IEEE P802.11
Wireless LANs

|  |
| --- |
| Resolution of BF-related CIDs II |
| Date: 2018-03-02 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Claudio da Silva | Intel |  |  | claudio.da.silva@intel.com |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes resolutions to BF-related CIDs. The text used as reference is D1.0.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1149 | 30.9.1.1 | 379.24 | Short SSW packets are not used in SU-MIMO beamforming training | remove "SU-MIMO or" from "whether it is used for SU-MIMO or MU-MIMO beamforming training" |
| 1150 | 30.9.1.1 | 379.25 | Short SSW packets are not used for SU-MIMO beamforming training | change "as part of an I-TXSS for SU-MIMO beamforming training" to "as part of an I-TXSS for SISO beamforming training" |
| 1151 | 30.9.1.1 | 381.01 | Short SSW packets are not used for SU-MIMO beamforming training | For the definition on the Addressing Mode field, changing "In case of an individual address, the SU-MIMO beamforming training is used" to "In case of an individual address, the SISO beamforming training is used" |

**Proposed resolution**: Accepted

**Modifications:** Modify lines 23 and 24 of page 379 as follows:

*The format of the Short SSW packet depends on whether it is transmitted as part of an ~~I-TXSS or R-TXSS~~ initiator TXSS or responder TXSS, and whether it is used for ~~SU-MIMO or~~ MU-MIMO beamforming training.*

Modify lines 25 and 26 of page 379 as follows:

*The format of the Short SSW packet when transmitted as part of an ~~I-TXSS~~ initiator TXSS for ~~SU-MIMO~~ SISO beamforming training is shown in Figure 155.*

Modify third sentence of the "addressing Mode" field in Table 85 (page 381) as follows:

*In case of an individual address, ~~the SU-MIMO~~ SISO beamforming training is used*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1401 | 30.9.1.1 | 379.18 | The term "packet" in Short SSW packet is being used inconsistently. As defined in 30.9.1.1, packet is being referred to only the content within the Data field. However, in legacy (e.g., NDP) packet is used to refer to the entire PPDU. Suggest to align the use just like in legacy. | 1) Change 30.9.1.1 to indicate that the content within the Data field (Figure 155-157) are referred to as Short SSW Payload field.2) Similar to NDP, define Short SSW packet in section 3.2 as "short sector sweep (SSW) packet: A directional muilti-gigabit (DMG) control mode physical layer (PHY) protocol data unit (PPDU) that has the Length field in the PHY header equal to 6 and the Packet Type field within the Short SSW Payload field is 0."3) Verify all occurences of SSW packet to ensure it is consistent with the above. |
| 1628 | 30.9.1.1 | 381.01 | Is there a simpler way to define short SSW? | Definining it in PHY layer and passing all contents through TX/ RXVECTOR generates a lot a (textual) overhead. It would be beneficial to describe in Sec. 9 "MAC frames formats" |
| 1784 | 10.38.1 | 146.05 | 802.11ay is introducing Short SSW packet. However, there is no definition of "packet" or "Short SSW packet" in clause 3. | Add the following defintion in clause 3. "Short SSW packet: A physical layer (PHY) protocol data unit (PPDU) that carries fields for sector level sweep for EDMG STAs." |

**Proposed resolution**: Revised

**Discussion:** As indicated by the Editor, the most suitable way of defining Short SSW packets is to follow the procedure used to define NDP. Specifically, NDPs are defined in a PHY clause (19.3.13) and its use by the MAC in Clause 10 (10.34). Similarly, Short SSW packets are defined in a PHY clause (30.9.1) and its used by the MAC in Clause 10 (10.38.2 and 10.38.5). At the same time, as indicated in CID 1401, the Short SSW packet definition in 30.9.1 has problems, which are solved with the changes below.

**Modifications:** Add the following definition to 3.2:

***short sector sweep (SSW) packet****: A directional muilti-gigabit (DMG) control mode physical layer (PHY) protocol data unit (PPDU) that has the Length field in the PHY header equal to 6 and the Packet Type field within the Short SSW Payload field is 0.*

Replace the first paragraph of 30.9.1.1 with the following

*~~The Short SSW packet is transmitted in the Data field of a DMG control mode PPDU (see Clause 20.4). When transmitting a Short SSW packet the Length field in the PHY header shall be set to 6 and the Packet Type field within the Short SSW packet shall be set to 0, which serves to uniquely identify that the PSDU contains a Short SSW packet.~~*

*A short SSW packet is a DMG control mode PPDU that has the Length field in the PHY header equal to 6 and the Packet Type field within the Short SSW Payload field is 0.*

Make the following modifications to the second paragraph of 30.9.1.1

*The contents of the Short SSW Payload field, which consists of 6 octets and shall be transmitted following the header, ~~The format of the Short SSW packet~~ depends on whether it is transmitted as part of an I-TXSS or R-TXSS, and whether it is used for SU-MIMO or MU-MIMO beamforming training.*

