IEEE P802.11
Wireless LANs

|  |
| --- |
| Comment Resolutions on Subsections of Clause 28.3.6:28.3.6.2, 28.3.6.3, 28.3.6.4 , 28.3.6.5, 28.3.6.6, 28.3.6.8 and 28.3.6.9 |
| Date: 2017-03-08 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Dongguk Lim | LG Electronics | 19, Yangjae-daero 11 gil, Seocho-gu, Seoul, Korea |  | dongguk.lim@lge.com |
| Eunsung Park  |  | esung.park@lge.com  |
| Jinsoo Choi |  | js.choi@lge.com |
|  |  |  |  |  |

Abstract

This submission proposes resolutions for the following comments (total 38 CIDs) on 28.3.6.2, 28.3.6.3, 28.3.6.4, 28.3.6.5 and 28.3.10.1 of TGax D1.0:

5287, 5288, 8842, 5289, 3317, 3397, 3666, 3756, 4016, 4140, 4242, 4253, 5095, 5290, 8843, 8844, 10205, 3318, 3399, 3669, 3758, 4145, 4246, 5096, 5291, 8845, 5097, 5293, 5294, 8846, 9162, 5098, 5099, 5100, 5295, 5296, 8847, 9163

This resolution is made based on D1.1.

Revisions:

* Rev 0: Initial version of the document.

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.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5287 | 28.3.6.2 | 249.62 | If the TXVECTOR parameter BEAM\_CHANGE is 0, the L-STF field needs the procedure for spatial mapping | Include the procedure for spatial mapping after applying CSD as follows."Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.3 (L-STF)." | RevisedTGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5288 | 28.3.6.2 | 249.53 | For the L-STF, GI insertion is not needed. | Remove the procedure to insert GI. | Revised TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 8842 | 28.3.6.2 | 249.62 | For HE\_MU, L-STF should only be sent in the 20 MHz channels that overlap with active RU's, so the CH\_BANDWIDTH alone does not determine L-STF sequence over the full frequency. | Add special requirements for HE\_MU.Similar for L-LTF, L-SIG and RL\_SIG. | Rejected Regardless of HE-SU/HE-MU transmission, L-STF and L-LTF are always transmitted by using the defined sequence acrroding to Bandwidth as shown in 21.3.8 VHT preamble. Since L-STF and L-LTF in HE-PPDU have an identical sequence with L-STF and L-LTF of VHT PPDU, so the L-STF and L-LTF sequence should be defined with channel bandwidth. |

Discussion : none

*Changes to subclasue 28.3.6.2 related to CIDS: 5287, 5288*

***TGax Editor: Please replace the current text in P257L47 to P258L4 of D1.1 with the proposed following text***

***------------- Begin Text Changes ---------------***

* Construction of L-STF

Construct the L-STF field as defined in 28.3.10.3 (L-STF) with the following highlights:

* Determine the channel bandwidth from the TXVECTOR parameter CH\_BANDWIDTH.
* Sequence generation: Generate the L-STF sequence over the channel bandwidth as described in 28.3.10.3 (L-STF).
* Phase rotation: Apply appropriate phase rotation for each 20 MHz subchannel as described in 28.3.9 (Mathematical description of signals) and 21.3.7.5 (Definition of tone rotation).
* IDFT: Compute the inverse discrete Fourier transform.
* CSD: Apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* ~~Insert GI and apply windowing: Prepend a GI (~~*~~T~~~~GI,~~*~~LegacyPreamble~~~~) and apply windowing as described in 28.3.9 (Mathematical description of signals).~~ Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.3 (L-STF)
* ~~Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.~~ Apply windowing: Apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.

