IEEE P802.11  
Wireless LANs

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | D4.0 Comment Resolution – Part 3 | | | | | | Date: 2019-7/15 | | | | | | 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 letter ballot on P802.11ax D4.0:

20217, 20561, 20523, 20552, 20556, 21500, 21499, 21215, 21216, 21120, 21378, 20653, 20619, 20620, 21563

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.

R3: Updated proposed text update for CID 12499 to resolve conflict with resolution to CID 20122 in 11-19/0771r1.

# CID 20217

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20217 | 619.06 | 27.3.18.3 | "+/-20 ppm in the 5 GHz and 6 GHz bands". The HE PPDU tone plan uses approx +/-78.125kHz or +/-156.25kHz (for HE SU PPDUs) as the DC guard tone spaces, depending on the signal bandwidth. It was originally designed for up to 5.9GHz and up to 40ppm relative center frequency difference between Tx and Rx. Now that the highest center freq could be up to 7GHz (20% up), the impact from LO leakage + CFO could be larger. On the other hand the state of the art radio/PLL design can make the center frequency much more accurate than +/-20ppm, should we make this requirement more stringent for 6GHz band? | Need discussions, possibly reduce the ppm requirement to, e.g. +/-15ppm in 6GHz band. |

**Discussion**

HE PPDUs have subcarrier spacing of 78.125 KHz.

40 ppm of 5.9 GHz = 23.6 KHz = 3.02 subcarrier spacing

40 ppm of 7.125 GHz = 28.5 KHz = 3.65 subcarrier spacing

For HE SU or full BW HE MU/TB PPDUs, following table shows the number of DC tones. One can see that except for 160 MHz, the DC offset/TX LO leakage is already directly interfering with the data subcarriers in 5 GHz. Simulation results also confirm that there is no performance difference between 5 GHz and 6 GHz for these HE SU or full BW HE MU/TB PPDUs. Hence, there is no need to change the ppm requirement for 6 GHz for these cases.

|  |  |  |
| --- | --- | --- |
| HE PPDU Type | Number of DC Tones | Number of DC Tones on One Side |
| 20 MHz HE SU  20 MHz HE MU/TB RU242 | 3 | 1 |
| 40 MHz HE SU  40 MHz HE MU/TB RU484 | 5 | 2 |
| 80/80+80 MHz HE SU  80/80+80 MHz HE MU/TB RU996 | 5 | 2 |
| 160 MHz HE SU  160 MHz HE MU/TB RU2x996 | 23 | 11 |

For DL/UL OFDMA (RU size less than PPDU BW), there are 7 DC tones (3 DC tones on each side). While the maximum frequency offset corresponding to 3.65 subcarrier spacing in 6 GHz band does introduce more interference from the DC offset/TX LO leakage than in 5 GHz band, simulation results show that impact is small. Other RUs are not impacted (either because they are far away from the DC tone, or have larger number of tones, and thus coding can recover the loss).

**Proposed Resolution: CID 20217**

**Rejected**.

For HE SU or full BW HE MU/TB PPDUs, there is no performance impact from the larger frequency offset in 6 GHz. For DL/UL OFDMA, only the center/inner-most 26-tone RU has small impact. Hence, it does not seem necessary to change the ppm requirement for the 6 GHz band.

