated with a nontransmitting BSSID shall inherit the OCW Range values from the UORA Parameter Set element when advertised by the transmitted BSSID if the element is not carried in the Nontransmitted BSSID Profile subelement for that BSSID.

An HE STA that has not received a UORA Parameter Set element from the AP with which it intends to communicate, shall use the default values OCWmin = 7 and OCWmax = 31 when contending for eligible RA-RUs allocated by that AP.

* **Eligibility of RA-RUs**

An HE STA that is the intended receiver of a User Info field in a Trigger frame (i.e., the AID12 subfield equal to the 12 LSBs of the AID of the STA) shall not contend for an RA-RU that is indicated by a Trigger frame contained in the same PPDU and shall not decrement its OBO counter.

An eligible RA-RU is a RA-RU for which the HE STA is capable of generating an HE TB PPDU (i.e., the HE STA supports all transmit parameters indicated in the Common Info field and in the User info field corresponding to the RA-RU) and shall satisfy at least one of the following conditions:

* The HE STA is not associated with the BSS it intends to transmit frames to and the AID12 value of the RA-RU is 2045
* The HE STA is an associated STA, the TA field of the Trigger frame is set to the BSSID of the associated BSS and the AID12 value of the RA-RU is 0

An HE STA shall not contend for an eligible RA-RU or decrement its OBO counter if it does not have pending frames for the AP.

An HE AP may indicate a set of contiguous RUs allocated for random access via the Number Of RA-RU subfield in the User Info field of the Trigger frame. When an AP allocates a contiguous set of RA-RUs, the first RA-RU in the set shall represent the starting RU allocation for the set.

Note: When contiguous RA-RUs are assigned, the size of all contiguous RA-RUs is the same and equal to the size of the first RU. Further, all the remaining subfields of the User Info field apply to all the contiguous RA-RUs in the set and the values for starting spatial stream and the number of spatial streams of the HE TB PPDU transmitted on each RA-RU are set to 1.

A non-AP HE STA shall determine the number of eligible RA-RUs in a contiguous set by adding the value carried in the Number Of RA-RU subfields plus one for the User Info field corresponding to an eligible RA-RU.

* Transmission procedure for UORA(#13652)

In this subclause, the transmission procedure using RA-RUs is described with respect to UORA parameters. The procedure is also illustrated in Figure 27-5 (Illustration of the UORA procedure).(#13652)

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| * **Illustration of the UORA procedure**
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After each successful HE TB PPDU transmission by using an RA-RU, an HE STA shall set the value of OCW to the OCWmin obtained from the most recent OCWmin indicated in the UORA Parameter Set element from the HE AP or the default (if UORA Parameter Set element was not received) and shall initialize its OBO counter to a random integer value in the range of 0 and OCW.

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, if the OBO counter of an HE STA is not greater than the number of eligible RA-RUs in a Trigger frame from that AP, then the HE STA shall set its OBO counter to zero and randomly select one of the eligible RA-RUs. Otherwise, the HE STA decrements its OBO counter by the number of eligible RA-RUs in the Trigger frame.

In the example shown in Figure 27-5 (Illustration of the UORA procedure), upon the reception of the Trigger frame 1, (#14211)HE STA 1 and HE STA 2, both associated with the AP and that has a pending frame for the AP, decrement their nonzero OBO counters by the eligible RA-RUs indicated in the Trigger frame where the AID12 subfield is 0. HE STA 3, which is not associated with the AP but has a pending frame for the AP, decrements its nonzero OBO counter by the eligible RA-RUs indicated in the Trigger frame where the AID12 subfield is 2045. HE STA 4, which is associated with the AP and has a pending frame for the AP, is assigned RU6 and does not decrement its nonzero OBO counter. HE STA 4 will transmit its pending frame in an HE TB PPDU using the assigned RU6. HE STA 4 still has pending frame for the AP so it maintains OBO counter and resumes random access in next Trigger frame.

After receiving Trigger frame 1, HE STA 1 transmits an HE TB PPDU because its OBO counter decrements to 0. HE STA 1 then randomly selects RU2 from RU1, RU2, and RU3 which are assigned to AID12 subfield value 0. HE STA 2, HE STA 3, and HE STA 4 hold their OBO counters and wait for the next Trigger frame because their OBO counters don't decrement to 0. After receiving Trigger frame 2, HE STA 2, HE STA 3, and HE STA 4 decrement their OBO counters to 0 and each transmit their pending frame in an HE TB PPDU on a randomly selected RU.(#14211)

If the selected RU is idle as a result of both physical and virtual CS as defined in 27.5.3.5 (UL MU CS mechanism), the HE STA transmits the HE TB PPDU in the selected RU following the rules of 27.10.4 (Multi-TID A-MPDU and ack-enabled A-MPDU). If the selected RU is considered busy as a result of either physical or virtual CS, then the HE STA shall not transmit the HE TB PPDU and the STA shall randomly select its OBO counter in the range of 0 and OCW.

The MU acknowledgment procedure for UORA follows the procedure as defined in 10.3.2.10.3 (acknowledgment procedure for an UL MU transmission).

If a STA transmits an HE TB PPDU that solicits an immediate response in an RA-RU and the expected response is not received, the transmission is considered unsuccessful. Otherwise, the transmission is considered successful. The STA shall initialize OCW to OCWmin if the transmission is successful and shall follow the retransmission procedure defined in 27.5.5.3 (Retransmission procedure for UORA) if the transmission is not successful.

NOTE—A non-AP STA that transmits an HE TB PPDU in response to a Trigger frame allocating RA-RU(s) by following the UORA procedure does not update its state variables to the values contained in the MU EDCA Parameter Set element (see 27.2.6 (EDCA operation using MU EDCA parameters)).

* Retransmission procedure for UORA

An HE STA whose HE TB PPDU transmission sent in a RA-RU(#11033) of a Trigger frame is unsuccessful, may attempt to retransmit the failed PPDU using EDCA or as a response to a Trigger frame.

If the HE TB PPDU is not successfully transmitted in the selected RA-RU(#11033), 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 27.5.5.2 (UORA procedure).

 (#13098)