***------------- End Text Changes ---------------***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5289 | 28.3.6.3 | 250.20 | If the TXVECTOR parameter BEAM\_CHANGE is 0, the L-LTF field needs the procedure for spatial mapping | Include the procedure for spatial mapping after applying CSD as follows."Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.4 (L-LTF)." | Revised.Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |

Discussion : none

*Changes to subclause 28.3.6.3 related to CIDS: 5289*

***TGax Editor: Please replace the current text in P258L6 to P258L26 of D1.1 with the proposed following text***

***------------- Begin Text Changes ---------------***

* Construction of L-LTF

Construct the L-LTF field as defined in 28.3.10.4 (L-LTF) with the following highlights:

* Determine the channel bandwidth from the TXVECTOR parameter CH\_BANDWIDTH.
* Sequence generation: Generate the L-LTF sequence over the channel bandwidth as described in 28.3.10.4 (L-LTF).
* Phase rotation: Apply appropriate phase rotation for each 20 MHz subchannel as described in 28.3.9 (Mathematical description of signals) and 21.3.7.5 (Definition of tone rotation).
* IDFT: Compute the inverse discrete Fourier transform.
* CSD: Apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* ~~Insert GI and apply windowing: Prepend a GI (~~*~~T~~~~GI~~*~~,L-LTF~~~~) and apply windowing as described in 28.3.9 (Mathematical description of signals).~~ Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.4 (L-LTF)
* ~~Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the carrier frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.~~ Insert GI and apply windowing: Prepend a GI (*TGI*,L-LTF) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the carrier frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.

***------------- End Text Changes ---------------***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 3317 | 28.3.6.4 | 250.43 | Four extra tones insertion; mapping not correct for Construction of L-SIG. | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected Please, refer the PHY Motion 114, January 2016. In this motion, we agreed that the Extra tone for L-SIG and RL-SIG is defiend with "{-1, -1, -1, 1}”.  |
| 3397 | 28.3.6.4 | 250.43 | Four extra tones insertion; mapping not correct for Construction of L-SIG. | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 3666 | 28.3.6.4 | 250.43 | Four extra tones insertion; mapping not correct for Construction of L-SIG. | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 3756 | 28.3.6.4 | 250.43 | Four extra tones insertion; mapping not correct for Construction of L-SIG. | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 4016 | 28.3.6.4 | 250.36 | Binary convolutional coding and BCC referenced in various subclauses, figures, and tables. This should be defined. | Add definition for "BCC" in clause 3.4 Definitions, acronyms, and abbreviations | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 4140 | 28.3.6.4 | 250.43 | Four extra tones insertion; mapping not correct for Construction of L-SIG. | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 4242 | 28.3.6.4 | 250.43 | Four extra tones insertion; mapping not correct for Construction of L-SIG. | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 4253 | 28.3.6.4 | 250.36 | Binary convolutional coding and BCC referenced in various subclauses, figures, and tables. This should be defined. | Add definition for "BCC" in clause 3.4 Definitions, acronyms, and abbreviations | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 8843 | 28.3.6.4 | 250.42 | Change "in subcarriers k" to "at subcarriers locations" | See comment | Rejected The identical expression is used throughout specification (i.e. 802.11-2016) so, it is proper to use this expression by considering the maintenance from now on.  |
| 8844 | 28.3.6.4 | 250.47 | Wrong reference: 228.3.9 | Correct | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5095 | 28.3.6.4 | 250.38 | In legacy part, we don't use the concept of RU described in 28.3.11.8. So, for the clarification, the reference should be changed with 17.3.5.7 | Change the reference 28.3.11.8 (BCC interleavers) to 17.3.5.7 (Data interleaving). | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5290 | 28.3.6.4 | 250.52 | If the TXVECTOR parameter BEAM\_CHANGE is 0, the L-SIG field needs the procedure for spatial mapping | Include the procedure for spatial mapping after applying CSD as follows."Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.5 (L-SIG)." | Revised TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 10205 | 28.3.6.4 | 250.43 | The subclause 28.3.10.5 (L-SIG) should be referred. Ditto in P251L11. | Add a reference of the subclause "28.3.10.5 (L-SIG)" in the bullet item f). | Rejected The identical tone insertion is applied for L-SIG and RL-SIG. and it is well described in each section so it does not need the additional reference.  |

