IEEE P802.11
Wireless LANs

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| CR on MIMO phase in MU-MIMO Beamforming |
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Abstract

This document proposes changes on 10.38.9.2.4 MU-MIMO beamforming in Draft D0.2

10.38.9.2.4 MU-MIMO beamforming

10.38.9.2.4.3 MIMO phase

*Change this section as follows*

The initiator shall start the MIMO phase MBIFS following the end of the SISO phase. The MIMO phase is shown in Figure 47 and consists of four subphases, namely, an MU-MIMO BF setup subphase, an MU-MIMO BF training subphase, an MU-MIMO FB poll subphase, and an MU-MIMO selection subphase. Each subphase shall be separated by MBIFS.

In the MU-MIMO BF setup subphase, based on the feedback of the SISO phase, the initiator may exclude some responders from the following MU-MIMO BF training subphase and MU-MIMO FB poll subphase if multiuser interference due to MU-MIMO transmission they suffer is expected to be negligible. If all of the responders are excluded from the following MU-MIMO BF training subphase and MU-MIMO FB poll subphase, these two subphases are not present in the MIMO phase.

In the MU-MIMO BF setup subphase, the initiator shall transmit a BF Setup frame to each intended responder. The BF Setup frame indicates the AID of each remaining responder, the training type (i.e., MU-MIMO training), an unique dialog token identifying MU-MIMO training, the number of simultaneous TX DMG antennas employing orthogonal waveforms, the order in which transmit sectors are trained. To reduce the MU-MIMO training time, the initiator may select a subset of TX sectors for each DMG antenna and the number of receive training fields based on the feedback of the SISO phase from the remaining responders. The initiator should transmit the minimum number of BF Setup frames to reach all responders. All frames transmitted during the MU-MIMO BF setup subphase should be sent using the DMG control mode. A responder whose AID does not match any AID included in the received BF Setup frame can ignore frames transmitted in the following MU-MIMO BF training subphase and MU-MIMO FB Poll subphase.

In the MU-MIMO BF training subphase, the initiator shall transmit BRP frames using the EDMG PHY. Each transmitted BRP frame is used to train one or more transmit sectors and, for each transmit sector, a number of receive AWVs. In each BRP frame the initiator shall include, for each selected sector, TRN-Units in the TRN field for intended responders to perform receive sector training. The number of TRN-Unit included in the TRN field should be the maximum number of receive sectors across all the remaining intended responders based on the feedback from the SISO phase. An initiator may transmit a BRP frame with orthogonal waveforms to train multiple (up to 4) transmit DMG antennas simultaneously through the same BRP frame and hence reduce the training time. The MU-MIMO BF training subphase is performed by setting, for a BRP frame, the TXVECTOR parameter EDMG\_TRN\_LEN to a value greater than zero and the parameter RX\_TRN\_PER\_TX\_TRN to a value greater than one.

In the MU-MIMO FB poll subphase, the initiator shall transmit a BF Poll frame to poll each remaining intended responder to collect MU-MIMO feedback from the preceding MU-MIMO BF training subphase. Each BF Poll frame and BF Feedback frame sent back by the remaining responder shall be separated by SIFS. Each BF Poll frame carries the dialog token that identifies the MU-MIMO training. The BF Feedback frame carries the list of received initiator’s transmit DMG antennas/sectors, each with its corresponding responder’s receive DMG antenna/sector and the associated quality indicated.

In the MU-MIMO selection subphase, the initiator shall transmit BF Selection frame to each responder in the MU group containing the dialog token identifying the MU-MIMO training, one or multiple sets of the MU transmission configurations, and the intended recipient STAs for each MU transmission configuration. The final set of selected responders in the MU group contained in the BF Selection frame does not have to be the same as the initial set of intended responders. The initiator should transmit the minimum number of BF Selection frames to selected responders.

**References:**