IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | D5.0 PHY CR | | | | | | Date: 2019-11-11 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm |  |  | youhank@qti.qualcomm.com | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from the LB244 on P802.11ax D5.0:

22460, 22024, 22025, 22026, 22027, 22548, 22297, 22298, 22556, 22367, 22396, 22505, 22506

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.

# CID 22460

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| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22460 | 499.05 | 27.3.2.2 | The captions of Tables 27-7, 27-8, and 27-9 contain " ... and in non-OFDMA 20 (or 40 or 80) MHz HE PPDU." Are these tables also used by the OFDMA HE PPDU? | Please clarify and update if needed. |

**Background**

D5.0 P499

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**Proposed Resolution: CID 22074**

**Rejected**

Yes, Table 27-7, 27-8 and 27-9 are used for HE MU and HE TB PPDUs as well. Note that the captions state “in a X MHz HE PPDU”, where HE PPDU includes HE MU and HE TB PPDU. Hence, there is no further clarification needed.

# CID 22024

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22024 | 506.39 | 27.3.2.5 | "In case of full bandwidth ... see 27.3.10.8.4 ... split" is nicely self-contained. But at P506L34 "Note that for an RU with 484 or more subcarriers ... may be split " only occurs when HESIGB Compression = 0. So this is not nicely self contained. | Change to "Note that, if the value of HE-SIG-B Compression field in HE-SIG-A is 0, for an RU with 484 or more subcarriers and having two or more intended users, the User fields corresponding to the RU may be split between two HE-SIG-B content channels." |

**Background**

Following is the proposed change by the commenter.

D5.0 P506L34

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| --- |
| 27.3.2.5 Resource indication and User identification in an HE MU PPDU  …  If there is more than one User field (see Table 27-29) for an RU in the HE-SIG-B content channel, then the number of allocated spatial streams for each user in the RU is indicated by the Spatial Configuration field of the User field in HE-SIG-B. Note that, if the value of HE-SIG-B Compression field in HE-SIG-A is 0, for an RU with 484 or more subcarriers and having two or more intended users, the User fields corresponding to the RU may be split between two HE-SIG-B content channels. In this case, the total number of users and the total number of spatial streams in the RU are the sum of the number of users and number of spatial streams per user, respectively, indicated in both HE-SIG-B content channels. In case of full bandwidth DL MU-MIMO with PPDU bandwidth greater than 20 MHz, see 27.3.10.8.4 on further details on how the User fields are split between the two HE-SIG-B content channels. |

**Proposed Resolution: CID 22024**

**Accepted**

Note to TGax Editor: In case it is not clear on where the text change should be, the ‘Background’ section under CID 22024 in 11-19/2004r0 has the redline version of the text change proposed by the commenter.

# CID 22025

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22025 | 506.44 | 27.3.2.5 | This para is an incomplete explanation of a complicated process (the full description is at P573L52-P574L28), and such partial information may be more confusing than helpful. E.g. what if a Common field is not present? E.g. the "corresponding" in "the STA-ID field in each User field indicates the intended recipient user of the corresponding ... RU" is meaningless since there is no way to determine from this language how the RU (width and position) is determined for a User field. E.g. where is load balancing (splitting) addressed? | Define the problem: how does a TX order the User fields so that the RU is determinable by the intended receiver, and how does the RX determine its RU and SSs from the order of User fields. Then address both problems completely. Likely turn this para into a setup plus cross-reference, perhaps keeping aspects of the last two sentences. e.g. "The combination of HESIGB Compression field, Common field (if present), ordering of User fields, and STA-ID within each User field provides a way for the transmitter to express to the receiver its RU, number of spatial streams and starting spatial stream (see section XXXX)" |

**Proposed Resolution: CID 22025**

**Revised**

Proposed text update for CID 22025 in 11-19/2004 removes details from 27.3.2, and instead refers to the HE-SIG-B section for details.

Instruction to TGax Editor: Implement the proposed text update for CID 22025 in 11-19/2004r0.