Discussion : none

*Changes to subclause 28.3.6.4 related to CIDS: 4016, 4253, 5095, 5290, 8844*

***TGax Editor: Please add the following acronym definitions in P7L42 on clause 3.4 of D1.1***

BCC binary convolutional code

***TGax Editor: Please replace the current text in P258L28 to P258L57 of D1.1 with the proposed following text***

***------------- Begin Text Changes ---------------***

* Construction of L-SIG

Construct the L-SIG field as the SIGNAL field defined in 28.3.10.5 (L-SIG) with the following highlights:

* Set the RATE subfield in the SIGNAL field to 6 Mb/s. Set the Length, Parity, and Tail bits in the SIGNAL field as described in 28.3.10.5 (L-SIG).
* BCC encoder: Encode the SIGNAL field by a convolutional encoder at the rate of R = ½ as described in 28.3.11.5.1 (Binary convolutional coding and puncturing).
* BCC interleaver: Interleave as described in ~~28.3.11.8 (BCC interleavers)~~17.3.5.7 (BCC interleavers).
* Constellation Mapper: BPSK modulate as described in 28.3.11.9 (Constellation mapping).
* Pilot insertion: Insert pilots as described in 28.3.10.5 (L-SIG).
* Extra tone insertion: Four extra tones are inserted in subcarriers  for channel estimation purpose and the values on these four extra tones are {1,1,1, 1}, respectively.
* Duplication and phase rotation: Duplicate the L-SIG field over each 20 MHz subchannel of the channel bandwidth. Apply appropriate phase rotation for each 20 MHz subchannel as described in ~~2~~28.3.9 (Mathematical description of signals) and 21.3.7.5 (Definition of tone rotation).
* IDFT: Compute the inverse discrete Fourier transform.
* CSD: Apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* ~~Insert GI and apply windowing: Prepend a GI (TGI,LegacyPreamble) and apply windowing as described in 28.3.9 (Mathematical description of signals).~~ Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.5 (L-SIG).
* ~~Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.~~ Insert GI and apply windowing: Prepend a GI (*TGI*,LegacyPreamble) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.

***------------- End Text Changes ---------------***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 3318 | 28.3.6.5 | 251.11 | Four extra tones insertion; mapping not correct for Construction of RL-SIG | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 3399 | 28.3.6.5 | 251.11 | Four extra tones insertion; mapping not correct for Construction of RL-SIG | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 3669 | 28.3.6.5 | 251.11 | Four extra tones insertion; mapping not correct for Construction of RL-SIG | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 3758 | 28.3.6.5 | 251.11 | Four extra tones insertion; mapping not correct for Construction of RL-SIG | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 4145 | 28.3.6.5 | 251.11 | Four extra tones insertion; mapping not correct for Construction of RL-SIG | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 4246 | 28.3.6.5 | 251.11 | Four extra tones insertion; mapping not correct for Construction of RL-SIG | In f) Change "{-1, -1, -1, 1}" to {-1, -1, 1, 1}" | Rejected It is duplicated with CID 3317. |
| 5096 | 28.3.6.5 | 251.07 | In legacy part, we don't use the concept of RU described in 28.3.11.8. So, for the clarification, the reference should be changed with 17.3.5.7 | Change the reference 28.3.11.8 (BCC interleavers) to 17.3.5.7 (Data interleaving). | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5291 | 28.3.6.5 | 251.21 | If the TXVECTOR parameter BEAM\_CHANGE is 0, the RL-SIG field needs the procedure for spatial mapping | Include the procedure for spatial mapping after applying CSD as follows."Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.6 (RL-SIG)." | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 8845 | 28.3.6.5 | 250.59 | No need to repeat copnstruction of RL-SIG. It is sufficient to mention that it is identical to L-SIG. | Delete text in section and replace with "Construction of RL-SIG is identical to construction of L-SIG" | Rejected RL-SIG is one of fields in HE-preamble. And we have a subsection on this field in the HE-preamble. So, although this field is identical with L-SIG, the construction of RL-SIG needs because this is new field.  |

