IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | D2.0 PHY Comment Resolution – Part 3 | | | | | | Date: 2018-05-03 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm | 1700 Technology Dr.  San Jose, CA 95110 |  | youhank@qti.qualcomm.com | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from the letter ballot on P802.11ax D2.0:

11722, 12490, 11418, 12796, 12580, 13764, 13428, 13952, 14159, 11435, 14056, 12558, 13631, 14315, 13434, 14059, 14060, 13440, 14161, 14162, 14163, 13633, 13377, 12561, 12872, 12590, 14196, 12051, 12876, 12687, 13613, 13614

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version.

R1: Updated proposed text for CIDs 13428, 13952, 14159 per discussion during teleconference on 5/2/2018.

R2: Fixed typo in CID 12876

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 11722 | 28.3.3.1 | 357.02 | Allocating different transmit powers to different subchannels may violate transmit spectrum flatness requirement; need to explain why this does not violate the flatness requirement or this statement is removed | either add text explain why this will not violate the flatness requirement or remove it |
| 12940 | 28.3.3.1 |  | Allocating different transmit powers to different subchannels may violate transmit spectrum flatness requirement | Add a NOTE to state that RU power boosting and beamforming should not be used when measuring spectral flatness. |

**Context**

D2.0 P357L2:

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| With OFDMA, different transmit powers may be applied to different RUs. |

P2.3 P542L17 (28.3.18.2 – Spectral flatness):

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| Resource unit power boosting and beamforming should not be used when measuring spectral flatness. |

**Proposed Resolution: CID 11722**

**Rejected**.

Spectral flatness measurement is done with the RU power boosting (different transmit power per RU) not used. Hence, the RU power boosting does not violate the spectral flatness requirement.

**Proposed Resolution: CID 12940**

**Rejected**.

Spectral flatness subclause (28.3.18.2) already specifies that RU power boosting and beamforming should not be used when measuring spectral flatness (see D2.3 P542L17).

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 11418 | 28.3.3.2 | 363.40 | In HE80 tone plan, the boundary of RU242s is not aligned with the 20MHz physical channel boundary. If a RU has a few tones into the 20MHz channel of punctured preamble, can this RU still be transmitted in the preamble puncturing transmission? | Need to add RU transmission and/or tone puncutring rules for preamble puncturing |
| 12796 |  |  | Preamble puncturing is inadequately defined and described. Needs to be clearer that it's basically about using OFDMA and restricting the allocated RUs | Define the terms "subchannel is punctured", "[RU is] zeroed out", "channels removed". Clarify whether tx is restricted to APs (as suggested by 28.1.1) or also allowed for STAs (as suggested by 9.4.2.237.3)? (Presumably not restricted to APs, since then what's the point, since the STAs will transmit in the not-to-be-messed-with 20 MHz channel?) Clarify whether the payload also punctured. (Presumably yes, otherwise what's the point w.r.t. the not-to-be-messed-with 20 MHz channel.) Clarify what the PHY rate is per the MCS tables in 28.5 |
| 12580 | 28.3.10.8.3 | 424.54 | It should be made clear that when preamble puncturing is used no RU is allocated in "punctured" subchannels so that the data is also "punctured" too | At the end of the referenced subclause add a para "When preamble puncturing is present, no RU shall be allocated that overlaps with any 20 MHz sub-channel that is punctured." |
| 13764 | 28.3.10.7 | 412.33 | Since 20MHz channel is not aligned with 242 tone RU in 80MHz, the 20MHz channel cannot be fully punctured because some RU in adjacent 20MHz may overlap with the punctured 20MHz. Currently, the spec doesn't specify how to handle this case. | Add the following clarifications after P.L. 412.33 "If an AP indicate preamble puncture in a HE MU PPDU by setting the Bandwidth field in HE-SIG-A in the range 4 to 7, the AP is recommended to avoid allocate resources on the tones that could interfere the punctured channel." |

**Proposed Resolution: CIDs 11418, 12580**

**Revised**.

Proposed text update in 11-18/0779r2 clarifies preamble punctured transmissions.

Instruction Editor: Implement the proposed text update for CIDs 11418, 12580, 12796 and 13764 in 11-18/0779r2.

