IEEE P802.11
Wireless LANs

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| CIDs related to Random Access – Part 1 |
| Date: January 2, 2018 |
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Abstract

This submission proposes resolutions for following CID received for TGax LB230 (16):

11033, 13196, 11992, 14208, 12224, 14210, 13198, 11001, 11364, 12178, 11731, 11732, 12179, 11045, 13796, 11379

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Editorial updates based on offline feedback

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** | **Pg / Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 11033 | Abhishek Patil | 257.12 | 27.5.5 | A UORA STA needs to set the dot11OFDMARandomAccessOptionImlemented to true | As in comment | **Revised**Agree with the comment.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11033** |
| 13196 | Rajesh Kumar | 257.15 | 27.5.5 | An HE STA that supports UORA shall set the dot11OFDMARandomAccessOptionImlemented to true | Add the following sentence at the end of the first paragraph:"An HE STA that sets the UL OFDMA RA Support subfield in the HE Capabilities element to 1 shall set dot11OFDMARandomAccessOptionImlemented to true." | **Revised**Agree with the comment.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 13196** |
| 11992 | James Yee | 258.06 | 27.5.5.1 | "the intended HE AP" is ambiguous and should be changed to "an HE AP it wishes to communicate with". | As suggested. | **Revised**Agree with the comment.Revised the sentence to remove any ambiguity.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11992** |
| 14208 | Yunbo Li | 258.08 | 27.5.5.1 | Why AID12 equal to 0 applies to a unassociated HE STA? | delete "0 or" in the sentence "... to be used reception of a Trigger frame containing RU with an AID12 subfield equal to 0 or 2045." | **Revised**Agree that there was some ambiguity since the paragraph started with description of unassociated STA. A new sub-section has been defined to cover the case of unassociated STAs. Text in this paragraph relating to unassociated STA is moved to the new sub-section. The text after the re-org clarifies that any STA (whether associated or unassociated) wishing to use UORA procedure to communicate with an AP shall use default values if it has not received the UORA parameter set from the AP.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 14208**Also, please see CID 13796 |
| 12224 | kaiying Lv | 258.10 | 27.5.5.1 | It is talking about unassociated STAs, so remove the case for RU with an AID12 subfield equal to 0 | Change as comment. | **Revised**Agree with the comment.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 12224**Also, please see CIDs 14208 & 13796 |
| 14210 | Yunbo Li | 258.58 | 27.5.5.2 | The value of AID12 subfleld is better here. | change "AID value 0" to "the value of AID12 subfield equal to 0" | **Revised**Agree with the comment.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 14210** |
| 13198 | Rajesh Kumar | 260.01 | 27.5.5.2 | Mention that OCW is reset after a successful transmission | Replace sentence as: "Otherwise, the transmission is considered successful and OCW is reset" | **Revised**Agree with the comment.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 13198** |
| 11001 | Abhishek Patil | 85.10 | 9.3.1.23 | Random access for unassociated STAs is broken. In case of random access for unassociated STAs (AID12=2045), the most likely case is that an unassociated STA wishing to use the random access RU has not received any other frames from the AP sending the Trigger frame. As a result, the unassociated STA has no knowledge of the reference channel (primary 20). Since the RU indexing is with respect to the primary20 of the AP, how would an unassociated non-AP STA know the RU mapping of the Trigger frame? | As in comment | **Revised**Agree with the comment.An unassociated STA may not have received any mgmt. frame from the AP before it hears a TF with AID12=2045. In such case, the STA would need to know the primary channel to honor the NAV rules. Per D2.0, only Basic Trigger frame is allowed to carry RA-RUs for unassociated STAs. Further, an unassociated STA is only permitted to send a single management frame in an HE TB PPDU as a response to a TF with RA-RU containing AID12=2045. Therefore, the subfields of Trigger Dependent User Info field of a Basic Trigger frame are not applicable when the RA-RU is assigned for unassociated STAs.One Octet field is sufficient to indicate the primary operating channel of the AP. Thus, the 1-octet Trigger Dependent User Info field can be overloaded to indicate the primary channel of an AP.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11001** |
| 11364 | Bibhu Mohanty | 85.10 | 9.3.1.23 | A Trigger frame can be sent in non-HE format. However, TB PPDU is an HE PPDU with the SIG-A field carrying the BSS Color information. In case of random access for unassociated STAs (AID12=2045), it is possible that an unassociated STA wishing to use the random access RU has not received any other frames from the AP sending the trigger frame. As a result, the unassociated STA may not have received information regarding the AP's BSS Color. Need to provide a mechanism to signal the BSS color information in TF if the TF has at least 1 random access RU for unassociated STAs. | Define a mechansim which allows an AP to provide BSS Color information when the TF includes at least one RU with AID12=2045 | **Revised**Agree with the comment.The proposed resolution is to mandate an AP to send a TF in HE PPDU format when the TF contains at least one RA-RU for unassociated STAs so that the unassociated STAs can determine the BSS color of the AP.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11364** |