*Changes to subclause 28.3.6.5 related to CIDS: 5096, 5291*

***TGax Editor: Please replace the current text in P258L59 to P259L26 of D1.1 with the proposed following text***

***------------- Begin Text Changes ---------------***

* Construction of RL-SIG

Construct the RL-SIG field as the repeat SIGNAL field defined in 28.3.10.6 (RL-SIG) with the following highlights:

* Set the RATE subfield in the repeat SIGNAL field to 6 Mb/s. Set the Length Parity, and Tail bits in the repeat SIGNAL field as described in 28.3.10.6 (RL-SIG).
* BCC encoder: Encode the repeat SIGNAL field by a convolutional encoder at the rate of R = ½ as described in 28.3.11.5.1 (Binary convolutional coding and puncturing).
* BCC interleaver: Interleave as described in ~~28.3.11.8 (BCC interleavers)~~17.3.5.7 (BCC interleavers).
* Constellation Mapper: BPSK modulate as described in 28.3.11.9 (Constellation mapping).
* Extra tone insertion: Four extra tones are inserted in subcarriers  for channel estimation purpose and the values on these four extra tones are {1,1,1, 1}, respectively.
* Duplication and phase rotation: Duplicate the RL-SIG field over each 20 MHz subchannel of the channel bandwidth. Apply appropriate phase rotation for each 20 MHz subchannel as described in 28.3.9 (Mathematical description of signals) and 21.3.7.5 (Definition of tone rotation).
* IDFT: Compute the inverse discrete Fourier transform.
* CSD: Apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* ~~Insert GI and apply windowing: Prepend a GI (~~*~~T~~~~GI~~*~~,LegacyPreamble~~~~) and apply windowing as described in 28.3.9 (Mathematical description of signals).~~ Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.6 (RL-SIG).
* ~~Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.~~ Insert GI and apply windowing: Prepend a GI (*TGI*,LegacyPreamble) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.

***------------- End Text Changes ---------------***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5097 | 28.3.6.8 | 253.07 | We have agreed that the phase rotation is not applied on HE-STF and beyond. Please rerfer the PHY Motion 82, November 2015. So, the phase rotation is not needed. | Change the sentence of clause b) with ''Phase rotation: Apply 1 for all subcarrier irrespective bandwidth as described in 28.3.9(Mathematical description of signals).'' | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5293 | 28.3.6.8 | 253.09 | For the HE-STF, the phase rotation value is always 1, and thus the clause 21.3.7.5 does not need to be referred. | Delete "and 21.3.7.5 (Definition of tone rotation)" in the relevant sentence. | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5294 | 28.3.6.8 | 253.16 | For the HE-STF, GI insertion is not needed. | Remove the procedure to insert GI. | Revised Agreed in principle with commenter. HE-STF does not have a GI in symbol. TGax Editor: make changes according to this document 11-17-xxxx-00-00ax\_ CR on subsections of clause 28.3.6 |
| 8846 | 28.3.6.8 | 253.08 | There is no per-20 MHz phase rotation for HE-STF (see page 267, line 4, "In HE modulated fields, gamma\_k,BW = 1 in all the subcarriers") | Remove bullet b) | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 9162 | 28.3.6.8 | 253.05 | For trigger-based PPDU or MU PPDU, HE-STF is transmissed only for (an) assigned RU(s), therefore HE-STF generation over the whole bandwidth indicated by CH\_BANDWIDTH can be misleading. | massage the sentence or add the description to clarify HE-STF is transmitted only for the assigned RU(s) for certain scenarios | Rejected Regardless of PPDU type, to construct the HE-STF, first we decide the appropriate seqeucne according to BW shown in 28.3.10.9 HE-STF. And, in this section, we already describe how to consist the HE-STF sequence for HE-STF transmission only for allocated RU(s). So, additional description does not need.  |
| 5099 | 28.3.6.9 | 253.16 | In time domain, the HE-STF symbol just consists of five-repeated time seqeunce as described in table 28-9. And, it does not inculde the GI in a symbol. So insertion of GI at STF symbol is wrong. | Change the sentence of cluase f) with"Apply windowing asdescribed in 28.3.9 (Mathematical description of signals). '' | Revised Agree in principle with commenter. The HE-STF symbol does not include the Guard interval. TGax Editor: make changes according to this document 11-17-xxxx-00-00ax\_ CR on subsections of clause 28.3.6 |