**Proposed Resolution: CID 12796**

**Revised**.

Proposed text update in 11-18/0779r2 clarifies preamble punctured transmissions. Note that 28.5 shows the PHY rate per RU, hence does not need to be updated for preamble punctured transmissions.

Instruction Editor: Implement the proposed text update for CIDs 11418, 12580, 12796 and 13764 in 11-18/0779r2.

**Proposed Resolution: CID 13764**

**Revised**.

Proposed text update in 11-18/0779r2 clarifies preamble punctured transmissions.

Instruction Editor: Implement the proposed text update for CIDs 11418, 12580, 12796 and 13764 in 11-18/0779r2.

**Proposed Text Updates: CIDs 11418, 12580, 12796, 13764**

*TGax Editor: Update D2.3 P367L46 (28.1.1 – Introduction to the HE PHY) as shown below.*

For PPDU bandwidths greater than or equal to 80 MHz, the HE PHY supports preamble punctured transmissions where pre-HE modulated fields (see Figure 28-22) are not transmitted in one or more of the non-primary 20 MHz channels, and RUs associated with those punctured 20 MHz channels are not allocated to any users in an HE MU PPDU.

*TGax Editor: Add the following at D2.3 P476L39 (28.3.10.8.5 – HE-SIG-B common content).*

If a 20 MHz channel has its preamble punctured in an HE MU PPDU, then the RU Allocation subfield for the corresponding 20 MHz channel shall use the value B7…B0 = 01110001.

If the value of the Bandwidth field in the HE-SIG-A of an HE MU PPDU is 4 or 5, and if either the second RU Allocation subfield in the first HE-SIG-B content channel or the first RU Allocation subfield in the second HE-SIG-B content channel has the value B7…B0 = 01110001, then the Center 26-tone RU subfield in both HE-SIG-B content channels shall be set to 0.

If the value of the Bandwidth field in the HE-SIG-A of an HE MU PPDU is 6 or 7, and if either the second RU Allocation subfield in the first HE-SIG-B content channel or the first RU Allocation subfield in the second HE-SIG-B content channel has the value B7…B0 = 01110001, then the Center 26-tone RU subfield in the first HE-SIG-B content channels shall be set to 0. If the value of the Bandwidth field in the HE-SIG-A of an HE MU PPDU is 6 or 7, and if either the fourth RU Allocation subfield in the first HE-SIG-B content channel or the third RU Allocation subfield in the second HE-SIG-B content channel has the value B7…B0 = 01110001, then the Center 26-tone RU subfield in the second HE-SIG-B content channels shall be set to 0.

If an RU Allocation subfield has value B7…B0 = 01110001, then the corresponding 20 MHz channel shall comply with the transmit spectral mask for preamble punctured transmissions as specified in 28.3.18.1.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13428 | 28.3.3.2 | 364.55 | "at least N x 4 x 26 subcarriers (contiguous or non-contiguous) shall be occupied". While this is correct, the subcarriers should still consist of entire RUs. It's not allowed to just randomly occupy subcarriers till the required number is met. | Clarify |
| 13952 | 28.3.3.2 | 364.55 | "In an HE MU PPDU, at least Nx4x26 subcarriers (contiguous or non-contiguous) shall be occupied throughout the signaled BW, where N is the number of 20 MHz subchannels occupied by non-HE portions of the HE PPDU preamble." It does not forbid that an HE MU PPDU occupies 26-tone RU in an 20MHz. But, in 11-16/910r0, original proposal was to require a minimum of four RU26 (or equivalently other sized RUs) in each 20MHz. It seems that current spec text is not correctly captured. | As in comment. |
| 14159 | 28.3.3.2 | 364.55 | make it clear whether the sentence "In an HE MU PPDU, at least N x 4 x 26 subcarriers (contiguous or non-contiguous) shall be occupiedthroughout the signaled BW, where N is the number of 20 MHz subchannels occupied by non-HE portions of the HE PPDU preamble." properly reflects its original intention by 16/0910r0. Its proposal in the document is "Proposal - require a minimum of four RU26 (or equivalently other sized RUs) in each 20MHz."  For example, the current text seems to allow 6 x 26 on the primary 20MHz channel and 2 x 26 on the secondary 20MHz. | as in comment |