# CID 20561, 20523

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20561 | 607.60 | 27.3.14.2 | "target receive signal power averaged over the AP's antenna connectors for the HE TB PPDU" -- but the STA can't determine this because all it knows is the path loss w.r.t. the antennas used to transmit the triggering PPDU. Similarly it needs to measure the RSSI on the same antennas it will use to transmit the TB PPDU. Note this comment should be resolved together with other comments marked [powerprecorr] as it makes makes changes in places they also make changes in | Change the cited text to "target RSSI for the HE TB PPDU averaged over the antenna connectors that were used for transmission of the triggering PPDU". Below change "received power over the antennas on which the average PLDL is being computed" to "received power over the antennas on which the HE TB PPDU will be transmitted". In 9.2.4.6a.1 change "the expected receive power at the AP (i.e., averaged RSSI over all the AP's antennas)" to "the expected average RSSI at the antennas used to transmit the triggering PPDU". In 9.3.1.22.1 change "expected receive signal power, averaged over the AP's antenna connectors," to "expected average RSSI at the antennas used to transmit the triggering PPDU". |
| 20523 | 607.62 | 27.3.14.2 | "TargetRSSI represents the target receive signal power averaged over the AP's antenna connectors for the HE TB PPDU. TargetRSSI is the value, in dBm, of UL Target RSSI subfield of User Info field in Trigger frame, the encoding of which is specified in Table 9-31h (UL Target RSSI subfield encoding)." -- missing articles and inappropriate xref (just say indicated by the UL Target RSSI subfield), and assumes Trigger frame but could be TRS. Following NOTE also spurious (and wrong for TRS) [powerprecorr] | Change the cited text to "TargetRSSI represents the target RSSI at the AP and is the value indicated by the UL Target RSSI subfield of the User Info field in the Trigger frame or of the TRS Control field." and change the following NOTE to "NOTE---A value of 127 in the UL Target RSSI subfield in a Trigger frame indicates that the HE TB PPDU is transmitted at its maximum transmit power for the assigned MCS; Equation (27-124) is not used.". At the start of the referenced subclause change "Each STA that is scheduled in the Trigger frame" to "Each STA that is scheduled in a triggering PPDU". Change the first sentence of 27.3.14.1 to "An AP may solicit simultaneous HE TB PPDU transmissions from multiple non-AP STAs using a triggering PPDU." |

**Background**

Following is my understanding of what the commenter is asking for (the suggested edits in the two CIDs are conflicting in some cases.)

D4.2 P81L12

|  |
| --- |
| **9.2.4.6a.1 TRS Control**  …  The UL Target RSSI subfield indicates, in units of dBm, the expected average RSSI at the antennas used to transmit the triggering PPDU for the HE TB PPDU transmitted on the assigned RU. The target receive power is calculated as *TargetRSSI* = –90 + 2×*FVal*, where *FVal* is the value of the UL Target RSSI subfield, except that the value 31 indicates to the STA to transmit at maximum power for the assigned MCS. |

D4.2 P115L36:

|  |
| --- |
| **9.3.1.22 Trigger frame format**  **9.3.1.22.1 General**  …  The UL Target RSSI subfield of the User Info field indicates the expected average RSSI at the antennas used to transmit the triggering PPDU, for the HE TB PPDU transmitted on the assigned RU. The resolution for the UL Target RSSI subfield in the User Info field is 1 dB. The UL Target RSSI subfield encoding is defined in Table 9-31i. |

D4.2 P621:

|  |
| --- |
| 27.3.14.1 Introduction  An AP may solicit simultaneous HE TB PPDU transmissions, or simultaneous non-HT or non-HT duplicate PPDU transmissions from multiple non-AP STAs using a triggering PPDU. Since there are multiple transmitters, transmission time, frequency, sampling symbol clock, and power pre-correction (in the case of an HE TB PPDU) by the non-AP STAs is necessary to mitigate synchronization and interference issues at the AP. Frequency and sampling clock pre-corrections are needed to prevent inter-carrier interference. Power pre-correction is necessary to control interference between HE TB PPDU transmissions from the non-AP STAs. An AP may solicit simultaneous HE TB PPDU transmissions from both Class A and Class B devices. A non-AP STA that supports HE TB PPDU transmission shall support power pre-correction as described in 27.3.14.2 and shall meet the pre-correction accuracy requirements described in 27.3.14.3.  27.3.14.2 Power pre-correction  Each STA that is scheduled in a triggering PPDU calculates the UL transmit power, , of the HE TB PPDU for the assigned MCS using Equation (27-124).  (27-124)  where  *PLDL* represents DL pathloss  *TargetRSSI* represents the target RSSI for the HE TB PPDU averaged over the antenna connectors that were used for the transmission of the triggering PPDU and is the value indicated by the UL Target RSSI subfield of User Info field in Trigger frame or of the TRS Control field.  NOTE—A value of 127 in the UL Target RSSI subfield in a Trigger frame indicates that the HE TB PPDU is transmitted at its maximum transmit power for the assigned MCS; Equation (27-124) is not used.  Each STA computes *PLDL* using Equation (27-125).  (27-125)  where  represents the AP's combined transmit power at the antenna connectors of all the transmit antennas used to transmit the Trigger frame and normalized to 20 MHz bandwidth.  is dBm value of AP Tx Power subfield of the Common Info field in Trigger frame, the encoding of which is specified in 9.3.1.22.  *DLRSSI* represents the measured received power of the triggering PPDU at the STA normalized to 20 MHz bandwidth. *DLRSSI* in dBm is an average of the received power over the antennas on which the HE TB PPDU will be transmitted. 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. |