Discussion :

Multiple CIDs (i.e. 5097, 5293, and 8846) indicate incorrect of the phase rotation of HE-STF. We have decided not to apply the phase rotation for HE-modulated field. And this is described in section 28.3.9 as application of 1 for all subcarrier in BW. So, for the clarification, it shoud be changed with appropriated text.

*Changes to subclause 28.3.6.5 related to CIDS: 5097, 5099, 5293, 5294, and 8846*

***TGax Editor: Please replace the current text in P261L1 to P261L23 of D1.1 with the proposed following text***

***------------- Begin Text Changes ---------------***

* Construction of HE-STF

The HE-STF field is defined in 28.3.10.9 (HE-STF) and is constructed as follows:

* Sequence generation: Generate the HE-STF in the frequency domain over the bandwidth indicated by the TXVECTOR parameter CH\_BANDWIDTH as described in 28.3.10.9 (HE-STF).
* Phase rotation: ~~Apply appropriate phase rotation for each 20 MHz subchannel as described in 28.3.9 (Mathematical description of signals) and 21.3.7.5 (Definition of tone rotation~~). Apply 1 for all subcarrier irrespective bandwidth as described in 28.3.9(Mathematical description of signals).
* CSD: Apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields).
* Spatial mapping: Apply the Q matrix as described in 28.3.10.9 (HE-STF).
* IDFT: Compute the inverse discrete Fourier transform.
* ~~Insert GI and a~~Apply windowing: ~~Prepend a GI;~~ *~~T~~~~GI1~~*~~,Data~~ ~~for HE SU PPDU, HE extended range SU PPDU, and HE MU PPDU and~~ *~~T~~~~GI2~~*~~,Data~~ ~~for a HE trigger-based PPDU.~~ Apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 21.3.10 (HE preamble) for details.

***------------- End Text Changes ---------------***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5098 | 28.3.6.9 | 253.32 | We have agreed that the phase rotation is not applied on HE-STF and beyond. Please rerfer the PHY Motion 82, November 2015. So, the phase rotation is not needed. | Change the sentence of clause b) with ''Phase rotation: Apply 1 for all subcarrier irrespective bandwidth as described in 28.3.9(Mathematical description of signals).'' | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5100 | 28.3.6.9 | 253.36 | In an UL MU-MIMO transmission not using the single stream pilot, the LTF sequense is generated by masking with P matrix as defined in Equation (28-53). And in this case, A matrix mapping is not used additionally, since this sequence is directly used. So, this sentence should be revised for clarification. | Chage the sentence of clause c) with ''Apply the PHE-LTF matrix to the data tones of the HE-LTF sequence and apply the RHE-LTF matrix to pilot tones except the ULMU-MIMO transmission not using single stream pilot as described in 28.3.10.10 (HE-LTF).'' | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 5295 | 28.3.6.9 | 253.25 | For the HE-LTF, there are two modes, i.e., single stream pilot and masking LTF sequence. However, the procedure for construction of HE-LTFseems to include only the single stream pilot mode. | Specify the procedure for the mode of masking LTF sequence. | Rejected In the section, the HE-LTF sequence defined in clause 28.3.10.10 is used for construction of HE-LTF symbol.and in this section, we don’t describe how to configure a HE-LTF sequence. And the explanation of how to configure a HE-LTF sequence according to mode, i.e. single stream pilot and masking LTF sequence is given in clause 28.3.10.10.  |
| 5296 | 28.3.6.9 | 253.33 | For the HE-LTF, the phase rotation value is always 1, and thus the clause 21.3.7.5 does not need to be referred. | Delete "and 21.3.7.5 (Definition of tone rotation)" in the relevant sentence. | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 8847 | 28.3.6.9 | 253.32 | There is no per-20 MHz phase rotation for HE-LTF (see page 267, line 4, "In HE modulated fields, gamma\_k,BW = 1 in all the subcarriers") | Remove bullet b) | Revised It is similar with CID 5098. by considering the section 28.3.9(Mathematical description of signals), it is proper to describe to use of 1 as a phase rotation.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |
| 9163 | 28.3.6.9 | 253.29 | For trigger-based PPDU or MU PPDU, HE-LTF is transmissed only for (an) assigned RU(s), therefore HE-LTF generation over the whole bandwidth indicated by CH\_BANDWIDTH can be misleading | massage the sentence or add the description to clarify HE-LTF is transmitted only for the assigned RU(s) for certain scenarios | Rejected Regardless of PPDU type, to construct the HE-LTF, first we decide the appropriate seqeucne according to BW shown in 28.3.10.9 HE-STF. And, in this section, we already describe how to consist the HE-STF sequence for HE-STF transmission only for allocated RU(s). So, additional description does not need.  |