**Discussion**

11-16/910r0:

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If there are no 20 MHz operating STAs allocated in an HE MU PPDU, then having N\*4\*26 tones across the entire PPDU BW should be enough to ensure reasonable dynamic range ratio between time and frequency domain signals. But if there are some 20 MHz operating STAs allocated, then the corresponding 20 MHz subchannel should have at least 4\*26 tones to ensure that the 20 MHz operating STA also sees reasonable dynamic range ratio between the time and frequency domain. Furthermore, the Primary 20 MHz should have at least one RU to ensure that other devices which missed the preamble still sees some energy and thus is prevented from jumping into grab the channel.

**Proposed Resolution: CIDs 13428, 13952, 14159**

**Revised**.

Proposed text update in 11-18/0779r2 clarifies the requirement on the minimum number of subcarriers to be modulated in an HE MU PPDU. Note that the requirement is moved to 28.3.10.8 (HE-SIG-B) for further clarity.

Instruction Editor: Implement the proposed text update for CIDs 13428, 13952 and 14159 in 11-18/0779r2.

**Proposed Text Updates: CIDs 13428, 13952, 14159**

*TGax Editor: Delete D2.3 P407L62-65.*

*TGax Editor: Add the following at D2.3 P476L39 (28.3.10.8.5 – HE-SIG-B common content).*

In an HE MU PPDU, an RU which is not allocated to any user can be indicated using the Center 26-tone RU subfield in the HE-SIG-B Common field (see Table 28-23), certain RU Allocation subfield values in the the HE-SIG-B Common field (see Table 28-24), or value 2046 for the STA-ID subfield in the HE-SIG-B User field (see 27.11.1 and 28.3.10.8.6). Subcarriers corresponding to such unallocated RUs shall not be modulated in HE-STF, HE-LTF and Data. An HE MU PPDU shall have sufficient number of RUs allocated to users such that

* At least *M* 4  26 subcarriers are modulated by the allocated RUs within the entire PPDU, where *M* is the number of RU Allocation subfields whose value is not B7…B0 = 01110001 (20 MHz subchannels which are not preamble punctured),
* In each RU Allocation subfield whose value is not B7…B0 = 01110001 (20 MHz subchannels which are not preamble punctured) and has allocation for at least one 20 MHz operating STA, at least 4  26 subcarriers are modulated by RUs allocated by that RU Allocation subfield, and
* At least one RU is allocated in the RU Allocation subfield corresponding to the Primary 20 MHz.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 11435 | 28.3.3.6 | 367.14 | Since a 20 MHz operating STA shall operate on the primary 20 MHz, it's not necessary to list RUs on secondary channels that are not allowed to allocate to 20 MHz operating STA. | Remove RUs on secondary channels. |

**Discussion**

Context: D2.3 P411L54

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Note that in D2.3, 20 MHz operating STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true may operate in any 20 MHz.

D2.3 P410L62:

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**Proposed Resolution: CID 11435**

**Rejected**.

A 20 MHz operating STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true may now operate in any 20 MHz (see D2.3 P410L62).

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14056 | 28.3.3.6 | 367.37 | 28.3.3.5 requires that 20 MHz operating non-AP HE STAs operate in the Primary 20 MHz channel. | Add "- RUs in which any of the subcarriers falls outside the Primary 20 MHz channel" |

**Proposed Resolution: CID 14056**

**Rejected**.

A 20 MHz operating STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true may now operate in any 20 MHz (see D2.3 P410L62).

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 12558 | 28.3.3.5 | 367.44 | 20 MHz-only devices operate in P20 channel. In that case why we need "All" in the following sentence "It is optional whether all 242-tone RUs of non-AP STAs with 20 MHz operating channel width to be supported in 40 MHz, 80 MHz, or 160 MHz, or 80+80 MHz HE MU PPDU, and is indicated in the Channel Width Set subfield in the HE PHY Capabilities Information field of the HE Capabilities element)" | Delete "All" from the sentence |

**Context**

D2.3 P412L20

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| It is optional whether all 242-tone RUs of non-AP STAs with 20 MHz operating channel width to be supported in 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE MU PPDU, and it is indicated in the Channel Width Set subfield in the HE PHY Capabilities Information field of the HE Capabilities element (see 9.4.2.237.3 (HE PHY Capabilities Information field)). A 242-tone RU for a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE TB PPDU shall not be allocated to a 20 MHz operating non-AP HE STA. |

**Proposed Resolution: CID 12558**

**Revised**.

A 20 MHz operating STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true may now operate in any 20 MHz (see D2.3 P410L62). Hence, the premise of comment that 20 MHz operating STAs operates only in the Primary 20 MHz is no longer true. However, the cited text deserves cleanup.