*The ~~format of the~~ Short SSW Payload field of a Short SSW packet when transmitted as part of an I-TXSS for SU-MIMO beamforming training is shown in Figure 155. The ~~format of the~~ Short SSW Payload field of a Short SSW packet when transmitted as part of an I-TXSS for MU-MIMO beamforming training is shown in Figure 156. The ~~format of the~~ Short SSW Payload field of a Short SSW packet when transmitted as part of an R-TXSS is shown in Figure 157. The ~~fields of the Short SSW packet~~ subfields contained in a Short SSW Payload field are defined in Table 85.*

Make the following modifications to the captions of Figures 155, 156, and 157:

*Figure 155 —~~Short SSW packet format~~ Short SSW Payload field when the Direction field is 0 (I-TXSS) and Addressing Mode field is 0*

*Figure 156 —~~Short SSW packet format~~ Short SSW Payload field when the Direction field is 0 (I-TXSS) and Addressing Mode field is 1*

*Figure 157 —~~Short SSW packet format~~ Short SSW Payload field when the Direction field is 1 (R-TXSS)*

Modify the header of Table 85 as follows

*Table 85 —Short SSW Payload field definition*

Modify lines 16-18 of page 382 as follows

*30.9.1.3 Short SSW ~~packet~~ Payload field example*

*This subclause describes an example configuration of a Short SSW ~~packet~~ Payload field using the following configuration as input:*

Modify line 1 of page 383 as follows

*Using the above configuration, the Short SSW ~~packet~~ Payload field encoding from LSB to MSB is as follows: 00010101…*

Modify line 15 of page 39 as follows

*The FSS subfield specifies the number of SSW frames or Short SSW ~~frames~~ packets allowed per sector sweep slot*

Table 85: Replace “Field” (left column) with “subfield”.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1836 | 30.9.2.2.8 | 391.08 | The text states it can select either contiguous or noncontiguous set of taps and how the delays of for the noncontiguous set of taps are included in the Tap Delay field. It doesn't describe the delay for contiguous taps. I assume the delays are fixed. | For clarity, add text to describe the delay for contiguous set of taps. |

**Proposed resolution**: Revised

**Discussion:** The modification suggested below (specifically, include the tap delays subfield as part of the subfield measurement for both contiguous and non-contiguous cases) aligns the text with 11ad.

**Modifications:** Modify lines 8-10 of page 391 as follows:

*It can select a contiguous set of taps or select a noncontiguous set of taps, and include ~~If a noncontiguous set of taps is selected, as defined in 9.4.2.136,~~ the delays of the selected taps ~~are included~~ in the Tap Delay field of the Channel Measurement Feedback element.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1331 | 30.9.2.2.7 | 390.04 | The P matrices defined here are the same as in the OFDM CEF. Referecne that rather than copy the same matrices | Replace the description of the matices with reference to 30.6.4.2 |

**Proposed resolution**: Rejected

**Discussion:** While the matrices are the same, the matrix used in the definition of the TRN subfield is defined per TX chain and the matrix used to define the EDMG-CEF is defined per space-time stream. The matrices are repeated in order to hopefully avoid confusion due to per stream/per TX chain issue.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1582 | 30.9.2.2 | 383.10 | Length of P, M and N TRN subfield is dependent on TRN Subfield Sequence Length field in EDMG Header-A. But EDMG TRN unit P subfield is used to maintain synchronization and estimate the channel. Not used to beam training. So P TRN subfield don't need to be dependent on TRN Sequence Length field | Length of P TRN subfield should be defined independent on TRN Sequence Length field |

**Proposed resolution**: Rejected

**Discussion:** The complexity resultant from defining a TRN field that is composed of different TRN subfields, in terms of both spec and implementation changes, is unlikely to offset any possible reduction in overhead by doing so. It is also not clear whether this change is desirable or not – for example, an implementation when used in propagation scenarios that require long training sequences may also take advantage of longer sequences for channel estimation/tracking.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1057 | 30.9.2.2.2 | 383.32 | An EDMG BRP packet may not be \*composed\* by an EDMG-STF and an EDMG-CEF; instead, an EDMG BRP packet may \*contain\* an EDMG-STF and an EDMG-CEF. | Replace "may be composed by" with "may contain" |
| 1920 | 30.9.2.2.2 | 383.32 | wrong use of preposition "by" in sentence "An EDMG BRP packet may be composed by an EDMG-STF and an EDMG-CEF." | modify sentence to "An EDMG BRP packet may be composed OF an EDMG-STF and an EDMG-CEF." |

