IEEE P802.11
Wireless LANs

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| Resolution of MIMO BRP TXSS-related CIDs |
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| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Claudio da Silva | Intel |  |  | claudio.da.silva@intel.com |
| Artyom Lomayev | Intel |  |  |  |
| Cheng Chen | Intel |  |  |  |
| Carlos Cordeiro | Intel |  |  |  |
| Dejian Li | Huawei |  |  | dejian.li@huawei.com |

Abstract

This submission proposes resolutions to MIMO BRP TXSS-related CIDs.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1027 | 10.38.9.5.2.3 | 191 | Similar to SISO BRP TXSS, the spec must define how to transmit non-TRN fields of packets used in MIMO BRP TXSS. | Antenna settings and mode of transmission must be defined. |
| 1028 | 10.38.9.5.2.3 | 191 | The rules defined for the Initiator BRP TXSS and the Responder BRP TXSS for SISO BRP TXSS must be extended to MIMO BRP TXSS. | Define rules for the Initiator BRP TXSS and the Responder BRP TXSS for MIMO BRP TXSS. |
| 1795 | 10.38.9.5.2.3 | 191 | MIMO BRP TXSS example frame exchange sequence is missing. | Please add example of MIMO BRP TXSS sequence chart similar to Figure 106~109. |

**Proposed resolution**: Revised

***Editor: Change the text of 10.38.9.5.2.3 (MIMO BRP TXSS configuration) as defined below. Changes include additions (underlined text) and deletions (strikethrough).***

Receive training of the responder and receive training of the initiator shall not be performed in a MIMO BRP TXSS procedure. The L-RX field within the EDMG BRP Request element in the BRP frames transmitted during the setup phase of a MIMO BRP TXSS shall be set to zero.

Responder BRP TXSS is mandatory in MIMO BRP TXSS.

An example of a MIMO BRP TXSS is shown in Figure X.



Figure X - Example of MIMO BRP TXSS.

BRP frames sent in the setup phase of a MIMO BRP TXSS shall be transmitted by applying spatial expansion and mapping a single space-time stream to all N transmit chains to be trained in the procedure.

In the setup phase of a MIMO BRP TXSS, if an implementation has not yet determined AWVs to use in some of its transmit chains (for example, if a station has been only using a single transmit chain before the setup phase), the AWVs used by such chains should be selected in an implementation dependent manner.

~~All fields of EDMG BRP-TX packets used in MIMO BRP TXSS shall be transmitted with all transmit chains of the transmitter and use an EDMG PPDU defined for MIMO transmission. The TRN field of EDMG BRP-TX packets used in MIMO BRP TXSS shall consist of N orthogonal waveforms, where N is the number of transmit chains used in the transmission of the packet, as defined in 30.9.2.~~

BRP frames sent in the Initiator BRP TXSS, the Responder BRP TXSS, and with acknowledgement shall be transmitted using EDMG PPDUs by applying spatial expansion and mapping a single space-time stream to all N transmit chains to be trained in the procedure. The TRN field of EDMG BRP-TX packets used in MIMO BRP TXSS shall consist of N orthogonal waveforms, as defined in 30.9.2.

~~The TRN-Unit RX Pattern field in the EDMG-Header-A of an EDMG BRP-TX packet used in MIMO BRP TXSS shall be set to 1.~~

The Initiator BRP TXSS shall consist of the transmission of $N\_{init}$ + 1 EDMG BRP-TX packets consecutively repeated *Rresp* + 1 times by the initiator followed by the transmission of a BRP frame with feedback by the responder. The EDMG BRP-TX packets transmitted in an Initiator BRP TXSS shall be configured as follows:

* The TRN-Unit RX Pattern field in the EDMG-Header-A shall be set to 1;
* The EDMG-Header-A of the *ith* EDMG BRP-TX packet within each of the *Rresp* + 1 repetitions, where $1\leq i\leq N\_{init}+1$, shall have the same value for the fields EDMG TRN Length, EDMG TRN-Unit P, EDMG TRN-Unit M and EDMG TRN-Unit N; and
* The TRN subfields of the *ith* EDMG BRP-TX packet within each of the *Rresp* + 1 repetitions, where $1\leq i\leq N\_{init}+1$, shall be transmitted using the same AWVs.

Similarly, the Responder BRP TXSS shall consist of the transmission of *Nresp* +1 EDMG BRP-TX packets consecutively repeated *Rinit* + 1 times by the responder followed by the transmission of a BRP frame with feedback by the initiator. The EDMG BRP-TX packets transmitted in a Responder BRP TXSS shall be configured as follows:

* The TRN-Unit RX Pattern field in the EDMG-Header-A shall be set to 1;
* The EDMG-Header-A of the *ith* EDMG BRP-TX packet within each of the *Rinit* + 1 repetitions, where $1\leq i\leq N\_{resp}+1$, shall have the same value for the fields EDMG TRN Length, EDMG TRN-Unit P, EDMG TRN-Unit M and EDMG TRN-Unit N; and
* The TRN subfields of the *ith* EDMG BRP-TX packet within each of the *Rinit* + 1 repetitions, where $1\leq i\leq N\_{resp}+1$, shall be transmitted using the same AWVs.

The AWVs used in the transmission of all fields except for the TRN field of BRP frames sent in the Initiator BRP TXSS, the Responder BRP TXSS, and with acknowledgement shall be the same ones used in the setup phase. Similarly, the AWVs used in the reception of all fields except for the TRN field of BRP frames sent in the Initiator BRP TXSS, the Responder BRP TXSS, and with acknowledgement shall be the same ones used in the setup phase.

~~A STA that is part of a MIMO BRP TXSS and that receives EDMG BRP-TX packets shall perform channel measurements using all of its DMG antennas simultaneously and provide feedback for each of its DMG antennas, as defined in 10.38.9.5.4.~~

A STA that is part of a MIMO BRP TXSS shall provide feedback for each of the receive chains trained in the procedure, as defined in 10.38.9.5.4.

For EDMG BRP-TX packets transmitted in a MIMO BRP TXSS, the value of the TXVECTOR parameter EDMG\_TRN\_LEN shall be set to k, where k is the number of TRN-Units used in the transmit training.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2324 | 10.38.9.5.2.3 | 191 | For MIMO STAs with number of RF chains < number of antennas, EDMG\_TRN\_LEN may still need to set to k+1 | change to 'the value of the TXVECTOR parameter EDMG\_TRN\_LEN shall be set to k,+1' |

**Proposed resolution**: Rejected

*Discussion:* Supporting BF training as indicated by the commenter (specifically, switching antennas during the transmission of a MIMO BRP packet) is not allowed in D1.0 (see, among other places, text from 183.25 to 183.34) and, to support it, more changes than the one indicated in the comment are required. The commenter is encouraged to discuss the value of the proposed flow with the group and bring a complete proposal, if appropriate.

**SP/M:** Do you accept the resolutions given in 18/0089r0 to the following CIDs: 1027, 1028, 1795, and 2324?

**References:**

[1] IEEE P802.11ay/D1.0, Nov. 2017.