Instruction to Editor: Implement the proposed text update for CID 12558 in 11-18/0779r2.

**Proposed Text Updates: CID 12558**

*TGax Editor: Update D2.3 P412L20 as shown below.*

A 242-tone RU in a 40 MHz HE MU PPDU shall not be allocated to a 20 MHz operating non-AP HE STA in the 2.4 GHz band unless the STA has set B4 of the Channel Width Set subfield of the HE PHY Capabilities Information field to 1. A 242-tone RU in a 40, 80, 160 or 80+80 MHz HE MU PPDU shall not be allocated to a 20 MHz operating non-AP HE STA in the 5 GHz band unless the STA has set B5 of the Channel Width Set subfield of the HE PHY Capabilities Information field to 1. A 242-tone RU in a 40, 80, 160 or 80+80 MHz HE TB PPDU shall not be allocated to a 20 MHz operating non-AP HE STA.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13631 | 28.3.3.7 | 367.65 | This sentence is confusing. When non-AP STA supports 80 MHz in 160/80+80, then AP shall not allocate RUs outside of the primary 80MHz? | Please clarify |

**Background**

D2.3 P412L37

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**Proposed Resolution: CID 13631**

**Rejected**.

The referred sentence indicates that an AP shall not allocate RUs outside of the Primary 80 MHz to an 80 MHz operating non-AP HE STA in an 160 or 80+80 MHz HE MU PPDU or HE TB PPDU.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14315 | 28.3.3.9.2 | 368.21 | "space-time stream" and "spatial stream" are mixed in subclause 28.3.3.9 and 28.3.3.11. | Same rules shall be applied to conditions in these subclause. |

**Proposed Resolution: CID 14315**

**Rejected**.

The cited sections are related to DL and UL MU-MIMO. Note that 11ax does not allow STBC to be used in conjunction with MU-MIMO. Hence, spatial stream and space-time stream are equivalent to each other in the context of MU-MIMO.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13434 | 28.3.3.9.2 | 368.29 | "An HE STA shall support reception of DL MU-MIMO transmissions on full bandwidth with the total number of space-time streams (across NUM\_USERS) less than or equal to a maximum value indicated by the Beamformee STS <= 80 MHz and Beamformee STS > 80 MHz subfields in the HE PHY Capabilities Information field in the HE Capabilities element." This is confusing. It sounds like the maximum of these two values needs to be considered. | Rewrite as e.g. "For transmissions using bandwidth lower than or equal to 80 MHz, an HE STA shall support reception of DL MU-MIMO transmissions on full bandwidth with the total number of space-time streams (across NUM\_USERS) up to the value indicated by the Beamformee STS <= 80 MHz subfield in the HE PHY Capabilities Information field in the HE Capabilities element. For transmissions using bandwidth larger than 80 MHz, an HE STA shall support reception of DL MU-MIMO transmissions on full bandwidth with the total number of space-time streams (across NUM\_USERS) up to the value indicated by the Beamformee STS > 80 MHz subfield in the HE PHY Capabilities Information field in the HE Capabilities element." |
| 14059 | 28.3.3.9.1 | 368.28 | For example, suppose NUM\_USERS = 2. Then, what does "across 2" mean? | Change "across NUM\_USERS" to "across all users". |

**Context**

D2.3 P413L1

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**Proposed Resolution: CID 13434**

**Revised**.

The proposed text update in 11-18/0779r2 adopts the example text proposed by the commenter.

Instruction to Editor: Implement the text update for CIDs 13434 and 14059 in 11-18/0779r2.

**Proposed Resolution: CID 14059**

**Revised**.

The proposed text update in 11-18/0779r2 adopts the text proposed by the commenter.