**Proposed resolution**: Revised

**Modifications:**  Modify lines 31-32 of page 383 as follows:

*An EDMG BRP packet may ~~be composed by~~ include an EDMG-STF and an EDMG-CEF.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1056 | 30.9.2.2.1 | 383.17 | The description given for EDMG BRP-TX packets does not include the case when HBF training is performed and the complete TRN field is transmitted with the same AWV. | Include a note at the end of the paragraph stating that the same AWV is used in the transmission of the complete TRN field when the packet is used for HBF training. |
| 1919 | 30.9.2.2.1 | 383.18 | "The transmitter may change the AWV used in the transmission of each of the last M TRN subfields in each TRN-Unit present in the TRN field." does not capture the fact that it may keep it constant for some of the last M i.e. To allow longer sequences for TX beam refinement, we allow a TX AWV held for N multiple contiguous TRN fields : 802.11/17-0001 | more accurate to say ""The transmitter may change the AWV used DURING the transmission of each of the last M TRN subfields in each TRN-Unit present in the TRN field" |

**Proposed resolution**: Revised

**Modifications:**  Modify lines 17-20 of page 383 as follows:

*EDMG BRP-TX packets are used for transmit AWV training. The transmitter may change the AWV used in the transmission of each of the last M TRN subfields in each TRN-Unit present in the TRN field. The transmitter may use the same AWV in the transmission of consecutive TRN subfields and may also transmit all TRN subfields of a TRN field with the same AWV. The receiver performs measurements during the reception of the EDMG BRP-TX packet and sends feedback to the STA that transmitted the packet.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1058 | 30.9.2.2.3 | 384.08 | EDMG TRN-Unit N is not used to indicate "the number of TRN subfields per EDMG TRN-Unit M field" | Replace "the number of TRN subfields per EDMG TRN-Unit M field" with "the number of consecutive TRN subfields within EDMG TRN-Unit M which are transmitted using the same AWV" |

**Proposed resolution**: Accepted

**Discussion:** Sentence referred to by the commenter is

“…the fields EDMG TRN Length, RX TRN-Units per Each TX TRN-Unit, the EDMG TRN-Unit P, EDMG TRN-Unit M and EDMG TRN-Unit N are used to indicate the length of the training field, the EDMG BRP-RX/TX packet configuration, the number of TRN sequences in a TRN-Unit that are used for channel estimation, the number of TRN sequences in a TRN-Unit that are used for beamforming training, and the number of TRN subfields per EDMG TRN-Unit M field, respectively.”

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1921 | 30.9.2.2.3 | 384.12 | Default parameters "EDMG TRN-Unit P = 2, EDMG TRN-Unit M = 5 and EDMG TRN-Unit N = 2" violate the rule that M should be a mulitiple of N as discussed in 802.11-17/0007r1. | Modify value fo M and N or clarify behavior  |

**Proposed resolution**: Rejected

**Discussion:** The configuration brought up by the commenter is valid:

* When M = 5, each TRN-Unit has 6 (“value of the field plus one”) TRN subfields used for BF.
* When N = 2, three consecutive TRN subfields are transmitted with the same AWV.

Thus, in this case (M = 5 and N = 2), each AWV is used in the transmission of three TRN subfields and two different AWVs can be “trained” in each TRN-Unit.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1059 | 30.9.2.2.3 | 384.29 | For the case when "the DMG TRN field is equal to one," shall the EDMG PPDU contain an AGC field? | Technical contribution is needed. |

**Proposed resolution**: Revised

**Discussion:**  The first paragraph of page 2490 reads: “Each BRP packet is composed of an STF, a CE field, and a data field followed by a training field containing an AGC training field and a TRN field. This is shown in Figure 20-24.” Cause of confusion are the terms “training field” and “TRN field.” Modifications proposed below may clarify this point.

**Modifications:** Modify value entry for DMG\_TRN in page 226 as follows:

*When set to 1, indicates that the TRN field appended to this PPDU has the structure of a DMG training field containing an AGC training field and a TRN field ~~TRN field~~ as defined in 20.10.2.2.2. In this case, the RX\_TRN\_PER\_TX\_TRN, EDMG\_TRN\_P, EDMG\_TRN\_M, EDMG\_TRN\_N and TRN\_SEQ\_LENGTH parameters are reserved. The EMDG\_TRN\_LEN parameter has a value greater than 0 and less than 32.*

Modify description of the "DMG TRN" field in page 250 as follows

*Corresponds to TXVECTOR parameter DMG\_TRN. When set to 1, indicates that the TRN field appended to this PPDU has the structure of a DMG ~~TRN field~~ training field containing an AGC training field and a TRN field as defined in 20.10.2.2.2. In this case, the RX TRN-Units per Each TX TRN-Unit, the EDMG TRN-Unit P, the EDMG TRN-Unit M, the EDMG TRN-Unit N, and the TRN Subfield Sequence Length fields are reserved. This field is reserved when the EDMG TRN Length field is equal to 0.*

Modify lines 29-31 in page 384 as follows

*When the DMG TRN field is equal to one in a received EDMG PPDU that has the EDMG TRN Length field greater than 0, the TRN field appended to the PPDU has the structure of a DMG ~~TRN field~~ training field containing an AGC training field and a TRN field as defined in 20.10.2.2.2. In this case, the value of the EDMG TRN Length field is smaller than 32.*