IEEE P802.11
Wireless LANs

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| Resolution of Analog Beam Tracking-related CIDs |
| Date: 2018-01-13 |
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Abstract

This submission proposes resolutions to analog beam tracking-related CIDs.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1049 | 10.38.7 | 162.09 | TRN-LEN is used for spoofing; length of the TRN field is indicated in EDMG\_TRN\_LEN. | Delete "TRN-LEN equal to zero" |
| 2305 | 10.38.7 | 162.09 | TRN-LEN may be needed for spoofing a long EDMG PPDU to satisfy spoofing error requirement | remove 'TRN-LEN equal to zero' |

**Proposed resolution**: Accepted

**Background:** Paragraph the commenters’ refer to is:“A beam tracking responder that receives a packet with RXVECTOR parameter EDMG\_BEAM\_TRACKING\_REQUEST equal to Beam Tracking Not Requested, EDMG\_BEAM\_TRACKING\_TYPE to Analog Beam Tracking, BEAM\_TRACKING\_REQUEST equal to Beam Tracking Not Requested, ~~TRN-LEN equal to zero,~~ Packet Type equal to TRN-R-PACKET, and EDMG\_TRN\_LEN to a nonzero value shall follow the rules described in 30.9.2.2 and may use the TRN-R subfields appended to the received packet to perform receive beam training.”

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1032 | 30.3.3.3.2.3 | 250.01 | Table 36: "Number of Transmit Chains" field, not clear why it is reserved when beam tracking request is 0. | Remove the condition on beam tracking request flag |
| 1053 | 30.3.3.3.2.3 | 250.01 | "Number of Transmit Chains" field should not be reserved in some cases when EDMG Beam Tracking Request is 1, such as for transmit beam tracking request. This field should be reserved is some cases when EDMG TRN Length field is greater than 0, such as for requesting receive beam tracking. | "Number of Transmit Chains" field: Replace "This field is reserved when the EDMG TRN Length field is 0 or the EDMG Beam Tracking Request is 0." with "This field is reserved if the EDMG PPDU does not contain a TRN field." |

**Proposed resolution**: Revised

**Discussion:** Table 36 is the EDMG-Header-A for SU PPDUs. It is stated for the “Number of Transmit Chains” field that “This field is reserved when the EDMG TRN Length field is 0 or the EDMG Beam Tracking Request is 0.” The reason for the condition “EDMG Beam Tracking Request is 0” is unknown.

**Modification:** Substitute

*“This field is reserved when the EDMG TRN Length field is 0 or the EDMG Beam Tracking Request is 0.”*

with

*“This field is reserved if the PPDU does not include a TRN field.”*

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1050 | 10.38.7 | 160.34 | Text should reflect the fact that the Beam Tracking Request field of EDMG SC PPDUs and EDMG OFDM PPDUs shall be set to zero. | Add the following text to the beginning of line 34: "If BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested," |

**Proposed resolution**: Revised

**Discussion:** Text should reflect the fact that the Beam Tracking Request field of EDMG SC PPDUs and EDMG OFDM PPDUs shall be set to zero, as defined in 30.3.3.2.4.1. Also, the packet type in a request for RX training shall be TRN-R-PACKET, as defined in the first paragraph of 10.38.7.

**Modification:** Modify lines 34-40, page 160 as follows:

*“If BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested, ~~If~~ EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, ~~and the~~ EDMG\_BEAM\_TRACKING\_TYPE parameter in the RXVECTOR is Analog Beam Tracking or Baseband Beam Tracking, and Packet Type equal to TRN-R-PACKET follow the rules described in 30.9.2.2 and shall include TRN-R subfields to the following packet transmitted to the initiator in the same allocation, with an MCS index greater than 0. The value of TXVECTOR parameter EDMG\_TRN\_LEN in the following packet from the responder to the initiator shall be equal to the value of the EDMG\_TRN\_LEN parameter in the RXVECTOR of the packet from the initiator.”*