Instruction to Editor: Implement the text update for CIDs 13434 and 14059 in 11-18/0779r2.

**Proposed Text Updates: CIDs 13434, 14059**

*TGax Editor: Update D2.3 P413L1 as shown below.*

For transmissions using bandwidth less than or equal to 80 MHz, an HE STA shall support reception of DL MU-MIMO transmissions on full bandwidth with the total number of space-time streams (across all users) up to the value indicated by the Beamformee STS  80 MHz subfield in the HE PHY Capabilities Information field in the HE Capabilities element. For transmissions using bandwidth greater than 80 MHz, an HE STA shall support reception of DL MU-MIMO transmissions on full bandwidth with the total number of space-time streams (across all users) up to the value indicated by the Beamformee STS > 80 MHz subfield in the HE PHY Capabilities Information field in the HE Capabilities element.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14060 | 28.3.3.9.3 | 368.49 | What about the case in which the PPDU bandwidth indicated by HE-SIG-A of HE MU PPDU uses preamble puncturing? | Clarify that a full bandwidth MU-MIMO is not applicable when preamble puncturing is employed. |

**Context**

D2.0 P368

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**Proposed Resolution: CID 14060**

**Revised**.

“Full bandwidth MU-MIMO” is not defined, thus causing this confusion. Proposed text update in 11-18/0779r2 clarifies full bandwidth MU-MIMO.

Instruction to Editor: Implement the text update for CID 14060 in 11-18/0779r2.

**Proposed Text Updates: CID 14060**

*TGax Editor: Update D2.3 P413L1 as shown below.*

A full bandwidth MU-MIMO transmission using the HE MU PPDU format shall have a value of 1 for the SIGB Compression field in HE-SIG-A, the Common field in HE-SIG-B is not present, the HE modulated fields of the PPDU consists of one RU that spans the entire PPDU bandwidth and preamble is not punctured.

*TGax Editor: Update D2.3 P454L7 as shown below.*

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| Table 28-19 – HE-SIG-A field of an HE MU PPDU | | | | |
| Two Parts of HE-SIG-A | Bit | Field | Number of bits | Description |
| HE-SIG-A1 | B15-B17 | Bandwidth | 3 | Set to 0 for 20 MHz.  Set to 1 for 40 MHz.  Set to 2 for 80 MHz non-preamble puncturing mode.  Set to 3 for 160 MHz and 80+80 MHz non-preamble puncturing mode.  If SIGB Compression field is 0:  Set to 4 for preamble puncturing in 80 MHz, where in the preamble only the secondary 20 MHz is punctured.  Set to 5 for preamble puncturing in 80 MHz, where in the preamble only one of the two 20 MHz sub-channels in secondary 40 MHz is punctured.  Set to 6 for preamble puncturing in 160 MHz or 80+80 MHz, where in the primary 80 MHz of the preamble only the secondary 20 MHz is punctured.  Set to 7 for preamble puncturing in 160 MHz or 80+80 MHz, where in the primary 80 MHz of the preamble the primary 40 MHz is present.  Values 4~7 are not used when SIGB Compression field is 1. |

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13440 | 28.3.3.9.3 | 369.28 | "measure the channel for the interfering space-time streams". Term "intefering streams" is only used in this paragraph. | Clarify |

**Context**

D2.0 P369

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**Proposed Resolution: CID 13440**

**Revised**.

Proposed text update in 11-18/0779r2 replaces the term “interfering streams” to “streams allocated to other users”.

Instruction to Editor: Implement the text update for CID 13440 in 11-18/0779r2.

**Proposed Text Updates: CID 13440**

*TGax Editor: Update D2.3 P410L19 as shown below.*

To successfully demodulate the space-time streams intended for the STA, it is recommended that the STA uses

the channel knowledge for all space-time streams to reduce the effect of space-time streams allocated to other users.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14161 | 28.3.3.9.3 | 369.33 | define u in NSTS,r,u. For example, "If a STA u is included as a ....." at L33 or "If a STA u finds" at L34 could be possible. | as in comment |

**Context**

D2.0 P369

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**Proposed Resolution: CID 14161**

**Revised**.

Proposed text update in 11-18/0779r2 replaces the term “interfering streams” to “streams allocated to other users”.