**Proposed Text Update: CID 22025**

27.3.2.5 Resource indication and User identification in an HE MU PPDU

*Instruction to TGax Editor: Update D5.1 P506L44 as shown below.*

In each HE-SIG-B content channel, the User fields are ordered such that, together with the HE-SIG-B Compression field in the HE-SIG-A and the Common field in the HE-SIG-B (if present), the RU location and spatial streams allocated to each user can be identified – see 27.3.10.8.4. If the UL/DL field in the HE-SIG-A field is set to 0,(#20747) the STA-ID field in each User field indicates the intended recipient user of the corresponding spatial streams and the RU. Otherwise, it indicates the STA that transmits the PPDU in the corresponding spatial streams and the RU.(#20747)

# CID 22026

|  |  |  |  |  |
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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22026 | 506.48 | 27.3.2.5 | "first ordered ... " then "... are ordered in the order of ..." How do these two ordering requirements interact with each other? | Specify how they intereact, e.g. change to "... are secondarily ordered in the order of ..." |

**Proposed Resolution: CID 22026**

**Rejected**

The relevant text has been deleted as per CID 22025, and a reference to 27.3.10.8.4 has been added for the details.

# CID 22027

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22027 | 506.50 | 27.3.2.5 | "Otherwise, it" but the previous singular noun is "The RU" which is surely wrong. | Change to "Otherwise the STA-ID field" |

**Background**

Following is the text update proposed by the commenter.

D5.1 P506L50

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| If the UL/DL field in the HE-SIG-A field is set to 0,(#20747) the STA-ID field in each User field indicates the intended recipient user of the corresponding spatial streams and the RU. Otherwise, the STA-ID field indicates the STA that transmits the PPDU in the corresponding spatial streams and the RU.(#20747) |

**Proposed Resolution: CID 22027**

**Accepted**

# CID 22548

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22548 | 600.41 | 27.3.10.10 | N\_HE-LTF=5 and 7 never happen. | Remove "5, " and "7, " in (27-57). Alternatively, use N\_STS,total similar to VHT-LTF, with the apprpriate definition of the N\_STS,total (N\_STS in HE SU PPDU or HE SU ER PPDU, maximum number of N\_STS,r,total in HE MU PPDU or HE TB PPDU). |

**Discussion**

Comment is on

D5.0 P600

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And the commenter is correct that NHE-LTF cannot take values of 5 or 7. Furthermore, NHE-LTF cannot take value of 3 either.

**Proposed Resolution: CID 22548**

**Revised**

Proposed text update for CID 22548 in 11-19/2004 fixes Equation (27-57) by removing cases for N\_{HE\_LTF} equal to 3, 5 or 7.

Instruction to TGax Editor: Implement the proposed text update for CID 22548 in 11-19/2004r0.

**Proposed Text Update: CID 22548**

*Instruction to TGax Editor: Update Equation (27-57) at D5.1 P599L39 as shown below.*

 (27-57)

# CID 22297

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22297 | 632.49 | 27.3.14.2 | How is path loss determined by STA if AP chooses to beamform the PPDU in which the Trigger frame is transmitted? Equation (27-125) will no longer provide an accurate estimate of the uplink path loss | Clarify |

**Background**

D5.0 P632

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**Proposed Resolution: CID 22297**

**Revised**

The AP knows whether it is using beamforming when transmitting a triggering PPDU, and it is up to the AP do decide how to deal with the beamforming gain, such as ignoring the beamforming gain, compensating for it in the AP Tx Power and/or Target RSSI, etc.

Proposed text update for CID 22297 in 11-19/2004 adds a NOTE which clarifies that an AP could choose to compensate for the beamforming gain in the AP Tx power or the Target RSSI.

Instruction to TGax Editor: Implement the proposed text update for CID 22297 in 11-19/2004r0.

**Proposed Text Update: CID 22297**

27.3.14.2 Power pre-correction

*Instruction to TGax Editor: Add the NOTE at D5.1 P631L65.*

NOTE – An AP could account for its beamforming gain in  or *TargetRSSI* if the triggering PPDU used beamforming.