Discussion : none

*Changes to subclasue 28.3.6.9 related to CIDS: 5098, 5100, 5296, 8847*

***TGax Editor: Please replace the current text in P261L25 to P261L48 of D1.1 with the proposed following text***

***------------- Begin Text Changes ---------------***

* Construction of HE-LTF

The HE-LTF field is defined in 28.3.10.10 (HE-LTF) and is constructed as follows:

* Sequence generation: Generate the HE-LTF sequence in frequency domain over the bandwidth indicated by CH\_BANDWIDTH as described in 28.3.10.10 (HE-LTF).
* Phase rotation: ~~Apply appropriate phase rotation for each 20 MHz subchannel as described in 28.3.9 (Mathematical description of signals) and 21.3.7.5 (Definition of tone rotation).~~Apply 1 for all subcarrier irrespective bandwidth as described in 28.3.9 (Mathematical description of signals).
* *A*HE-LTF matrix mapping: Apply the PHE-LTF matrix to the data tones of the HE-LTF sequence and apply the RHE-LTF ~~or~~ *~~P~~*~~HE-LTF~~ matrix to pilot tones except the UL MU-MIMO transmission not using single stream pilot as described in 28.3.10.10 (HE-LTF).
* CSD: Apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields).
* Spatial mapping: Apply the *Q* matrix as described in 28.3.10.10 (HE-LTF).
* IDFT: Compute the inverse discrete Fourier transform.
* Apply windowing: Apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 21.3.10 (HE preamble) for details.

***------------- End Text Changes ---------------***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5292 | 28.3.6.6 | 251.54 | If the TXVECTOR parameter BEAM\_CHANGE is 0, the HE-SIG-A field needs the procedure for spatial mapping | Include the procedure for spatial mapping after applying CSD as follows."Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.7.4 (Encoding and modulation)." | Revised Agree in principle with the commenter.TGax Editor: make changes as shown in this document 11-17-301-00-00ax \_CR on Subsection of Clause 28.3.6 |

Discussion : none

*Changes to subclause 28.3.6.6 related to CIDS: 5292*

***TGax Editor: Please change the current text after bullet h) in P259 L54 of D1.1 with underlined following text***

* ~~Insert GI and apply windowing: Prepend a GI (~~*~~T~~~~GI~~*~~,LegacyPreamble~~~~) and apply windowing as described in 28.3.9 (Mathematical description of signals).~~ Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the Q matrix as described in 28.3.10.7.4 (Encoding and modulation).
* ~~Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.~~ Insert GI and apply windowing: Prepend a GI (*TGI*,LegacyPreamble) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 28.3.9 (Mathematical description of signals) and 28.3.10 (HE preamble) for details.

**References:**

1. **IEEE P802.11axTM/D1.1, Feb 2017.**