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1051 | 10.38.7 | 161.37 | Text should reflect the fact that the Beam Tracking Request field of EDMG SC PPDUs and EDMG OFDM PPDUs shall be set to zero. | Replace lines 37-40 with the following: " If BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested, ~~If~~ EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested and EDMG\_BEAM\_TRACKING\_TYPE in the RXVECTOR is Baseband Beam Tracking, the initiator shall include a FBCK-REQ in a DMG Beam Refinement element to request the needed feedback. The responder shall respond with the requested feedback." |

**Proposed resolution**: Accepted

**Discussion:** See discussion for CID 1050.

**Modification:** As suggested by the commenter.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1052 | 10.38.7 | 161.28 | Text is unclear | Replace lines 28-36 with " - BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, the responder shall respond with all subfields of the FBCK-TYPE field equal to 0 and set the BS-FBCK field to the index of the TRN-T subfield that was received with the best quality; or - BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested, EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested and EDMG\_BEAM\_TRACKING\_TYPE in the RXVECTOR is Analog Beam Tracking, the responder shall respond with all subfields of the FBCK-TYPE field equal to 0 and set the BS-FBCK field to the AWV feedback ID corresponding to the TRN subfields transmitted with the same AWV that were received with the best quality." |
| 1338 | 10.38.7 | 161.34 | "transmitted with the same AWV that" I think this text is unnecessary and confusing | Remove this text. |

**Proposed resolution**: Revised

**Discussion:**  Proposed changes (1) clarify the text by separating DMG and EDMG behavior, and (2) provide complete beam tracking settings for the EDMG case. Original text is:

“If the responder has never received a BRP frame from the initiator with TX-TRN-REQ equal to 1, and if:

- BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, or if EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested and EDMG\_BEAM\_TRACKING\_TYPE is Analog Beam Tracking, the responder shall respond with all subfields of the FBCK-TYPE field equal to 0 and set the BS-FBCK field to:

the index of the TRN-T subfield that was received with the best quality if the measurements were performed with DMG PPDUs; or

the AWV feedback ID corresponding to the TRN subfields transmitted with the same AWV that were received with the best quality if the measurements were performed with EDMG PPDUs

**Modification:** Substitute lines 28-36 with the following text:

* *BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, the responder shall respond with all subfields of the FBCK-TYPE field equal to 0 and set the BS-FBCK field to the index of the TRN-T subfield that was received with the best quality; or*
* *BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested, EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, EDMG\_BEAM\_TRACKING\_TYPE in the RXVECTOR is Analog Beam Tracking, and Packet Type is equal to TRN-T-PACKET, the responder shall respond with all subfields of the FBCK-TYPE field equal to 0 and set the BS-FBCK field to the AWV feedback ID corresponding to TRN subfields received with best quality.*

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1055 | 10.38.7 | 162.14 | While the use of EDMG BRP-RX/TX packets for beam tracking is defined in page 162, the exact procedure for simultaneous receive and transmit beam tracking is not defined | Technical contribution is needed. |

**Proposed resolution**: Revised

**Discussion:** The use of EDMG BRP-RX/TX packets for beam tracking is defined in [1] (page 162):

“A beam tracking initiator may use the procedures specified above to request a beam tracking responder to perform both transmit and receive beam tracking on the same packet. This is done by, on top of the corresponding TXVECTOR parameter configuration specified above, setting the TXVECTOR parameter RX\_TRN\_PER\_TX\_TRN to a value greater than zero and the Packet Type to TRN-T-PACKET. In this case, the beam tracking initiator and beam tracking responder shall use the rules described in 30.9.2.2 to perform both transmit and receive training over the TRN subfields appended to the transmitted packet.”

The changes below propose modifications to the text in order to clarify the procedure.

**Modifications:** Delete the second half of the paragraph in lines 6-17 in page 162; specifically, delete the sentences “A beam tracking initiator may use the procedures specified above… over the TRN subfields appended to the transmitted packet.”

Add the following paragraph below the paragraph in lines 6-17 in page 162. (Note: Beam tracking initiator transmits an EDMG BRP-RX/TX packet.)