# CID 22298

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22298 |  | 27.3.2.6 | HE TB power control doesn't work in the case where the AP uses beamforming for the PPDU containing the Trigger frame, so the STA can't determine the actual path loss | At the end of the referenced subclause add a para "An AP shall not use beamforming for transmission of a triggering frame. NOTE---This means a triggering frame cannot be transmitted using DL MU-MIMO." |

**Background**

D5.0 P507

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**Proposed Resolution: CID 22298**

**Rejected**

The AP knows whether it is using beamforming when transmitting a triggering PPDU, and it is up to the AP do decide how to deal with the beamforming gain, such as ignoring the beamforming gain, compensating for it in the AP Tx Power and/or Target RSSI, etc. There is no need to disallow use of beamforming when transmitting a triggering PPDU.

# CID 22556

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| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22556 | 632.59 | 27.3.14.2 | What does DL\_RSSI represent if the trigger PPDU used the non-HT or non-HT duplicate format? | Describe what DL\_RSSI represents if the trigger PPDU used the non-HT or non-HT duplicate format. |

**Background**

D5.0 P632

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**Proposed Resolution: CID 22556**

**Revised**

The last sentence for the description of DL\_{RSSI} already clearly specifies that the RSSI is measured prior to HT/VHT/HE-STF in case the triggering PPDU is HT/VHT/HE PPDU. Hence, the “non-HE portion of the HE PPDU” at D5.0 P632L60 is redundant and causes additional question of how to measure the RSSI for non-HE PPDUs.

Proposed text update for CID 22556 in 11-19/2004 deletes the redundant information, and thus clarifies how RSSI is measured for all relevant PPDU types.

Instruction to TGax Editor: Implement the proposed text update for CID 22556 in 11-19/2004r0.

**Proposed Text Update: CID 22556**

27.3.14.2 Power pre-correction

*Instruction to TGax Editor: Update D5.1 P631L58 as shown below.*

*DLRSSI* represents the RSSI at the antenna connector(s) of the STA of the triggering PPDU (#20559)normalized to 20 MHz bandwidth. *DLRSSI* in dBm is an average of the received power over the antennas on which the average *PLDL* is being computed. If the triggering PPDU is a HT-mixed, VHT or HE PPDU, then the received power is measured from the fields prior to the HT-STF, VHT-STF or HE-STF, respectively.(#20560)

# CID 22367

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22367 |  |  | CID 20620. OK, well then the location of the centre 26-tone RU should be shown in the table | In Table 27-7--Data and pilot subcarrier indices for RUs in a 20 MHz HE PPDU and in a non-OFDMA 20 MHz HE PPDU at the end of the bottom row add "RU 5 is the middle 26-tone RU."  In Table 27-9--Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU and in a non-OFDMA 80 MHz HE PPDU at the end of the bottom row add "RU 19 is the centre 26-tone RU.".  In 27.3.10.8.4 delete " that spans subcarriers [-16:-4, 4:16]".  In 27.3.2.2 Resource unit, guard and DC subcarriers delete "The middle 26-tone RU in the 20 MHz HE MU PPDU or HE TB PPDU and the center 26-tone RU in the 80 MHz HE MU PPDU or HE TB PPDU formats using OFDMA transmission (Figure 27-5 (RU locations in a 20 MHz HE PPDU) and Figure 27-7 (RU locations in an 80 MHz HE PPDU)) is located on subcarriers [-16: -4, 4: 16]. " |

**Background**

Following is CID 20620 from LB238:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 20620 | 467.53  (D4.0) | 27.3.2.2 | The location of the central 26-tone RU should be in Tables 28-6 and 28-8, not in running text | Delete "The center 26-tone RU in the 20 MHz and 80 MHz HE MU PPDU or HE TB PPDU formats using OFDMA transmission (Figure 27-5 (RU locations in a 20 MHz HE PPDU) and Figure 27-7 (RU locations in an 80 MHz HE PPDU)) is located on subcarriers [-16: -4, 4: 16]. " at the referenced location. Delete " that spans subcarriers [-16:-4, 4:16]" throughout (3x) | REJECTED (EDITOR: 2019-07-19 19:40:42Z) - While RUs using subcarriers [-16:-4, 4:16] are included in Tables 27-7 and 27-9, they are referred to as “RU 5” and “RU 19”, respectively. The text outside of Tables which the commenter is proposing to delete is the definition of the center 26-tones RU, hence must not be deleted. Also, D4.2 has been updated such that the phrase “that spans subcarriers [-16:-4, 4:16]” is not present in 27.3.2.2. |

**Proposed Resolution: CID 22367**

**Revised**

Proposed text update for CID 22367 in 11-19/2004 implements the changes proposed by the commenter, with an editorial update (centre -> center).