**Proposed Resolution: CID 20561, 20523**

**Revised**

Proposed text update for CIDs 20561 and 20523 in 11-19/1225 implements parts of the spirit of the commenter, but with slightly different wording. For example, the phrase “average RSSI” suggested by the commenter is not clear on what the average is over.

Regarding the changes by the commenter on computing the DL\_RSSI using the antennas at STA which will be used for HE TB PPDU transmission, it is ultimately up to the STA on how it meets the Target\_RSSI when using a subset of antennas.

Regarding the antennas used to receive the HE TB PPDU, it is obvious that the STA’s computation of TX power is based on the assumption that AP uses the same set of antennas for transmitting the Triggering frame and HE TB PPDU. If the AP chooses to use different set of antennas, it is up to the AP to deal with it.

Instruction to Editor: Implement the text updates for CIDs 20561 and 20523 in 11-19/1225r2.

**Proposed Text Updates: CID 20561, 20523**

*TGax Editor: Update D4.2 P621L26 as shown below.*

27.3.14.2 Power pre-correction

Each STA that is scheduled in a triggering frame calculates the UL transmit power, , of the HE TB PPDU for the assigned MCS using Equation (27-124).

 (27-124)

where

*PLDL* represents DL pathloss

*TargetRSSI* represents the target receive signal power of the HE TB PPDU, averaged over the AP's antenna connectors. *TargetRSSI* is the value, in dBm, indicated in the UL Target RSSI subfield of User Info field in Trigger frame or in TRS Control subfield.

NOTE—A value of 127 in the UL Target RSSI subfield indicates that the HE TB PPDU is transmitted at its maximum transmit power for the assigned MCS, and Equation (27-124) is not used.

# CID 20552

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20552 |  |  | Table 27-14---Tone allocation related constants makes it clear that only 80+80M transmissions have two segments. 160M segments do not | In Table 9-31g change "segment" to "channel". In the bullets in 9.3.1.22.5 and the para immediately after delete "/160 MHz" (7x). In 27.3.2.2 (6x), 27.3.2.3, F27-12, 27.3.10.8.3 (9x) change "frequency segment" to "channel". In 27.3.10.8.3 (4x), 27.3.10.8.4 (3x) change "MHz segment" to" MHz channel". In 27.3.18.3 change the last two "frequency segments" to "channels" |

**Background**

D4.2 P113:

|  |
| --- |
| … |

**Proposed Resolution: CID 20552**

**Revised**.

Regarding the changes for Table 9-31h (D4.2), B0 indicates Primary 80 MHz vs. Secondary 80 MHz channel. Proposed text update in 11-19/1225 updates the text accordingly for most of the places identified by the commenter except the following:

9.3.1.22.5: The phrase “segment” is not present in D4.2, hence the comment in no longer applicable.

27.3.2.3: D4.2 has been updated such that “segment” here only applies to 80+80 MHz, hence the comment is no longer applicable.

