IEEE P802.11
Wireless LANs

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| Comment Resolution on the SISO Phase of SU-MIMO BF |
| Date: 2018-2-21 |
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Abstract

This submission proposes resolution of comments on SU-MIMO beamforming (in particular, 10.38.9.2.2.1 General and 10.38.9.2.2.2 SISO phase) received from LB# 231 (TGay Draft 1.0).

- 15 CID:

1136, 1137, 1139, 1141, 1142, 1243, 1898, 1899, 1900, 1901,

2306, 1133, 1143, 1144, 1807

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| **CID** | **Page Number** | **Line Number** | **Comment** | **Proposed Change** | **Resolution** |
| 1136 | 163 | 19 | "A SU-MIMO capable" should be "An SU-MIMO capable" | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1136. |
| 1137 | 163 | 22 | "a SU-MIMO capable initiator and a SU-MIMO capable responder" should be "an SU-MIMO capable initiator and an SU-MIMO capable responder | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1137. |
| 1139 | 164 | 16 | "per TX antenna" should be "per TX DMG antenna" | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1139. |
| 1141 | 164 | 24 | "per TX antenna" should be "per TX DMG antenna" | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1141. |
| 1142 | 164 | 46 | "per TX antenna" should be "per TX DMG antenna" | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1142. |
| 1243 | 164 | 5 | Three overlong paras. | Split them up. Add visual structure. | Revised-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1243. |
| 1898 | 164 | 9 | The first occurrence of each frame or element type should have a hyperlink reference beside it to enable readability: EDMG BRP Request Element | EDMG BRP Request Element (9.4.2.255) | Accepted-Similar change should be made on the first occurrence of the other frames or elements.TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1898. |
| 1899 | 164 | 11 | The first occurrence of each frame or element type should have a hyperlink reference beside it to enable readability.: EDMG Channel Measurement Feedback Element | EDMG Channel Measurement Feedback Element (9.4.2.253) | Accepted-See resolution to AID 1898.TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1899. |
| 1900 | 164 | 14 | The first occurrence of each frame or element type should have a hyperlink reference beside it to enable readability.:Channel Measurment Feedback Element | Channel Measurment Feedback Element (9.4.12.126) | Accepted-See resolution to AID 1898.TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1900. |
| 1901 | 164 | 25 | Discussion of different fields of the DMG refinement element without introducing the element "When the SISO phase comprises a SISO feedback procedure as shown in Figure 98, the initiator shall send a BRP frame to the responder with the" | Modify the sentence as follows: "When the SISO phase comprises a SISO feedback procedure as shown in Figure 98, the initiator shall send a BRP frame to the responder with the following field of the DMG Beam Refinement Element (9.4.2.130) set....." | Revised-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1901. |
| 2306 | 164 | 25 | When SISO phase comprises a SISO feedback procedure, it should be the same procedure as described in 10.38.6.4.1 requesting TXSS sector list. However, there are some minor differences between here and what was described in 10.38.6.4.1.For example, the requirement of setting Sector ID Order Requested to 1 is not in 10.38.6.4.1, the IFS between 2 BRP packets is SIFS in this cause but in 10.38.6.4.1 it is within MBIFS. Minimum 16 sector feedback are required in 10.38.6.4.1 but there is no such requirement in this clausesame comment applies to 10.38.9.2.3.2 | SISO feedback procedure should refer to 10.38.6.4.1 for consistency with the additional requirement that the 1st BRP frame should contain the feeback to the responder in addition to the TXSS-FBCK\_REQ | Revised-agreed that MBIFS shall be used between two BRP frames instead of SIFS for the SISO feedback procedure. Also agreed that minimum feedback requirement for both SISO and MIMO BF should keep consistency. For this purpose, it is proposed that feedback of minimum 16 sectors per TX/RX antenna pair is required for MIMO BF.TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 2306. |
| 1133 | 165 |  | Figure 98 is not very informative and can be removed or modified to include more details on the SISO procedure, in addition its title need to be fixedThe SISO feedback procedure of the SU-MIMO beamforming | Figure 98 --The SISO feedback procedure of the SU-MIMO beamforming | Revised-Agreed in principle that Figure 98 is not very informative and should be removed.TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1133. |
| 1143 | 165 | 4 | "are" shall be removed from "The BRP shall have all the subfields within the FBCK-REQ field are set to 0" | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1143. |
| 1144 | 165 | 22 | "per TX antenna" should be "per TX DMG antenna" | as per comment | Accepted-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1144. |
| 1807 | 165 | 2 | Correct spelling of "feeback" | change spelling to "feedback" | Revised-TGay editor to make the changes shown in 11-18/0281r0 under all headings that include CID 1807. |

**Proposed changes to D1.0:**

10.38.9.2.2 SU-MIMO beamforming

10.38.9.2.2.1 General

***Modify this clause as follows (CID #1136, 1137):***

An EDMG STA is SU-MIMO capable if the SU-MIMO Supported subfield of the Beamforming Capability field in the STA’s EDMG Capabilities element (see 9.4.2.250) is one. An SU-MIMO capable STA supports both SU-MIMO transmission and reception and the SU-MIMO beamforming protocol described in this subclause.

The SU-MIMO beamforming protocol supports beamforming training for subsequent transmission and reception of multiple spatial streams between an SU-MIMO capable initiator and an SU-MIMO capable responder. The SU-MIMO beamforming protocol enables the determination of transmit antenna settings and the corresponding receive antenna settings for simultaneous transmission of multiple spatial streams from the initiator to the responder or vice versa.

