IEEE P802.11
Wireless LANs

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| CRs for the HE Trigger-based NDP feedback |
| Date: 2017-06-22 |
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Abstract

This submission proposes resolutions for comments of TGax Draft 1.3 with the following CIDs: CID 5788, 8571

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Minor editorial.
* Rev 2: update the name of HE-LTF modes based on agreed CRs
* Rev 3: update the title of 28.3.17 and the name of the figure in this section

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L.** | **Comment** | **Proposed Change** | **Resolution** |
| 5788 | Hongyuan Zhang | 27.5.2.7 | 174.24 | The NDP feedback report PHY format is not defined. | Either define the PHY mechanism for NDP feedback report, or remove this subclause and other related placehodlers. | Revised – Add the missed content.TGax editor to make the changes shown in 11-17/0985r3 under all headings that include CID 5788. |
| 8571 | Ron Porat | 27.5.2.7 | 174.24 | PHY design for NDP feedback report procedure is missing | Please provide PHY design details for this feature | Revised – Resolved in CID 5788 |

**Proposed change: 28.3.10.10 HE-LTF**

**Discussion:** Add the HE-LTF sequence generation for the HE Trigger based NDP feedback.

*To the TGax Editor: Add the following paragraphs after equation 28-48 (P.L. 399.36 in D1.3)*

In the HE Trigger-based NDP feedback PPDU, neither HE single stream pilot HE LTF mode nor HE masked HE LTF sequence mode is applied to the HE-LTF sequence. Only 4x HE-LTF shall be used in the HE Trigger-based NDP feedback PPDU. The 4x HE-LTF sequence is generated by Equation (28-yy)

$HELTF\_{k,u}^{TB\\_NDP}=\left\{\begin{array}{c}HELTF\_{k,} if k∊K\_{tone\\_NDP\_{u}} \\0, Otherwise\end{array}\right. $ Equation (28-yy)

where$HELTF\_{k}$is the value of the common HE-LTF sequence on subcarrier *k* generated by one of the 4x HE-LTF equations (Equation (28-37), Equation (28-40), Equation (28-43), Equation (28-46)) according to the channel bandwidth, $K\_{tone\\_NDP\_{u}}$ is the set of subcarrier indices for user *u.* $K\_{tone\\_NDP\_{u}}$ is defined in Table 28-zz according to the RU\_TONE\_SET\_INDEX and FEEDBACK\_STATUS.