27.3.10.8.3, 27.3.10.8.4: These subclauses have been re-written in D4.2, and the comments are no longer applicable.

Note also that for the comment on 27.3.18.3, REVmd D2.2 uses the term “frequency portion” for the similar section at 21.3.17.3. Hence, “frequency portion” is used in the proposed text update in 11-19/1225.

Instruction to Editor: Implement the text updates for CID 20552 in 11-19/1225r2.

**Proposed Text Updates: CID 20552**

**9.3.1.22 Trigger frame format**

**9.3.1.22.1 General**

*TGax Editor: Update D4.2 P113L61 as shown below.*

NOTE—If the UL BW subfield indicates 80+80 MHz or 160 MHz, the description indicates the RU index for the Primary 80 MHz or Secondary 80 MHz channel as indicated by B0 of the RU Allocation subfield.

* Resource unit, guard and DC subcarriers

*TGax Editor: Update D4.2 P487L24 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 the 160 MHz and 80+80 MHz HE MU PPDU or HE TB PPDU formats using OFDMA transmission.

*TGax Editor: Update D4.2 P489L52 as shown below.*

The same structure as used in the 80 MHz HE MU PPDU format or HE TB PPDU formats using OFDMA transmission is used for both the Primary 80 MHz and Secondary 80 MHz channels in the 160 MHz and 80+80 MHz HE MU PPDU formats or HE TB PPDU formats using OFDMA transmission.

*TGax Editor: Update D4.2 P490L3 as shown below.*

The same structure as used in 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 the 160 MHz and 80+80 MHz HE MU PPDU formats or HE TB PPDU formats using OFDMA transmission.

*TGax Editor: Update D4.2 P490L18 as shown below.*

The same structure as used in the 80 MHz HE PPDU formats is used for both the Primary 80 MHz and Secondary 80 MHz channels in the 160 MHz and 80+80 MHz HE PPDU formats.

*TGax Editor: Update D4.2 P490L30 as shown below.*

The same structure as used for the 80 MHz HE PPDU formats is used for both the Primary 80 MHz and Secondary 80 MHz channels in the 160 MHz and 80+80 MHz HE PPDU formats.

*TGax Editor: Update D4.2 P490L51 as shown below.*

The structure used in the 80 MHz HE PPDU is used for both the Primary 80 MHz and Secondary 80 MHz channels in the 160 MHz and 80+80 MHz HE PPDU. The DC subcarriers are located on subcarriers [–11: 11].

*TGax Editor: Update the following text with Figure 27-12 (D4.2 P499L25) as shown below.*

The 160 MHz and 80+80 MHz HE PPDU uses the 80 MHz HE PPDU RU locations in Primary 80 MHz and Secondary 80 MHz channels.

* Transmit center frequency and symbol clock frequency tolerance

*TGax Editor: Update D4.2 P632L52 as shown below.*

Transmit signals with TXVECTOR parameter CH\_BANDWIDTH set to CBW160 or CBW80+80 may be generated using two separate RF LOs, one for each of the lower and upper 80 MHz frequency portions.

NOTE—The signal phase of the two 80 MHz frequency portions might not be correlated.

# CID 20556

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20556 |  |  | The term "symbol segment" is not defined | Delete "segment" in "symbol segment", case-insensitively (note might be plural) throughout. In (27-146) add a space between "LDPC" and "Extra" |

**Reference for Readers**

D4.2 P591:

|  |
| --- |
|  |

**Proposed Resolution: CID 20556**

**Rejected**.

The term “symbol segment” is defined in 27.3.11.2 (D4.2 P591L27). If we change the “symbol segment” to “symbol”, then this leads to technical error in that the LDPC encoding process does not add a full OFDM symbol worth of coded bits, but the text would suggest otherwise (“extra symbol” instead of “extra symbol segment”).