| 12178 | kaiying Lv | 249.33 | 27.5.3.3 | Miss a case that the STA is an unassociated STA. Change the sentence to "If the Trigger frame was received in a non-HE PPDU, then set to the value of the BSS Color subfield of the most recently received HE Operation element for the BSS with which the STA is associated or the BSS with which the STA is unassociated and it intends to transmit frames." | Please clarify it | **Revised**Agree in principle however, it is possible that an unassociated STA has not received HE Operation element from the AP it intends to communicate with via the UORA procedure. Therefore, it is mandatory for an AP to send a TF in HE PPDU format when the TF includes at least 1 RA-RU for unassociated STAs.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 12178** |
| 11731 | Geonjung Ko | 249.35 | 27.5.3.3 | There is no BSS\_COLOR setting rule when the Trigger frame is in a non-HE PPDU and the STA is an unassociated STA. | Use the active BSS color,use an HE PPDU when soliciting unassociated STAs, ordefine the BSS Color field in the Trigger frame format | **Revised**Agree in principle however, it is possible that an unassociated STA has not received HE Operation element or BSS Color Change Announcement from the AP it intends to communicate with via the UORA procedure. Therefore, it is mandatory for an AP to send a TF in HE PPDU format when the TF includes at least 1 RA-RU for unassociated STAs. **TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11731** |
| 11732 | Geonjung Ko | 258.06 | 27.5.5.1 | For the faster channel access, an unassociated STA can participate in the UORA using the default values of OCWmin and OCWmax without receiving the UORA Parameter Set element. Need to clarify whether an unassociated STA can participate in the UORA even before receiving the HE or VHT Operation element. | As in the comment | **Revised**D2.0 27.5.5.1 specified default OCW parameters and permitted an unassociated STA to send frames to the AP even if it didn’t received UORA parameter set from the AP. However, as indicated by this comment and CID 11364, it is possible that the unassociated has not received HE Op element from the AP. The resolution provides clarification that an HE AP is required to send a TF in HE PPDU format to aid unassociated STAs determine the BSS Color of the AP so that they can use that to send HE TB PPDU by following the UORA procedure.TGax editor, please make changes as shown in doc **11-17/1849r2 that are marked with CID 11732.** **Also, please see resolution for CID 11364** |
| 12179 | kaiying Lv | 257.31 | 27.5.5.1 | It is better to clarify how to set the TA field of a trigger frame allocating random access RUs for multiple BSSID case. Please change the sentence to "The HE STA is an unassociated STA, the TA field of the Trigger frame is set to the BSSID of the BSS it intends to transmit frames to and the AID12 value of the random access RU is 2045" | as comment | **Revised**A STA may be associated with AP1 while sending a frame to AP2 by following the UORA procedure in response to a TF from AP2 (with RA-RUs AID12=2045). In that sense, the STA is not associated with the BSS (AP2) that sent the TF. Added clarification text to prevent an unassociated from wasting an RA-RU (by setting the RA to an unknown value).**TGax editor, please make changes as suggested in doc 11-17/1849r2 under CID 12179** |
| 11045 | Abhishek Patil | 313.05 | 27.14.2 | Since this section related to power save, the paragraph on unassociated STAs should be moved out of this section - perhaps to section 27.5.5 or to a new section which is dedicated to random access for unassociated STAs. | As in comment | **Revised**Agree with the comment.Moved the contents of this paragraph to a new subsection under section 27.5.5 dedicated to random access for unassociated STAs.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11045** |
| 13796 | Yanjun Sun | 313.05 | 27.14.2 | The paragraph on random access for unassociated STAs is an odd fit in this section as some of the power states do not apply to unassociated STAs. Random access during TWT SPs is still an important access feature for unassociated STAs and needs to be described (as in this paragraph). Random access for unassociated STAs as such requires several other considerations - e.g., signaling of BSS Color, reference channel etc. | Define a new section on random access for unassociated STAs and move this paragraph along with other content (e.g., BSS Color & reference channel signaling) into that section. | **Revised**Agree with the comment.Defined a new section under section 27.5.5 dedicated to random access for unassociated STAs. Moved the contents of this paragraph to the new sub-section. The new section also covers other aspects related to UORA operation for unassociated STAs.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 13796** |
| 11379 | Bibhu Mohanty | 312.33 | 27.14.2 | B-TWT element can carry indication of one or more B-TWT sessions. The current sentence doesn't capture this correctly (i.e., "... one or more start times for broadcast TWT SP ...." is a bit ambiguous whether it refers to the SPs belonging to the same TWT session or several of them) | Reword sentence as:"An HE AP may indicate start time(s) for broadcast TWT SP(s) containing Trigger frames ..." | **Revised**Agree with the comment.**TGax editor, please make changes as shown in doc 11-17/1849r2 that are marked with CID 11379** |