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10.38.9.2.2.2 SISO phase

***Modify this clause as follows (CID#1139, 1141, 1142, 1243, 1898, 1899, 1900, 1901, 2306, 1133, 1143, 1144, 1807)***

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When the SISO phase comprises a MIMO BRP TXSS procedure, it includes a setup phase, an Initiator BRP TXSS, a Responder BRP TXSS, and a feedback phase as defined in 10.38.9.5. In particular, the BRP frame sent by the initiator during the setup phase to start the SISO phase shall have the BRP-TXSS, TXSS-INITIATOR, and the TXSS-MIMO fields within the EDMG BRP Request element (see 9.4.2.255) all set to 1.

In the BRP frame sent by the initiator during the feedback phase, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element (see 9.4.2.253) indicates AWV feedback IDs, TX antennas and RX antennas of all or a subset of sectors that were received in the Responder BRP TXSS. The BRP CDOWN subfield in the EDMG Channel Measurement Feedback element indicates BRP CDOWNs of the packets in which these sectors were received. The SNR subfield in the Channel Measurement Feedback element (see 9.4.2.136) indicates the SNRs with which these sectors were received. The BRP frame sent by the initiator during the feedback phase shall contain feedback information for more than one sector per TX DMG antenna that were received in the Responder BRP TXSS.

In the BRP frame sent by the responder during the feedback phase, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicates AWV feedback IDs, TX antennas and RX antennas of all or a subset of sectors that were received in the Initiator BRP TXSS. The BRP CDOWN subfield in the EDMG Channel Measurement Feedback element indicates BRP CDOWNs of the BRP packets in which these sectors were received. The SNR subfield in the Channel Measurement Feedback element indicates the SNRs with which these sectors were received. The BRP frame sent by the responder during the feedback phase shall contain feedback information for more than one sector per TX DMG antenna that were received in the Initiator BRP TXSS.

When the SISO phase comprises a SISO feedback procedure, the initiator shall send a BRP frame to the responder. The DMG Beam Refinement element (see 9.4.2.130) included in the BRP frame shall have the TXSS-FBCK-REQ, EDMG Extension Flag and EDMG Channel Measurement Present fields set to 1, the SNR Requested and Sector ID Order Requested subfields within the FBCK-REQ field set to 1, the remaining subfields within the FBCK-REQ field set to 0, and the SNR Present, Sector ID Order Present, Channel Measurement Present, Tap Delay Present and Link Type subfields within the FBCK-TYPE field set to 1, 1, 0, 0 and 1, respectively.

The last responder TXSS may have been performed using DMG Beacon frames, SSW frames, Short SSW packets or EDMG BRP-TX packets. If the last responder TXSS was performed using DMG Beacon or SSW frames, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicates the sector IDs, TX antennas and RX antennas of all or a subset of sectors that were received in the last responder TXSS. If the last responder TXSS was performed using Short SSW packets, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicates the CDOWNs, TX antennas and RX antennas of all or a subset of sectors that were received in the last responder TXSS. If the last responder TXSS was performed using EDMG BRP-TX packets, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicate AWV feedback IDs, TX antennas and RX antennas of all or a subset of sectors that were received in the last responder TXSS. The BRP CDOWN subfield in the EDMG Channel Measurement Feedback element indicates the BRP CODWNs of the BRP packets in which these sectors were received. The SNR subfield in the Channel Measurement Feedback element indicates the SNRs with which these sectors were received. If the number of sectors for a pair of TX and RX DMG antennas that were received in the last responder TXSS is larger than 16, the BRP frame shall contain feedback for at least 16 received sectors for the pair of TX and RX DMG antennas. Otherwise the BRP frame shall contain feedback for all the received sectors for the pair of TX and RX DMG antennas.

The responder shall send a BRP frame to the initiator within an MBIFS following the reception of the BRP frame from the initiator. The DMG Beam Refinement element included in the BRP frame shall have the EDMG Extension Flag and EDMG Channel Measurement Present fields set to 1, all the subfields within the FBCK-REQ field set to 0, and the SNR Present, Sector ID Order Present, Channel Measurement Present, Tap Delay Present and Link Type subfields within the FBCK-TYPE field set to 1, 1, 0, 0 and 0, respectively.

The last initiator TXSS may have been performed using DMG Beacon frames, SSW frames, Short SSW packets or EDMG BRP-TX packets. If the last initiator TXSS was performed using DMG Beacon or SSW frames, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicates the sector IDs, TX antennas and RX antennas of all or a subset of sectors that were received in the last initiator TXSS. If the last initiator TXSS was performed using Short SSW packets, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicates the CDOWNs, TX antennas and RX antennas of all or a subset of sectors that were received in the last initiator TXSS. If the last initiator TXSS was performed using EDMG BRP-TX packets, the EDMG Sector ID Order subfield in the EDMG Channel Measurement Feedback element indicates AWV feedback IDs, TX antennas and RX antennas of all or a subset of sectors that were received in the last initiator TXSS. The BRP CDOWN subfield in the EDMG Channel Measurement Feedback element indicates the BRP CODWNs of the BRP packets in which these sectors were received. The SNR subfield in the Channel Measurement Feedback element indicates the SNRs with which these sectors were received. If the number of sectors for a pair of TX and RX DMG antennas that were received in the last initiator TXSS is larger than 16, the BRP frame shall contain feedback for at least 16 received sectors for the pair of TX and RX DMG antennas. Otherwise the BRP frame shall contain feedback for all the received sectors for the pair of TX and RX DMG antennas.

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**Straw Poll:**

* **Do you agree to accept the comment resolution as proposed in doc 11-18/0281r1?**