# CID 21500

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 21500 | 485.60 | 27.3.2.7 | A 20 MHz operating non-AP HE STA shall operate in the primary 20 MHz channel except when the 20 MHz operating non-AP HE STA is a 20 MHz-only non-AP HE STA with dot11HESubchannelSelectiveTransmissionImplemented equal to true. In this case, the 20 MHz-only non-AP HE STA may operate in any 20 MHz channel within the BSS bandwidth by following the procedure in 26.8.7 (HE subchannel selective transmission).  This is not consistent with 26.8.7.1 in which operating in non-primary 20MHz is not limited to 20MHz only sta, but applied to 20MHz operating STA also. | A 20 MHz operating non-AP HE STA shall operate in the primary 20 MHz channel except when the 20 MHz operating non-AP HE STA set dot11HESubchannelSelectiveTransmissionImplemented equal to true. In this case, the 20 MHz operating non-AP HE STA may operate in any 20 MHz channel within the BSS bandwidth by following the procedure in 26.8.7 (HE subchannel selective transmission). |

**Discussion**

Following is the suggested edit by the commenter, which is inline with 26.8.7.

D4.2 P493L30:

|  |
| --- |
| **27.3.2.7 20 MHz operating non-AP HE STAs**  …  A 20 MHz operating non-AP HE STA shall operate in the primary 20 MHz channel except when the 20 MHz operating non-AP HE STA set dot11HESubchannelSelectiveTransmissionImplemented equal to true. In this case, the 20 MHz-operating non-AP HE STA may operate in any 20 MHz channel within the BSS bandwidth by following the procedure in 26.8.7 (HE subchannel selective transmission). |

**Proposed Resolution: CID 21500**

**Accepted**.

Note to Editor: The discussion section for CID 21500 in 11-19/1225r2 contains the redline version of the text update proposed by the commenter in case helpful to the Editor.

# CID 21499

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 21499 | 487.17 | 27.3.2.9 | "An HE AP STA shall not allocate RUs outside of the primary 80 MHz when allocating an RU in an 160 MHz or 80+80 MHz HE MU PPDU or HE TB PPDU to a non-AP HE STA that sets the 80 MHz In 160/ 80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field in the HE Capabilities element to 1 and is operating in 80 MHz channel width mode."  This is contradictory to the 26.8.7.1 2nd subbullet which means 80MHz operating STA can operate in non-primary 80MHz in a TWT window. | add the following exception: except the 80 MHz operating non-AP HE STA set the dot11HESubchannelSelectiveTransmissionImplemented equal to true. In this case, the 80 MHz operating non-AP HE STA may operate in any 80 MHz channel within the BSS bandwidth by following the procedure in 26.8.7 (HE subchannel selective transmission) |

**Proposed Resolution: CID 21499**

**Revised**.

Proposed text update for CID 21499 in 11-19/1225 implements the spirit of the comment. Note that the definition of 80 MHz operating STA in Clause 3 is also updated to better align with the definition of 20 MHz operating STA.

Instruction to Editor: Implement the text updates for CID 21499 in 11-19/1225r3. Also, note that there is text added to 27.3.2.9 as part of resolution to CID 20122 in 11-19/0771r1, which should be deleted as shown in the proposed text for CID 21499 in 11-19/1225r3.

**Proposed Text Updates: CID 21499**

*TGax Editor: Update D4.2 P41L62 as shown below.*

**20 MHz-only non-access-point (non-AP) high efficiency STA (HE STA):** A non-AP HE STA that indicates in the Supported Channel Width Set subfield in the HE PHY Capabilities Information field of the HE Capabilities element that it transmits support for only 20 MHz channel width for the frequency band in which it is operating.

**20 MHz operating non-access-point (non-AP) high efficiency STA (HE STA):** A non-AP HE STA that is operating in 20 MHz channel width mode, such as a 20 MHz-only non-AP HE STA or an HE STA that has reduced its operating channel width to 20 MHz using operating mode indication (OMI).