Instruction to Editor: Implement the text update for CID 14161 in 11-18/0779r2.

**Proposed Text Updates: CID 14161**

*TGax Editor: Update D2.3 P410L24 as shown below.*

If a STA is included as a member of the MU-MIMO group in RU *r*, its corresponding *NSTS,r,u* contained in the User field in HE-SIG-B for user *u* shall not be zero. If a STA finds that it is not a member of the MU-MIMO group in RU *r*, then the STA may elect not to process RU *r* in the remainder of the PPDU.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14162 | 28.3.3.10 | 369.42 | add "a UMRS Control field" after a Trigger frame | as in comment |

**Proposed Resolution: CID 14162**

**Revised**.

Note that that “UMRS” was changed to “TRS” (triggered response scheduling) in D2.3. Proposed text update in 11-18/0779r2 adds “TRS Control field” to Trigger frame.

Instruction to Editor: Implement the text update for CID 14162 in 11-18/0779r2.

**Proposed Text Updates: CID 14162**

*TGax Editor: Update D2.3 P399L23 as shown below.*

UL MU transmissions for UL MU-MIMO and UL OFDMA are preceded by a Trigger frame or a frame containing TRS Control subfieldfrom the AP.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14163 | 28.3.3.11.5 | 370.40 | add both "a UMRS Control field" after a Trigger frame and corresponding description in 28.3.3.11.5. | as in comment |
| 13633 | 28.3.3.11.5 | 370.41 | There is no indication of when to transmit in the Common Info field of the trigger frame. "The Common Info field of the Trigger frame indicates to the STAs performing the UL MU transmissions when to transmit, and the duration of the payload and packet extension." | Remove "when to transmit, and" in the sentence. |

**Context**

D2.0 P370

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**Proposed Resolution: CID 14163**

**Revised**.

Note that that “UMRS” was changed to “TRS” (triggered response scheduling) in D2.3. Proposed text update in 11-18/0779r2 addss “TRS Control field” to Trigger frame, and clarifies the description.

Instruction to Editor: Implement the text update for CID 14163 and 13633 in 11-18/0779r2.

**Proposed Resolution: CID 13633**

**Revised**.

Agree with the commenter in principle. However, the proposed text update in 11-18/0779r2 removes the relevant sentence.

Instruction to Editor: Implement the text update for CID 14163 and 13633 in 11-18/0779r2.

**Proposed Text Updates: CIDs 14163 and 13633**

*TGax Editor: Update D2.3 P410L31 as shown below.*

UL MU transmissions are preceded by a Trigger frame or a frame containing TRS Control subfield from the AP. The Trigger frame or the frame containing TRS Control subfield indicates the parameters required to transmit an HE TB PPDU, such as the duration of the HE TB PPDU, RU allocation, target RSSI and MCS (see 9.3.1.23 (Trigger frame format), 9.2.4.6a.1 (TRS Control) and 27.5.3.3 (STA behavior for UL MU operation) for further details.)

The value of GI duration shall be the same for all users in an HE MU PPDU. The Trigger frame indicates whether the UL MU transmission following it uses HE single stream pilot HE-LTF mode or HE masked HE-LTF sequence mode or no pilots if a 1x LTF is used. When HE single stream pilot HE-LTF mode is used, no masking is applied to the HE-LTF. HE single stream pilot HE-LTF mode is used for any UL OFDMA transmission, including UL OFDMA with MU-MIMO transmissions. The appropriate MU-MIMO LTF mode indicated by the Trigger frame is used for full bandwidth UL MU-MIMO transmission except for 1x LTF.

If a STA finds that there is no User Info field in the Trigger frame carrying the STA’s AID in the AID12 subfield and there is no resource allocated for random access, then the STA shall not transmit an HE TB PPDU.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13377 | 28.3.12 | 477.00 | "PE" should be cast as subscript | Revise as suggested |

**Discussion**

It is not clear which part of the text the commenter is referring to. Perhaps the commenter is suggesting to change the highlighted “TPE” below to “TPE”.

D2.0 P477L2

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However, the highlight portion is a text automatically generated by the Framemaker SW, copying the title of Table 28-42. Note that in a ‘published’ IEEE standard (not a ‘draft’), there will not be any such auto generated reference.