Instruction to TGax Editor: Implement the proposed text update for CID 22367 in 11-19/2004r0.

**Proposed Text Update: CID 22367**

27.3.2.2 Resource unit, guard and DC subcarriers

*Instruction to TGax Editor: Update D5.1 P499L27 as shown below.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| * Data and pilot subcarrier indices for RUs in a 20 MHz HE PPDU and in a non-OFDMA 20 MHz HE PPDU(#20665) | | | | | |
| RU type | RU index and subcarrier range | | | | |
| 26-tone RU | RU 1  [–121: –96] | RU 2  [–95: –70] | RU 3  [–68: –43] | RU 4  [–42: –17] | RU 5  [–16: –4, 4: 16] |
| RU 6  [17: 42] | RU 7  [43: 68] | RU 8  [70: 95] | RU 9  [96: 121] |  |
| 52-tone RU | RU 1  [–121: –70] | RU 2  [–68: –17] | RU 3  [17: 68] | RU 4  [70: 121] |  |
| 106-tone RU | RU 1  [–122: –17] | | RU 2  [17: 122] | |  |
| 242-tone RU | RU 1  [–122: –2, 2:122] | | | |  |
| (#21386)The subcarrier(#Ed) index of 0 corresponds to the DC tone. Negative subcarrier indices correspond to subcarries with frequency lower than the DC tone, and positive subcarrier indices correspond to subcarriers with frequency higher than the DC tone.  RU 5 is the middle 26-tone RU. | | | | | |

*Instruction to TGax Editor: Update D5.1 P500L56 as shown below.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| * Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU and in a non-OFDMA 80 MHz HE PPDU(#20665) | | | | | |
| RU type | RU index and subcarrier range | | | | |
| 26-tone RU | RU 1  [–499: –474] | RU 2  [–473: –448] | RU 3  [–445: –420] | RU 4  [–419: –394] | RU 5  [–392: –367] |
| RU 6  [–365: –340] | RU 7  [–339: –314] | RU 8  [–311: –286] | RU 9  [–285: –260] |  |
| RU 10  [–257: –232] | RU 11  [–231: –206] | RU 12  [–203: –178] | RU 13  [–177: –152] | RU 14  [–150: –125] |
| RU 15  [–123: –98] | RU 16  [–97: –72] | RU 17  [–69: –44] | RU 18  [–43: –18] | RU 19  [–16: –4, 4: 16] |
| RU 20  [18: 43] | RU 21  [44: 69] | RU 22  [72: 97] | RU 23  [98: 123] | RU 24  [125: 150] |
| … | | | | |
| … | | | | | |
| 996-tone RU | RU 1  [–500: –3, 3: 500] | | | |  |
| (#21386)The subcarrier(#Ed) index of 0 corresponds to the DC tone. Negative subcarrier indices correspond to subcarries with frequency lower than the DC tone, and positive subcarrier indices correspond to subcarriers with frequency higher than the DC tone.  RU 19 is the center 26-tone RU. | | | | | |

*Instruction to TGax Editor: Delete the sentence starting at D5.1 P501L6 as shown below.*

The location of the 26-tone RUs are shown in Figure 27-5, Figure 27-6 and Figure 27-7 for the 20 MHz, 40 MHz and 80 MHz HE MU PPDU formats or HE TB PPDU formats using OFDMA transmission, respectively. The same structure as used for the 80 MHz HE MU PPDU formats or HE TB PPDU formats using OFDMA transmission is used for both the Primary 80 MHz and Secondary 80 MHz channels in(#20552) the 160 MHz and 80+80 MHz HE MU PPDU or HE TB PPDU formats using OFDMA transmission.