**80 MHz operating non-access-point (non-AP) high efficiency STA (HE STA):** A non-AP HE STA that is operating in 80 MHz channel width mode, such as a non-AP STA (excluding the 20 MHz-only non-AP HE STA) which is not capable of 160 MHz operation or a non-AP STA that has reduced its operating channel width to 80 MHz using operating mode indication (OMI).

*TGax Editor: Update D4.2 P494L59 as shown below.*

27.3.2.9 80 MHz operating non-AP HE STAs

An HE AP shall not allocate an RU in a 160 MHz or 80+80 MHz HE MU or HE TB PPDU to an 80 MHz operating non-AP HE STA if the non-AP STA has set the 80 MHz In 160/80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field in the HE Capabilities element to 0.

An HE AP shall not allocate an RU outside of the primary 80 MHz in a 160 MHz or 80+80 MHz HE MU or HE TB PPDU to an 80 MHz operating non-AP HE STA if the non-AP STA has set the HE Subchannel Selective Transmission Support subfield in the HE MAC Capabilities Information field in the HE Capabilities element to 0.

An HE AP shall not allocate an RU outside of the primary 80 MHz in a 160 MHz or 80+80 MHz HE MU or HE TB PPDU to an 80 MHz operating non-AP HE STA if the non-AP STA has set the HE Subchannel Selective Transmission Support subfield in the HE MAC Capabilities Information field in the HE Capabilities element to 1 but has not set up SST operation on the secondary 80 MHz channel with the HE AP.

# CID 21215, 21216

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 21215 | 561.51 | 27.3.10.10 | From (27-55) "The pilot subcarriers of each HE-LTF symbol are multiplied by the entries of a matrix R HE-LTF defined below." is not true if HE single stream pilot HE LTF mode is not in force | Insert corrections for 1x HELTF and HE masked HE-LTF sequence modes. |
| 21216 | 561.53 | 27.3.10.10 | "The multiplication of the pilot subcarriers in the HE-LTF symbol by the R HE-LTF matrix instead of the P HE-LTF matrix allows receivers to track phase and frequency offset during MIMO channel estimation using the HE-LTF" is not true for 1x HELTF and HE masked HE-LTF sequence modes | 1) Limit this to RUs other than UL-MU-MIMO. 2) For RUs with UL-MU-MIMO, describe how to ameliorate phase and freq offset during MIMO channel estimation for each of 1x HELTF and HE masked HE-LTF sequence modes. |

**Context**

D4.2 P574

|  |
| --- |
|  |

**Proposed Resolution: CID 21215**

**Revised**.

Agree with the commenter that the R\_HE-LTF matrix is used only for single stream pilot. Proposed text update in 11-19/1225 clarifies this.

Instruction to Editor: Implement the text updates for CID 21215 and 21216 in 11-19/1225r2.

**Proposed Resolution: CID 21216**

**Revised**.

Proposed text update in 11-19/1225 clarifies that the phase and/or frequency offset tracking during HE-LTF described in the sentence is for the case of using the single stream pilot. Ultimately, what receivers to using HE-LTF is up to receiver implementation, and there is no need in the standard to list out all possibilities, such as how to ameliorate phase and freq offset during MIMO channel estimation for each of 1x HELTF and HE masked HE-LTF sequence modes.

Instruction to Editor: Implement the text updates for CID 21215 and 21216 in 11-19/1225r2.

**Proposed Text Updates: CID 21215, 21216**

27.3.10.10 HE-LTF

*TGax Editor: Update D4.2 P574L15 as shown below.*

When single stream pilot is used in HE-LTF, the pilot subcarriers of each HE-LTF symbol are multiplied by the entries of a matrix *R*HE-LTF defined below to allow receivers to track phase and/or frequency offset during MIMO channel estimation using the HE-LTF.