**Proposed Resolution: CID 13377**

**Rejected**.

“TPE” at D2.0 P477L2 is a text auto generated by the Framemaker tool, and will not be part of the published standard.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 12561 | 28.3.12 | 477.01 | The text can be made more readable by use of brackets. E.g., T\_PE,nominal=max\_u(T\_PE,nominal,u) | As in comment |
| 12872 | 28.3.12 | 477.01 | An max\_u vector operator is used but not defined | Define the max\_u operator |

**Context**

D2.3 P527L10:

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**Proposed Resolution: CID 12561**

**Revised**.

Proposed text update in 11-18/0779r2 clarifies the max\_u operator and makes the equation more readable.

Instruction to Editor: Implement the proposed text update for CID 12561 in 11-18/0779r2.

**Proposed Text Updates: CID 12561**

*TGax Editor: Update D2.3 P527L10 as shown below.*

For an HE MU PPDU, the nominal *TPE* value (*TPE,nominal*) is given by



where

*TPE,nominal,u* is the nominal *TPE* value for user *u* and is also given by Table 28-43

 is the maximum value of  over all values of *u*.

In this case, *a* in Table 28-43 is given by Equation (28-84) or Equation (28-85).

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 12590 | 28.3.12 | 477.59 | Figure 28-41 was called "PE field when maximum PE duration is 8 us (non STBC)" in D1.0 but its content is otherwise unchanged. So it seems the STBC case is missing | Add analogues of F28-41 and F28-42 for STBC |

**Context**

D2.3 P527:

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**Proposed Resolution: CID 12590**

**Revised**.

Figures 28-42 and 28-43 are ‘examples’. It is neither necessary nor practical to creat examples for all possible scenarios. Proposed text update in 11-18/0779r2 clarifies that Figures 28-42 and 28-43 are for non-STBC cases.

Instruction to Editor: Implement the proposed text update for CID 12590 in 11-18/0779r2.

**Proposed Text Updates: CID 12590**

*TGax Editor: Add the following at D2.3 P528L2.*

Figure 28-42 and Figure 28-43 show examples of the PE field duration in an HE SU PPDU or HE ER SU PPDU where the TXVECTOR parameter NOMINAL\_PACKET\_PADDING has values of 8 µs and 16 µs, respectively, and *TPE* = *TPE,nominal*. STBC is assumed not to be used in these examples.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 14196 | 28.3.12 | 478.34 | PE\_duration seems to indicate "TXVECTOR parameter PE\_DURATION". Make it clear with proper term. | as in comment |

**Discussion**

D2.0 P478:

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Note that this has already been addressed in D2.3.

D2.3 P529L3:

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**Proposed Resolution: CID 14196**

**Revised**.

Agree with the commenter in principle. However, the relevant text has already been fixed in D2.3 (see P529L3).

Instruction to Editor: No text change is required for this CID.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 12051 | 28.3.12 | 437.48(?)  Probably 478.48 | In formula 28-109, the bPE-Disambiguity is excrated from Packet Extension subfield of the Common Info field of the Trigger frame. It should be available at the MAC-PHY Interface (In TxVector) | Add PE-Disambiguity in TXVector |

**Context**

D2.0 P478:

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**Proposed Resolution: CID 12051**

**Revised**.

Proposed text update in 11-18/0779r2 makes required changes to add and use the proposed TXVECTOR parameter.

Instruction to Editor: Implement the proposed text update for CID 12051 in 11-18/0779r2.

**Proposed Text Updates: CID 12051**

*TGax Editor: Add the following bullet item at D2.3 P281L27:*

**27.5.3.3 STA behavior for UL MU operation**

A STA transmitting an HE TB PPDU in response to a Trigger frame shall set the TXVECTOR parameters as follows:

…

* The HE\_TB\_PE\_DISAMBIGUITY parameter is set to the value indicated in the PE Disambiguity subfield in the Trigger frame

*TGax Editor: Add the following row in Table 28-1 (TXVECTOR and RXVECTOR parameters)*