(#20560)

27.3.10.8.4 User Specific field(#21248, #Ed)

*Instruction to TGax Editor: Update D5.1 P573L16 as shown below.*

The ordering of User fields in the User Specific field in an HE-SIG-B content channel is determined using the following three step procedure:

* If the HE-SIG-B Compression field in the HE-SIG-A field of an HE MU PPDU is 1, this first step is bypassed. Otherwise, the User fields in the User Specific field of an HE-SIG-B content channel are grouped into sets of User fields, where each set comprises the User fields indicated by one RU Allocation subfield or the Center 26-tone RU. These sets shall be ordered as follows:
* If the Bandwidth field in HE-SIG-A is 0 or 1, then there is only one set, so the need for ordering in this first step does not arise
* If the Bandwidth field in HE-SIG-A is 2, 4 or 5, then the set of User fields indicated by the first RU Allocation subfield are followed by the set of the User fields indicated by the second RU Allocation subfield; in turn, if the center 26-tone RU is assigned, then its User field is appended as the last User field to HE-SIG-B content channel 1 only.

# CID 22396

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| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22396 |  |  | CID 20784. Resolution says "The main purpose of Table 27-29 is to describe the mandatory/optionality of various LTF/GI modes." but it doesn't do so if it doesn't make it clear whether this is on tx or rx. Yes, "27.1.1 does not require an AP to transmit HE TB PPDU, or require a non-AP STA to receive HE TB PPDU" but the problem is with the less obvious ones (e.g. MU by a non-AP STA) | In Table 27-31--HE-LTF type and GI duration combinations for various HE PPDU formats: in the HE SU PPDU, HE MU PPDU, HE ER SU PPDU and HE sounding NDP headings add "(tx and rx)";  at the end of table add ""Mandatory" only applies if the underlying feature is supported by the STA (e.g. NDP feedback report, HE MU PPDU transmission by a non-AP STA)." |

**Background**

Following is CID 20784 from LB238:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 20620 | 562.36  (D4.0) | 27.3.10.10 | Re CID 16343: the whole point was to make the information digestible, because when we didn't have the table it was extremely difficult to find the mandatory/optional/unavailable distinctions | Indicate in each cell whether it is about tx or rx and whether it is about an AP or a non-AP STA | REJECTED (EDITOR: 2019-05-14 20:44:27Z) - The main purpose of Table 27-29 is to describe the mandatory/optionality of various LTF/GI modes. Whether the transmission and/or reception of a PPDU type is mandatory or optional for AP and/or non-AP STA is described in other parts of the standard (e.g. 27.1.1). Table 27-29 does not ‘override’ that. For example, 27.1.1 does not require an AP to transmit HE TB PPDU, or require a non-AP STA to receive HE TB PPDU. Hence, even if a particular LTF/GI combination is indicated as mandatory in Table 27-29, it is clear that transmitting that LTF/GI combination is not required by an AP, and receiving that LTF/GI combination is not required by a non-AP STA. There is no need to further complicate Table 27-29 with such information. |

Following is the text update proposed by the commenter.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| * HE-LTF type and GI duration combinations for various HE PPDU formats(#20864) | | | | | | |
| HE-LTF type and GI duration combination | HE SU PPDU  (tx and rx) | HE MU PPDU  (tx and rx) | HE ER SU PPDU  (tx and rx) | HE TB PPDU | HE sounding NDP  (tx and rx) | HE TB feedback NDP |
| 1x HE-LTF  0.8 µs GI | O | N/A | O | N/A | N/A | N/A |
| 1x HE-LTF  1.6 µs GI | N/A | N/A | N/A | CM3 | N/A | N/A |
| 2x HE-LTF  0.8 µs GI | M | M | M | N/A | M | N/A |
| 2x HE-LTF  1.6 µs GI | M | M | M | M | M | N/A |
| 4x HE-LTF  0.8 µs GI | CM1 | CM2 | O | N/A | N/A | N/A |
| 4x HE-LTF  3.2 µs GI | M | M | M | M | O | M |
| M = mandatory  CM1 = Mandatory if the STA supports 4x HE-LTF 0.8 µs GI for HE ER SU PPDU. Otherwise, optional.  CM2 = For an AP, mandatory for transmission if the AP supports 4x HE-LTF 0.8 µs GI for HE ER SU PPDU. For a non-AP STA, mandatory for reception if the non-AP STA supports 4x HE-LTF 0.8 µs GI for HE ER SU PPDU. Otherwise, optional.  CM3 = Mandatory for full bandwidth UL MU-MIMO if the STA supports UL MU-MIMO. Otherwise, not supported. N/A for partial bandwidth UL MU-MIMO or UL OFDMA.(#20785, #20783)  O = optional  N/A = not supported by the PPDU format  "Mandatory" only applies if the underlying feature is supported by the STA (e.g. NDP feedback report, HE MU PPDU transmission by a non-AP STA). | | | | | | |