Table 28-ZZ HE-LTF tone mapping for the HE Trigger-based NDP feedback PPDU

|  |  |  |  |
| --- | --- | --- | --- |
|  | **80 MHz** | **40 MHz** | **20 MHz** |
| RU\_TONE\_SET\_INDEX | $K\_{tone\\_NDP\_{u}}$if FEEDBACK\_STATUS = 1  | $K\_{tone\\_NDP\_{u}}$if FEEDBACK\_STATUS = 0 | $$K\_{tone\_{NDP}\_{u}}$$if FEEDBACK\_STATUS = 1 | $K\_{tone\\_NDP\_{u}}$if FEEDBACK\_STATUS = 0  | $K\_{tone\\_NDP\_{u}}$if FEEDBACK\_STATUS = 1 | $K\_{tone\\_NDP\_{u}}$ if FEEDBACK\_STATUS = 0 |
| 1 | Use 20 MHz FEEDBACK\_STATUS = 1 Subcarrier Indices - 384 | Use 20 MHz FEEDBACK\_STATUS = 0 Subcarrier Indices - 384 | Use 20 MHz FEEDBACK\_STATUS = 1 Subcarrier Indices - 128 | Use 20 MHz FEEDBACK\_STATUS = 0 Subcarrier Indices - 128 | -113, -77, -41, 6, 42, 78 | -112, -76, -40, 7, 43, 79 |
| 2 | -111, -75, -39, 8, 44, 80 | -110, -74, -38, 9, 45, 81 |
| 3 | -109, -73, -37, 10, 46, 82 | -108, -72, -36, 11, 47, 83 |
| 4 | -107, -71, -35, 12, 48, 84 | -106, -70, -34, 13, 49, 85 |
| 5 | -105, -69, -33, 14, 50, 86 | -104, -68, -32, 15, 51, 87 |
| 6 | -103, -67, -31, 16, 52, 88 | -102, -66, -30, 17, 53, 89 |
| 7 | -101, -65, -29, 18, 54, 90 | -100, -64, -28, 19, 55, 91 |
| 8 | -99, -63, -27, 20, 56, 92 | -98, -62, -26, 21, 57, 93 |
| 9 | -97, -61, -25, 22, 58, 94 | -96, -60, -24, 23, 59, 95 |
| 10 | -95, -59, -23, 24, 60, 96 | -94, -58, -22, 25, 61, 97 |
| 11 | -93, -57, -21, 26, 62, 98 | -92, -56, -20, 27, 63, 99 |
| 12 | -91, -55, -19, 28, 64, 100 | -90, -54, -18, 29, 65, 101 |
| 13 | -89, -53, -17, 30, 66, 102 | -88, -52, -16, 31, 67, 103 |
| 14 | -87, -51, -15, 32, 68, 104 | -86, -50, -14, 33, 69, 105 |
| 15 | -85, -49, -13, 34, 70, 106 | -84, -48, -12, 35, 71, 107 |
| 16 | -83, -47, -11, 36, 72, 108 | -82, -46, -10, 37, 73, 109 |
| 17 | -81, -45, -9, 38, 74, 110 | -80, -44, -8, 39, 75, 111 |
| 18 | -79, -43, -7, 40, 76, 112 | -78, -42, -6, 41, 77, 113 |
| 19 | Use 20 MHz FEEDBACK\_STATUS = 1 Subcarrier Indices - 128 | Use 20 MHz FEEDBACK\_STATUS = 0 Subcarrier Indices - 128 | Use 20 MHz FEEDBACK\_STATUS = 1 Subcarrier Indices + 128 | Use 20 MHz FEEDBACK\_STATUS = 0 Subcarrier Indices + 128 |  |
| 20 |
| 21 |
| 22 |
| 23 |
| 24 |
| 25 |
| 26 |
| 27 |
| 28 |
| 29 |
| 30 |
| 31 |
| 32 |
| 33 |
| 34 |
| 35 |
| 36 |
| 37 | Use 20 MHz FEEDBACK\_STATUS = 1 Subcarrier Indices + 128 | Use 20 MHz FEEDBACK\_STATUS = 0 Subcarrier Indices + 128 |  |
| 38 |
| 39 |
| 40 |
| 41 |
| 42 |
| 43 |
| 44 |
| 45 |
| 46 |
| 47 |
| 48 |
| 49 |
| 50 |
| 51 |
| 52 |
| 53 |
| 54 |
| 55 | Use 20 MHz FEEDBACK\_STATUS = 1 Subcarrier Indices + 384 | Use 20 MHz FEEDBACK\_STATUS = 0 Subcarrier Indices + 384 |
| 56 |
| 57 |
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| NOTE - The RU\_TONE\_SET\_INDEX for 80+80 MHz and 160 MHz shall use the 80MHz RU\_TONE\_SET\_INDEX definition for the lower and upper 80MHz (The RU\_TONE\_SET\_INDEX 1~72 shall be mapped to the lower 80MHz, and the RU\_TONE\_SET\_INDEX 73~144 shall be mapped to the upper 80MHz). |

*In addition, modify 28.3.10.10 (P.L. 401.42~45 in D1.3) as following:*

$HELTF\_{k,u,m}^{''}$ is the HE-LTF sequence applied on subcarrier *k* for spatial stream *m* of user *u.*

$HELTF\_{k,u,m}^{''}=HELTF\_{k }$~~if single stream pilots are used or the 1x HE-LTF is used for nonOFDMA UL MU-MIMO, otherwise~~ $HELTF\_{k,u,m}^{''}=HELTF\_{k}^{'}$

$$HELTF\_{k,u,m}^{''}=\left\{\begin{matrix} HELTF\_{k,u,m}^{Mask} if HE masked HE LTF sequence mode is used \\HELTF\_{k,u}^{TB\\_NDP} if HE trigger-based NDP feedback is used \\HELTF\_{k} otherwise \end{matrix}\right.$$