# CID 21120

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 21120 | 561.54 | 27.3.10.10 | RHE-LTF is defined for both masked and single stream pilots. Howver, the sentence just speaks about the single stream pilots and not the masked case. "Single stream pilot in HE-LTF shall be used for SU, DL and UL OFDMA, DL MU-MIMO and UL MU-MIMO transmission using HE UL MU-MIMO single stream pilot HE-LTF mode.". It should speak on both or remove this sentence as it has been discussed earlier in pg 329 line 30 and pg 488 line 39 | Define normative text for masked pilot after this sentence |

**Context**

D4.2 P574

|  |
| --- |
|  |

**Proposed Resolution: CID 21120**

**Rejected**.

R\_HE-LTF is defined only for single stream pilot case.

# CID 21378

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 21378 | 642.19 | 27.3.22.2 | Reconsider channelization for 6 GHz.  Channel center frequencies are defined at every integer multiple of 5 MHz above 5940 MHz. This leaves only 10 MHz of Guard-Band between U-NII-5 and U-NII-4, which will make filter design challenging. In addition, with the current channelization, , there is no single complete 80 MHz channel in UNII-6 and only one complete 40 MHz channel within UNII-6. Given that UNII-6 and the adjoining UNI-5 and UNII-7 may operate under different regulatory rules, it would be better to have more self-contained channels within this band. | Both of these issues could be addressed by simply moving the starting frequency of the channelization by 10 MHz (from 5940 to 5950 MHz). A submission with further details will be provided. |

**Proposed Resolution: CID 21378**

**Rejected**.

While the commenter makes good points, regulatory rules have not been finalized yet. This should be revisited after more information is available from the regulatory bodies, rather than making speculative updates now, and then potentially have to update again later.

# CID 20653

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20653 | 651.48 | 27.4.4 | aRxPHYStartDelay needs to be a function of the number of HE-LTFs, as for VHT | As it says in the comment |

**Proposed Resolution: CID 20653**

**Revised**.

aRxPHYStartDelay of VHT was a function of the number of VHT-LTFs because VHT-SIG-B is after VHT-LTF. In HE, however, all SIG fields are prior to HE-LTF, hence there is no need to include HE-LTF in aRxPHYStartDelay.

Proposed text update for CID 20653 in 11-19/1225 clarifies aRxPHYStartDelay for various HE PPDU types.

Instruction to Editor: Implement the text updates for CID 20653 in 11-19/1225r2.

**Proposed Text Updates: CID 20653**

*TGax Editor: Update Table 27-55 at D4.2 P667L48 as shown below.*

|  |  |
| --- | --- |
| * HE PHY characteristics | |
| Characteristic | Value |
| … | |
| aRxPHYStartDelay | 32 µs for HE SU and HE TB PPDUs.  40 µs for HE ER SU PPDUs.  32 + 4 × *NHE-SIG-B* µs for HE MU PPDUs, where *NHE-SIG-B* is the number of OFDM symbols in the HE-SIG-B field. |

# CID 20619

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20619 | 475.32 | 27.3.2 | All the subcarrier assignments should be in tables, not in running text. This includes guard bands and DC subcarriers (null subcarriers and pilots are OK -- Tables 27-10 and 27-11) | As it says in the comment |

**Proposed Resolution: CID 20619**

**Rejected**.

There is no requirement that subcarrier assignments should be in tables.

# CID 20620

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 20620 | 476.53 | 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) |

**Context**

D4.2 P487:

|  |
| --- |
|  |

**Proposed Resolution: CID 20620**

**Rejected**.

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.

# CID 21563

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 21563 | 525.28 | 27.3.10.7.2 | Beam change = 1 does not mandate that the transmitter use different spatial mapping between pre-HE modulated fields and the first symbol of HE-LTF. For example, the spatial mapping matrix of the HE-LTF may be constructed such that the 1st symbol of HE-LTF happens to have the same 'net' spatial mapping as the pre-HE modulated fields. | Change "are spatially mapped differently" to "may be spatially mapped differently". |

**Proposed Resolution: CID 21563**

**Accepted**.

[End of File]