**Proposed Resolution: CID 22396**

**Revised**

The text update proposed by the commenter puts “(tx ‘and’ rx)” for HE MU PPDU, which could be confused to mean that AP has to support transmitting and receiving HE MU PPDU, which is not correct.

Also, the commenter only clarifies that “Mandatory” is applicable only if the underlying feature is supported, but does not clarify for CM or O.

Proposed text update for CID 22396 in 11-19/2004 adds language to Table 27-31 clarifying that M/CM/O designation is not applicable for transmission or reception of a PPDU format not supported by the STA.

Instruction to TGax Editor: Implement the proposed text update for CID 22396 in 11-19/2004r0.

**Proposed Text Update: CID 22396**

*Instruction to TGax Editor: Update Table 27-31 at D5.1 P585L60 as shown below.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| * HE-LTF type and GI duration combinations for various HE PPDU formats(#20864) | | | | | | |
| HE-LTF type and GI duration combination | HE SU PPDU | HE MU PPDU | HE ER SU PPDU | HE TB PPDU | HE sounding NDP | HE TB feedback NDP |
| 1x HE-LTF  0.8 µs GI | O | N/A | O | N/A | N/A | N/A |
| 1x HE-LTF  1.6 µs GI | N/A | N/A | N/A | CM3 | N/A | N/A |
| 2x HE-LTF  0.8 µs GI | M | M | M | N/A | M | N/A |
| 2x HE-LTF  1.6 µs GI | M | M | M | M | M | N/A |
| 4x HE-LTF  0.8 µs GI | CM1 | CM2 | O | N/A | N/A | N/A |
| 4x HE-LTF  3.2 µs GI | M | M | M | M | O | M |
| M = mandatory  CM1 = Mandatory if the STA supports 4x HE-LTF 0.8 µs GI for HE ER SU PPDU. Otherwise, optional.  CM2 = For an AP, mandatory for transmission if the AP supports 4x HE-LTF 0.8 µs GI for HE ER SU PPDU. For a non-AP STA, mandatory for reception if the non-AP STA supports 4x HE-LTF 0.8 µs GI for HE ER SU PPDU. Otherwise, optional.  CM3 = Mandatory for full bandwidth UL MU-MIMO if the STA supports UL MU-MIMO. Otherwise, not supported. N/A for partial bandwidth UL MU-MIMO or UL OFDMA.(#20785, #20783)  O = optional  N/A = not supported by the PPDU format  If a STA does not support transmission or reception of a particular PPDU format, then the M/CM/O designation is not applicable for the transmission or reception, respectively, of that PPDU format. | | | | | | |

# CID 22505

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22505 | 337.18 | 26.5.2.1 | In P732L8, dot11ULMUMIMOOptionImplemented when true, indicates that the station implementation is capable of a full bandwidth UL MU-MIMO transmission. So "A non-AP HE STA with dot11ULMUMIMOOptionImplemented equal to true shall set the Full Bandwidth UL MU-MIMO subfield of the HE PHY Capabilities Information field of the HE Capabilities element it transmits to 1" is ok, " if it supports transmitting an HE TB PPDU that uses UL MU-MIMO within an RU that spans the entire PPDU bandwidth" is redundant. | change as the comment |

**Background**

D5.0 P337:

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D5.0 P731-732:

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D5.0 P731-732:

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D5.0 P750:

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**Proposed Resolution: CID 22505**

**Revised**

Note that there are two MIBs for UL MU-MIMO - dot11ULMUMIMOOptionImplemented (within Dot11HEStationConfigEntry) and dot11HEFullBWULMUMIMOImplemented (within Dot11PhyHEEntry). Since the all other MIBs related to HE PHY Capabilities is in Dot11PhyHEEntry, suggestion is to use dot11HEFullBWULMUMIMOImplemented.