*In addition, replace quation 28-47 with the following equation.*



*In addition, replace equation 28-52 with the following equation.*



*In addition, replace equation 28-53 with the following equation.*



*In addition, modify the paragraph in P.L. 389.31 as following:*

An HE PPDU supports 3 HE-LTF modes, which are 1x HE-LTF, 2x HE-LTF and 4x HE-LTF. It is optional to support the 1x HE-LTF in an HE SU PPDU and HE ER SU PPDU. It is mandatory to support 1x HE-LTF for full bandwidth UL MU-MIMO, for a STA declaring support for UL MU-MIMO. The 1x HE-LTF is disallowed in an HE MU PPDU and in an HE TB PPDU with more than one RU. In an HE SU PPDU, HE MU PPDU and HE ER SU PPDU, the combination of HE-LTF modes and GI duration is indicated in HE-SIG-A field. In an HE TB PPDU, the combination of HE-LTF modes and GI duration is indicated in the Trigger frame that triggers the transmission of the PPDU.

If an HE PPDU is an HE NDP PPDU, the combinations of HE-LTF modes and GI durations are listed in 28.3.16. If an HE PPDU is an HE Trigger-based NDP feedback PPDU, the combinations of HE-LTF modes and GI durations are listed in 28.3.17. Otherwise, the ~~The~~ mandatory combinations of HE-LTF modes and GI duration are:
— 2x HE-LTF, *TGI1,Data*— 2x HE-LTF, *TGI2,Data*— 4x HE-LTF, *TGI4,Data*— 1x HE-LTF, *TGI2,Data* in a non-OFDMA, MU-MIMO HE TB PPDU
The optional combinations of HE-LTF mode and GI duration are:
— 1x HE-LTF, *TGI1,Data* in an HE SU PPDU or HE ER SU PPDU
— 4x HE-LTF, *TGI1,Data* in an HE SU PPDU, HE ER SU PPDU,(#9769) or HE MU PPDU

*In addition, add the following text after P.L. 431.65 (sub-clause 28.3.16) in D1.3*

The HE NDP PPDU has the following properties:
— Uses the HE SU PPDU format but without the Data field
— Has a Packet Extension field that is 4 μs in duration

— It is mandatory to support the 2x HE-LTF with *TGI1,Data* and 2x HE-LTF with *TGI2,Data*. It is optional to support the 4x HE-LTF with *TGI4,Data*. The other combinations of HE-LTF modes and GI durations are disallowed.

*In addition, add the following sub-clause after sub-clause 28.3.16 (P.L. 432.5 in D1.3)*

28.3.17 HE Trigger-based NDP feedback PPDU

The HE Trigger-based NDP feedback PPDU is used to carry the NDP feedback report information as introduced in 27.5.5. The PPDU structure of a HE Trigger-based NDP feedback PPDU is shown in Figure 28-xx (HE Trigger-based NDP feedback PPDU).



Figure 28-xx HE Trigger-based NDP feedback PPDU.

The HE Trigger-based NDP feedback PPDU has the following properties:

* Uses the HE trigger-based PPDU format but without the Data field and PE field;
* Has two 4x HE-LTF symbols;
* 4x HE-LTF, *TGI4,Data* is the only HE-LTF modes and GI duration combination for the HE-LTF;
* The generation of HE-LTF symbols for the HE Trigger-based NDP feedback PPDU was defined in 28.3.10.10.

*In addition, modify 28.3.12 Packet extension (P.L. 426.34 in D1.3) as following:*

When transmitting an HE TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRIGGER\_FRAME, each transmitter of an HE TB PPDU shall append a PE field with a duration *TPE* calculated using Equation (28-108) except for the HE trigger-based NDP feedback which has a PE\_duration = 0.

*In addition, modify 28.3.20 HE receive procedure (P.L. 460.35 in D1.3) as following:*

Except in an HE NDP PPDU and an HE Trigger-based NDP feedback PPDU, a Data field follows the HE-STF and HE-LTF fields.

*In addition, modify 28.3.20 HE receive procedure (P.L. 461.9 in D1.3) as following:*

For an HE NDP PPDU and HE Trigger-based NDP feedback, there is no Data field and *NSYM* = 0.