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| Parameter | Condition | Value | TXVECTOR | RXVECTOR |
| HE\_TB\_PE\_DISAMBIGUITY | FORMAT is HE\_TB and TRIGGER\_METHOD is TRIGGER\_FRAME | Indicates PE disambiguity for the HE TB PPDU transmission  0 indicates no PE disambiguity  1 indicates PE disambiguity | Y | N |
| Otherwise | Not present | N | N |

*TGax Editor: Update D2.3 P529L16 as shown below.*

*b*PE-Disambiguity is the value specified by the TXVECTOR parameter HE\_TB\_PE\_DISAMBIGUITY

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 12876 | 28.3.12 | 479.26 | "The PE Disambiguity subfield of the Packet Extension subfield for an HE TB PPDU" -- there are no such subfields | Change the cited text to "The PE Disambiguity subfield in the Packet Extension subfield of the Common Info field in a Trigger frame". At 480.12 change "is PE Disambiguity subfield of the HE-SIG-A field for an HE SU, HE ER SU or HE MU PPDU, and an indicated value of PE Disambiguity subfield in the Packet Extension subfield of the Common Info field in the Trigger frame (see Table 9-25g (Subfields of the Packet Extension subfield)) for an HE TB PPDU." to "is the PE Disambiguity subfield of the HE-SIG-A field for an HE SU, HE ER SU or HE MU PPDU, and is the PE Disambiguity subfield in the Packet Extension subfield of the Common Info field in a Trigger frame." |

**Discussion**

D2.0 P479:

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Agree with the commenter on this.

P2.0 P479-480:

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Agree with the commenter, but the corresponding change has already been made in D2.3.

D2.3 P530:

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**Proposed Resolution: CID 12876**

**Revised**.

Proposed text update in 11-18/0779r2 incorporates the proposed update by the commenter, except for cases where the change has already been made in D2.3.

Instruction to Editor: Implement the proposed text update for CID 12867 in 11-18/0779r2.

**Proposed Text Updates: CID 12876**

*TGax Editor: Add the following bullet item at D2.3 P529L62:*

The PE Disambiguity subfield in the UL Packet Extension subfield of the Common Info field in a Trigger frame (see Table 9-25g) shall be set to 1 if the condition in Equation (28-118) is met for the HE TB PPDU being solicited by the Trigger frame. Otherwise, it shall be set to 0.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 12687 | 28.4.3 | 521.26 | Equations (28-129) and (28-130) refer to N\_DBPS,u but the "where" below refers to N\_DBPS,last,u and N\_DBPS,last,init,u not N\_DBPS,u | Add a cross-reference to N\_DBPS,u in the "where" below |

**Context**

D2.0 P520-521:

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**Proposed Resolution: CID 12687**

**Revised**.

Proposed text update in 11-18/0779r2 adds a cross-reference to N\_DPBS,u.

Instruction to Editor: Implement the proposed text update for CID 12687 in 11-18/0779r2.

**Proposed Text Updates: CID 12687**

*TGax Editor: Update D2.3 P574L7 as shown below:*

 (28-136)

 (28-137)

where

*NSYM,init* is given by Equation (28-77)

*NDBPS,u* is given in Table 28-15

*NDBPS,last,u* is given by Equation (28-86)

*NDBPS,last,init,u* is given by Equation (28-78)

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13613 | 28.4.4 | 522.35 | In the condition of N\_DBPS,last,RX,u in (28-137), u index is missing | Change 'if a\_RX = 4' to 'if a \_RX,u = 4' in Eq (28-137) of P802.11ax D2.0 |
| 13614 | 28.4.4 | 522.37 | Parameter is not 100% accurate. Subscript should be lowercase for short in Eq. (28-137) in P802.11ax D2.0 | Change the parameter subscript into lowercase for 'short', i.e., change 'N\_SD,SHORT,u' to 'N\_SD,short,u' |

**Context**

D2.3 P575:

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**Proposed Resolution: CID 13613**

**Revised**.

Agree with the commenter.

Instruction to Editor:

In the first line of Equation (28-144) (at D2.3 P575L35), change “a\_{RX}=4” to “a\_{RX,u}=4”.

**Proposed Resolution: CID 13614**

**Revised**.

Agree with the commenter.

Instruction to Editor:

In the second line of Equation (28-144) (at D2.3 P575L37), change “N\_{SD,SHORT,u}” to “N\_{SD,short,u}”.

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