Proposed text update for CID 22505 in 11-19/2004 fixes the redundancy by clarifying that the dot11HEFullBWULMUMIMOImplemented is set to true if full BW UL MU-MIMO is supported, and delets all instances of dot11ULMUMIMOOptionImplemented.

Instruction to TGax Editor: Implement the proposed text update for CID 22505 in 11-19/2004r0.

**Proposed Text Update: CID 22505**

*Instruction to TGax Editor: Update D5.1 P337L15 as shown below.*

If a non-AP HE STA supports transmitting an HE TB PPDU that uses UL MU-MIMO within an RU that spans the entire PPDU bandwidth, then the STA shall set dot11HEFullBWULMUMIMOImplemented to true and the Full Bandwidth UL MU-MIMO subfield of the HE PHY Capabilities Information field of the HE Capabilities element it transmits to 1. Otherwise, the HE STA shall set dot11HEFullBWULMUMIMOImplemented to false and the Full Bandwidth UL MU-MIMO subfield to 0.

*Instruction to TGax Editor: Remove entry for dot11ULMUMIMOOptionImplemented at D5.1 P729L9 as shown below.*

Dot11HEStationConfigEntry ::=

SEQUENCE {

dot11TRSOptionImplemented TruthValue,

dot11OFDMARandomAccessOptionImplemented TruthValue,

*Instruction to TGax Editor: Remove dot11ULMUMIMOOptionImplemented at D5.1 P729L65 as shown below.*

*Instruction to TGax Editor: Remove entry for dot11ULMUMIMOOptionImplemented at D5.1 P729L9 as shown below.*

dot11HEComplianceGroup OBJECT-GROUP

OBJECTS {

dot11HEOptionImplemented,

dot11OBSSNarrowBWRUinOFDMATolerated,

dot11HE6GOptionImplemented,

dot11OCTOptionImplemented,

dot11TRSOptionImplemented,

dot11OFDMARandomAccessOptionImplemented,

# CID 22506

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 22506 | 337.25 | 26.5.2.1 | How a non-AP HE STA know it supports transmitting an HE TB PPDU that uses UL MU-MIMO within an RU that does not span the entire PPDU bandwidth? We need to add a dot11 parameter to describe this. | Add a new dot11 parameter to describe it supports transmitting an HE TB PPDU that uses UL MU-MIMO within an RU that does not span the entire PPDU bandwidth. |

**Background**

D5.0 P337:

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D5.0 P750:

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**Proposed Resolution: CID 22506**

**Revised**

There is already a MIB for this feature - dot11HEPartialBWULMUMIMOImplemented.

Proposed text update for CID 22506 in 11-19/2004 uses the dot11HEPartialBWULMUMIMOImplemented in the reference text.

Instruction to TGax Editor: Implement the proposed text update for CID 22506 in 11-19/2004r0.

**Proposed Text Update: CID 22506**

*Instruction to TGax Editor: Update D5.1 P337L23 as shown below.*

If a non-AP HE STA with dot11ULMUMIMOOptionImplemented equal to true also supports transmitting an HE TB PPDU that uses UL MU-MIMO within an RU that does not span the entire PPDU bandwidth, the STA shall set dot11HEPartialBWULMUMIMOImplemented to true and the Partial Bandwidth UL MU-MIMO subfield in the HE PHY Capabilities Information field of the HE Capabilities element it transmits to 1. Otherwise, the non-AP HE STA shall set dot11HEPartialBWULMUMIMOImplemented to false and the Partial Bandwidth UL MU-MIMO subfield to 0.

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