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**3.4 Abbreviations and acronyms**

***TGax Editor: Please Insert the following acronym definitions (maintaining alphabetical order):***

RA-RU Random Access Resource Unit (RU)

***TGax Editor: Please replace all occurrences of “random access RU” and “random access resource unit” in the 11ax Draft 2.0 with “RA-RU”.***

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

***TGax Editor: Please make the following changes to the 1st paragraph in 27.5.5.1 (11ax D2.0 P257L15):***

[11033, 13196]A STA with dot11OFDMARandomAccessOptionImplemented to true shall set the UL OFDMA RA Support subfield in the HE MAC Capabilities Information field of the HE Capabilities element to 1. Otherwise, it shall set the UL OFDMA RA Support subfield to 0.

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

***TGax Editor: Please delete the 2nd paragraph and replace it with the last paragraph with the changes as indicated below (27.5.5.1 11ax D2.0 P257L22):***

[11033, 13196] p eligibleRA-

***TGax Editor: Please move the 2nd sentence from the 4th paragraph in 27.5.5.1 to 27.5.5.5 as indicated below (11ax D2.0 P257L39):***

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.

***TGax Editor: Please make the following changes to the 9th paragraph in 27.5.5.1 (11ax D2.0 P258L5):***

***Note: portions of this paragraph are moved to a new sub-section 27.5.5.5***

[14208, 12224]An HE STA shall initialize the range of OFDMA contention window (OCW) upon reception of the UORA Parameter Set element from the intended HE AP. [11992]An HE STA that has not received an UORA Parameter Set element from the AP with which it intends to communicate shall use the default values of OCWmin = 7 and OCWmax = 31 when contending for RA-RUs allocated by a Trigger frame from that AP. [14208, 12224] [13796]

***TGax Editor: Please move the last paragraph to be the 2nd paragraph in 27.5.5.1 (11ax D2.0 P258L15):***

[11033, 13196]

* **UORA procedure**

***TGax Editor: Please make the following changes to the 4th paragraph in 27.5.5.2 (11ax D2.0 P258L57):***

[14210]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 AID12 subfield of the User Info field in the Trigger frame to 2045 to indicate that the RA-RU is allocated for a STA not associated with it.

***TGax Editor: Please make the following changes to the last paragraph in 27.5.5.2 (11ax D2.0 P260L1):***

If a STA transmits an HE TB PPDU that solicits an immediate response in a RA-RU and the expected response is not received, the transmission is considered unsuccessful. Otherwise, the transmission is considered successful. [13198]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.

***TGax Editor: Please add the following note at the end of 27.5.5.2:***

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 (Obtaining an EDCA TXOP for HE non-AP STAs using MU EDCA parameters)).

***TGax Editor: Please add a new section after 27.5.5.4 as follows (11ax D2.0 P260L29):***

**27.5.5.5 Additional Considerations to Support Random Access for Unassociated STAs** [13796]

[11364, 12178, 11731]An AP shall transmit a Trigger frame in an HE PPDU when the frame allocates one or more RA-RUs with AID12 set to 2045 to enable an unassociated STA determine the BSS Color of the AP.