*A beam tracking initiator requesting simultaneous receive and transmit beam tracking shall set the EDMG\_BEAM\_TRACKING\_REQUEST parameter in the TXVECTOR to Beam Tracking Requested, EDMG\_BEAM\_TRACKING\_TYPE to Analog Beam Tracking, BEAM\_TRACKING\_REQUEST to Beam Tracking Not Requested, Packet Type to TRN-T-PACKET, the TXVECTOR parameter RX\_TRN\_PER\_TX\_TRN to a value greater than zero, and the parameters EDMG\_TRN\_LEN, EDMG\_TRN\_P, EDMG\_TRN\_M and EDMG\_TRN\_N as described in 30.9.2.2, and append a TRN field to the packet. The feedback sent by the beam tracking responder shall follow the same specification defined for the transmit beam tracking procedure.*

Change lines 34-40 in page 160 as indicated below: (Editor: The text below includes changes previously proposed in this document for CID 1050.)

*If BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested, ~~If~~ EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, ~~and the~~ EDMG\_BEAM\_TRACKING\_TYPE parameter in the RXVECTOR is ~~Analog Beam Tracking or~~ Baseband Beam Tracking, and EDMG\_PACKET\_TYPE parameter in the RXVECTOR is EDMG-TRN-R-PACKET, follow the rules described in 30.9.2.2 and shall include TRN-R subfields to the following packet transmitted to the initiator in the same allocation, with an MCS index greater than 0. ~~The value of TXVECTOR parameter EDMG\_TRN\_LEN in the following packet from the responder to the initiator shall be equal to the value of the EDMG\_TRN\_LEN parameter in the RXVECTOR of the packet from the initiator.~~ The following packet from the responder to the initiator shall have the value of the TXVECTOR parameter EDMG\_PACKET\_TYPE equal to TRN-R-PACKET and the value of the TXVECTOR parameter EDMG\_TRN\_LEN equal to the value of the EDMG\_TRN\_LEN parameter in the RXVECTOR of the packet from the initiator*

Add the following paragraph as an item following the item in lines 34-40 (page 160) (Note: Responder of a receive beam tracking request responds with a BRP-RX/TX packet.)

*If BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Not Requested, EDMG\_BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR is Beam Tracking Requested, EDMG\_BEAM\_TRACKING\_TYPE parameter in the RXVECTOR is Analog Beam Tracking, and EDMG\_PACKET\_TYPE parameter in the RXVECTOR is EDMG-TRN-R-PACKET, follow the rules described in 30.9.2.2 and the beam tracking responder shall respond with either an EDMG BRP-RX packet or an EDMG BRP-RX/TX packet to the initiator in the same allocation, with an MCS index greater than 0. If the responder sends an EDMG BRP-RX packet, the value of TXVECTOR parameter EDMG\_TRN\_LEN in the following packet from the responder to the initiator shall be equal to the value of the EDMG\_TRN\_LEN parameter in the RXVECTOR of the packet from the initiator. If the responder sends EDMG BRP-RX/TX packet, the value of TXVECTOR parameter RX\_TRN\_PER\_TX\_TRN in the following packet from the responder to the initiator shall be equal to the value of the EDMG\_TRN\_LEN parameter in the RXVECTOR of the packet from the initiator.*

Add the following paragraph after the new paragraph introduced above(Note: Feedback for the case when responder of a receive beam tracking request sends with a BRP-RX/TX packet.)

*If a beam tracking responder sends an EDMG BRP-RX/TX packet in response to an analog receive beam tracking request, the beam tracking initiator may append the feedback to any packet to the responder.*

*The feedback type shall be the same as the feedback type in the last BRP frame that was transmitted from the responder to the initiator with TX-TRN-REQ equal to 1. If the responder has never received a BRP frame from the initiator with TX-TRN-REQ equal to 1, the initiator shall respond with all subfields of the FBCK-TYPE field equal to 0 and set the BS-FBCK field to the AWV feedback ID corresponding to TRN subfields received with best quality.*

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1337 | 10.38.7 | 160.23 | "A beam tracking responder that receives a packet requesting beam tracking with the Beam Tracking " explicitly mentioning receive beam tracking will make the previous paragraph clearer | replace "requesting beam tracking" with "requesting receive beam tracking" |

**Proposed resolution**: Accepted

**SP/M:** Do you accept the resolutions given in 18/0125r0 to the following CIDs: 1049, 2305, 1032, 1053, 1050, 1051, 1052, 1338, 1055, and 1337?