IEEE P802.11
Wireless LANs

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| CSD update for 28.3.6 |
| Date: 2017-05-05 |
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Motivation

In CR doc 17-301r4, CIDs related with beam change indication in pre-HE modulated fields were treated.

And, according to Beamchange indication, the CSD can be applied differently in pre-HE modulated fields (i.e. L-STF, L-LTF, L-SIG, HE-SIGA, and HE-SIGB). But, the applying CSD when beam change = 0 has been omitted in the DOC 11-17/301r4.

If beam change = 0, CSD is applied as HE-fields in each spatial time stream before apply the A and Q matrix for spatial mapping.

Thus, for clarification of applying of CSD at pre he-modulated fields, the description when beam change is 0 should be added in subclause of 28.3.6.

Proposed updates

Add the sentence for applying the CSD when beam change is 0 at pre-HE modulated fields (i.e. L-STF, L-LTF, L-SIG, HE-SIGA, and HE-SIGB) in subclasue 28.3.6.

***Instruction to the TGax editor: Make the following edits to P802.11ax D1.2.***

At P277L58, insert the following sentence as sub bullet d) in subclause 28.3.6.2 in prior to sub bullet for spatial mapping.

* CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields).
* e) Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and the *Q* matrix as described in 28.3.10.3 (L-STF).
* f) IDFT: Compute the inverse discrete Fourier transform.
* g) CSD: If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* h) Insert GI and apply windowing: Prepend a GI (*TGI,*Pre-HE) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* i) 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.

At P278L20, insert the following sentence as sub bullet d) in subclause 28.3.6.3 in prior to sub bullet for spatial mapping.

* CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields) before Spatial mapping.
* e) Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and the *Q* matrix as described in 28.3.10.4 (L-LTF).
* f) IDFT: Compute the inverse discrete Fourier transform.
* g) CSD: If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* h) Insert GI and apply windowing: Prepend a GI (*TGI*,L-LTF) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* i) 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.

At P278L58, insert the following sentence as sub bullet h) in subclause 28.3.6.4 in prior to sub bullet for spatial mapping

* CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields) before Spatial mapping
* i) Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and *Q* matrix as described in 28.3.10.5 (L-SIG).
* j) IDFT: Compute the inverse discrete Fourier transform.
* k) CSD: If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* l) Insert GI and apply windowing: Prepend a GI (*TGI*,Pre-HE) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* m) 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.

At P279L32, insert the following sentence as sub bullet h) in subclause 28.3.6.5 in prior to sub bullet for spatial mapping

* CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields) before Spatial mapping
* i) Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and the *Q* matrix as described in 28.3.10.6 (RL-SIG).
* j) IDFT: Compute the inverse discrete Fourier transform.
* k) CSD: If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* l) Insert GI and apply windowing: Prepend a GI (*TGI*,Pre-HE) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* m) 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.

At P280L4, insert the following sentence as sub bullet g) in subclause 28.3.6.6 in prior to sub bullet for spatial mapping

* CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields) before Spatial mapping.
* h) Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and the *Q* matrix as described in 28.3.10.7.4 (Encoding and modulation).
* i) IDFT: Compute the inverse Fourier transform.
* j) CSD: If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* k) Insert GI and apply windowing: Prepend a GI (*TGI*,Pre-HE) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* l) 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.

At P280L40, replace the sentences after the sub bullet f) in subclause 28.3.6.6 with following sentences

* CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply CSD for each space-time stream and frequency segment as described in 28.3.10.2.2 (Cyclic shift for HE modulated fields).
* g) Spatial mapping: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and the *Q* matrix as described in 28.3.10.7.4 (Encoding and modulation).
* h) IDFT: Compute the inverse Fourier transform.
1. i) CSD: If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
* j) Insert GI and apply windowing: Prepend a GI (*TGI*,Pre-HE) and apply windowing as described in 28.3.9 (Mathematical description of signals).
* k) 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.

At P281L15, replace the sentences after the sub bullet f) in subclause 28.3.6.7 with following sentences

1. CSD: If the TXVECTOR parameter BEAM\_CHANGE is 0, 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: If the TXVECTOR parameter BEAM\_CHANGE is 0, apply the *A* matrix and the *Q* matrix as described in 28.3.10.7.4 (Encoding and modulation).
1. i) IDFT: Compute the inverse Fourier transform.
2. j) 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)~~.If the TXVECTOR parameter BEAM\_CHANGE is 1, apply CSD for each transmit chain and frequency segment as described in 28.3.10.2.1 (Cyclic shift for pre-HE modulated fields).
3. k) Insert GI and apply windowing: Prepend a GI (*TGI*,Pre-HE) and apply windowing as described in 28.3.9 (Mathematical description of signals).

~~j)~~ l) 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.

**Strawpoll:**

Do you agree to replace the sentence of subclauses under 28.3.6 in P802.11ax D1.2 as specified in 17/714r4?

**References:**

1. **IEEE P802.11axTM/D1.2, April 2017.**