IEEE P802.11
Wireless LANs

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| Comment Resolution on MIMO Beamforming related CIDs |
| Date: 2017-09-11 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Hiroyuki Motozuka | Panasonic |  |  | motozuka.hiroyuki@jp.panasonic.com |
| Lei Huang | Panasonic |  |  |  |
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Abstract

This submission proposes resolutions of comments received from TGay comment collection (TGay Draft 0.3).

* 7 CIDs: 92, 94, 95, 96, 184, 272, 396

Revisions:

* Rev 0: Initial version of the document.
1. **Introduction**

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGay Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGay Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGay Editor: Editing instructions preceded by “TGay Editor” are instructions to the TGay editor to modify existing material in the TGay draft. As a result of adopting the changes, the TGay editor will execute the instructions rather than copy them to the TGay Draft.***

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| CID | Clause | Page | Comment | Proposed Change | Proposed Resolution |
| 272 | 9.4.2.254 | 36 | Where the groups for DL FDMA are defined? | Define the corresponding grouping for DL MU FDMA | RejectedAs a consistent resolution of CID 337, which proposes removal of FDMA from the draft, it is proposed not to add the definition of the group for FDMA. |
| 95 | 10.38.9.2.3.2 | 67.36 | To prevent possible interop issues, make the should a shall | Replace "should" with "shall" | RejectedIt is problematic to limit transmission of the BRP frame during SISO Feedback subphase using DMG control mode. This is because the large size of feedback and low rate of control mode. Furthermore, SU-MIMO or MU-MIMO training is performed after a control mode link has been established between initiator and responder and it is possible to use data MCSs for transmission. |
| 94 | 10.38.9.2.3.3 | 70.07 | To prevent possible interop issues, make the should a shall | Replace "should" with "shall" | RejectedConsidering the consistency with SISO Feedback frame, it is preferred not to mandate use of the DMG control mode during MIMO setup subphase. Also, it should be noted that the STA may use non-EDMG duplicate mode. |
| 92 | 10.38.9.2.4.2 | 71.29 | To prevent possible interop issues, make the "should" a "shall" | Replace "should" with "shall" | RejectedIt is problematic to limit transmission of the BRP frame during SISO Feedback subphase using DMG control mode. This is because the large size of feedback and low rate of control mode. Furthermore, SU-MIMO or MU-MIMO training is performed after a control mode link has been established between initiator and responder and it is possible to use data MCSs for transmission. |
| 96 | 10.38.9.2.4.3 | 73.01 | To prevent possible interop issues, make the should a shall | Replace "should" with "shall" | RejectedConsidering the consistency with SISO Feedback frame, it is preferred not to mandate use of the DMG control mode during MIMO setup subphase. Also, it should be noted that the STA may use non-EDMG duplicate mode. |
| 184 | 15 |  | "Each DMG antenna should have the similar number of candidate transmit sectors in order to avoid biasing a DMG antenna" - This can make the training actually inefficient in certain scenarios as the signals from some antennas might be significantly attenuated w.r.t to other antennas. This information can be retrieved from the SISO feedbacks. | Better define recommendation based on relative SNR of the links between transmit and receive DMG antennas. | Rejected-Basically how the candidate TX sectors are selected for the following MIMO phase of SU-MIMO BF is an implementation issue. It is unnecessary in the specification to mention whether the TX sector down-selection is based on actual SNR or relative SNR. In addition, for SU-MIMO BF, eventually multiple best TX sector combinations shall be determined in such a way that no determined transmit sectors come from the same DMG antenna. As a result, the current recommendation is reasonable, especially when the number of selected candidate TX sectors per antenna is small.  |
| 396 | 10.38.9.2.4.3 | 73.01 | SU/MU-MIMO BF setup and SU/MU\_MIMO BF training are in the same TXOP, so BF setup sub-phase should occupy all the channels occupied in training sub-phase. However, the setup frame is in DMG control mode | added setup frame in 30.3.3.2.6 table 9, row B0=1, or define a control trailer for setup frame,or remove the sentence 'All frames transmitted during the MU-MIMO BF setup subphase should be sent using the DMG control mode.'Make similar changes for SU-MIMO setup frames | RevisedAgreed in principle. The BF setup frames could be transmitted during the same TXOP as the following BRP frames of the MIMO phase. In that case, the STA may need to choose 4.32 GHz or wider channel width to follow the channel width selection rules specified in section 10.7.7.Similar change is proposed for SU-MIMO case. |

**Discussion:** None

**Propose:**

Revised for CID 396 as per discussion and editing instructions in IEEE 802.11-17/1439r2.

1. * + - 1. SU-MIMO beamforming

MIMO phase

***Change the fifth paragraph (P90L22 of D0.5) as follows (CID#396)***

All frames transmitted during the MIMO BF setup subphase should be sent using the DMG control mode or non-EDMG duplicate PPDU with the DMG Control modulation class.

* + - * 1. MU-MIMO beamforming

Downlink MIMO phase

***Change the third paragraph (P93L18 of D0.5) as follows (CID#396)***

In the MU-MIMO BF setup subphase, the initiator shall transmit one or more MIMO BF Setup frame with the SU/MU field set to 0 and the DL/UL MIMO Phase field set to 1 to each responder in the MU group. The initiator should transmit the minimum number of MIMO BF Setup frames to reach all responders in the MU group. The MIMO BF Setup frames should be sent using the DMG control mode or non-EDMG duplicate PPDU with the DMG Control modulation class. The TA field of the MIMO BF Setup frame shall be set to the BSSID of the initiator and the RA field shall be set to the broadcast address. The MIMO BF Setup frame shall indicate the EDMG group ID of the MU group in the EDMG Group ID field, each remaining responder in the Group User Mask field, and a unique dialog token in the Dialog Token field for identifying MU-MIMO BF training. The MIMO BF Setup frame shall also indicate whether time domain channel response is requested as part of MU-MIMO BF feedback in the Channel Measurement Requested field. If the time domain channel response is requested as part of MU-MIMO BF feedback, the Channel Measurement Requested field shall be set to 1 and the Number of Taps Requested field shall indicate the number of channel taps requested in time domain channel response. To reduce the MU-MIMO BF training time, the initiator may select a subset of TX sectors for each DMG antenna and the number of TRN subfields required for receive AWV training based on the L-TX-RX subfields and the EDMG TRN-Unit M subfields in the feedback from responders received at the SISO phase. A responder whose corresponding bit in the Group User Mask field of the received MIMO BF Setup frame is set to 0 can ignore frames transmitted in the following MU-MIMO BF training subphase and MU-MIMO BF feedback subphase.

Straw Poll:

* **Do you agree to accept resolutions to CIDs** 92, 94, 95, 96, 184, 272, 396 **in doc** IEEE 802.11-17/1439r2**?**