RA-

An AP shall indicate its primary operating channel via the Trigger Dependent User Info subfield corresponding to an RA-RU with AID12 set to 2045 in a Basic Trigger frame (see 9.3.1.23.1 Basic Trigger variant).[11001]

A non-AP STA that sends an HE TB PPDU in response to a Trigger frame from an AP it is not associated with allocating RA-RU(s):

* shall set the TXVECTOR parameter BSS\_COLOR to the value of the RXVECTOR parameter BSS\_COLOR of the soliciting Trigger frame (see 27.5.5.2 (UORA Procedure) and 27.5.3.3 (STA behavior for UL MU operation)).[11364, 12178, 11731]
* shall determine the primary channel of the AP via the Trigger Dependent User Info subfield corresponding to the RA-RU.[11001]
* shall include at most one MMPDU in the HE TB PPDU.[11001]
* shall set the RA field of the frame carried in the HE TB PPDU to the TA address of the soliciting Trigger frame or to the address of a nontransmitted BSSID if the soliciting BSS corresponds to transmitted BSSID.[12179]

[11732]An unassociated non-AP STA that has not received an UORA Parameter Set element from the AP with which it intends to communicate shall use the default OCW values as defined in 27.5.5.1 (General). using

***TGax Editor: Please move 4th paragraph from 27.14.2 as the last paragraph of 27.5.5.5 and make the following changes:***

[11045]begin listening for Trigger frames at the start of a particular broadcast TWT SP indicating that the particular TWT SP shall include Trigger frames with at least one RA-RU for unassociated STAs (see 27.7.3.1 (General)).

* **Power save with UORA**

***TGax Editor: Please make the following changes to the 2nd paragraph in 27.14.2 (11ax D2.0 P312L33):***

[11379]An HE AP may indicate start time for one or more broadcast TWT SPs 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).

***TGax Editor: Please delete the 4th paragraph from 27.14.2 and move its contents to (the new subsection) 27.5.5.5 (11ax D2.0 P313L5):***

[11045, 13796]

* **Basic Trigger variant**

[11001]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 as defined in Figure 9-52j (Trigger Dependent User Info subfield for the Basic Trigger variant when AID12 subfield is not 2045) when the AID12 subfield of the User Info field is not equal to 2045. The Trigger Dependent User Info subfield of the Basic Trigger frame is as defined in Figure 9-52jj (Trigger Dependent User Info subfield for the Basic Trigger variant when AID12 subfield is 2045) when the AID12 subfield of the User Info field is equal to 2045.

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| --- | --- | --- | --- | --- |
|  | B0                       B1 | B2                    B4 | B5 | B6               B7 |
|  | MPDU MU Spacing Factor | TID Aggregation Limit | Reserved | Preferred AC |
| Bits: | 2 | 3 | 1 | 2 |
| * **Trigger Dependent User Info subfield(#7324) for the Basic Trigger variant when AID12 subfield is not 2045**[11001]
 |

|  |  |
| --- | --- |
|  | Primary Channel |
| Octet: | 1 |
| **Figure 9-52jj – Trigger Dependent User Info subfield(#7324) for the Basic Trigger variant when AID12 subfield is 2045**[11001] |

[11001]When the AID12 subfield of the User Info field is not equal to 2045, the Trigger Dependent User Info carries the MPDU MU Spacing Factor, TID Aggregation Limit and Preferred AC subfields.

Note: The MPDU MU Spacing Factor, TID Aggregation Limit and Preferred AC subfields do not apply to the case when AID12=2045 since the response is a single MMPDU (see 27.5.5.5 (Additional Considerations to Support Random Access for Unassociated STAs)).

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.

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).

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 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.

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 (see 9.3.1.23 (Trigger frame format)). The encoding of the Preferred AC subfield is shown in Table 9-25j (Preferred AC subfield encoding).

|  |
| --- |
| * **Preferred AC subfield encoding**
 |
| **Value** | **Description** |
| 3(#3018) | AC\_VO |
| 2 | AC\_VI |
| 1 | AC\_BE |
| 0 | AC\_BK |

[11001]When the AID12 subfield of the User Info field is equal to 2045, the Trigger Dependent User Info carries the Primary Channel field. The Primary Channel field is as defined in 9.4.2.57 (HT Operation element) and indicates the channel number of the primary channel of the AP.