IEEE P802.11
Wireless LANs

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| Comment Resolution on CIDs 1951 & 2021 |
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Abstract

This submission proposes resolution of comments received from LB# 231 (TGay Draft 1.0).

- 2 CIDs: 1951, 2021

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Page Number** | **Line Number** | **Comment** | **Proposed Change** | **Resolution** |
| 1951 | 43 | 9 | The new defined Sub elements Measurement Configuration, Extended Measurement Configuration, Extended Measurement Report do not provide direction specific information that makes the measurements less relevant. | Add sector ID indication to the new subelements. Provide indication and reference of sector ID to Directional channel quality, Directional Measurement, Directional Statistics | Rejected- Comment withdrawn by commenter. |
| 2021 | 167 |  | It may be difficult for the initiator/responder to provide the feedback immediately after the BRP training. | allow delayed feedback also in the case of the MIMO feedback, similar to the description within the short brp case | Revised-Agreed in principle. The delayed feedback mechanism for SISO BF shall be adapted to be used for SU-MIMO BF feedback and MU-MIMO BF feedback.TGay editor to make the changes shown in 11-18/995r0 under all headings that include CID 2021. |

**Proposed changes to D1.2 and 18/610r1 (CID 2021):**

**9.4.2.261 MIMO Feedback Control element**

**Change Table 15 as follows (P106L5):**

Table 15—MIMO Feedback Control element format

|  |  |  |
| --- | --- | --- |
| Field | Size (bits) | Meaning |
| Element ID | 8 |  |
| Length | 8 |  |
| Element ID Extension | 8 |  |
| SU/MU | 1 | This field is set to 0 to indicate SU-MIMO beamforming and set to 1 to indicate MU-MIMO beamforming. |
| Link Type | 1 | This field is set to 0 to indicate initiator link and set to 1 otherwise. This field is set to 0 when the SU/MU field is set to 1. |
| Comeback Delay | 3 |  |
| MIMO FBCK-TYPE | 12 |  |
| Reserved | 7 |  |

**Insert the following after P106L7:**

The Comeback Delay field indicates whether MIMO BF feedback is included in the MIMO BF Feedback frame containing the MIMO Feedback Control element or when the EDMG STA transmitting the MIMO Feedback Control element will be ready with MIMO BF feedback. The encoding of this field is defined in Table 11.

**Change the following at P106L8:**

The MIMO FBCK-TYPE field is defined in Figure 64. This field is reserved when the Comeback Delay field is set to a non-zero value.

9.4.2.260 MIMO Poll Control element

**Change Table 14 as follows**

Table 14—MIMO Poll Control element format

|  |  |  |
| --- | --- | --- |
| Field | Size (bits) | Meaning |
| Element ID | 8 |  |
| Length | 8 |  |
| Element ID Extension | 8 |  |
| SU/MU | 1 | This field is set to 0 to indicate SU-MIMO beamforming and is set to 1 to indicate MU-MIMO beamforming.  |
| Poll Type | 1 | This field is set to 1 to indicate training packet poll used in the reciprocal MU-MIMO beamforming and set to 0 to indicate MIMO BF feedback poll used in the SU-MIMO beamforming or the non-reciprocal MU-MIMO beamforming. |
| L-TX-RX | 8 | Indicates the requested number of consecutive TRN-Units in which the same AWV is used in the transmission of the last M TRN subfields of each TRN-Unit. This field is reserved when the Poll Type field is set to 0. |
| Requested EDMG TRN-Unit M | 4 | The value of this field plus one indicates the requested number of TRN subfields in a TRN-Unit transmitted with the same AWV following a possible AWV change. This field is reserved when the Poll Type field is set to 0. |
| Requested EDMG TRN-Unit P | 2 | Indicates the requested number of TRN subfields at the start of a TRN-Unit that use the same AWV. A value of zero indicates zero requested TRN subfields, a value of one indicates one requested TRN subfield, a value of two indicates two requested TRN subfields and a value of three indicates four requested TRN subfields. This field is reserved when the Poll Type field is set to 0. |
| Reserved | 2 |  |

**10.39.9.2.2 SU-MIMO beamforming**

**10.39.9.2.2.3 MIMO phase**

**10.39.9.2.2.3.2 Non-reciprocal MIMO phase**

**Change the following paragragh as follows (P208L24):**

The initiator shall initiate the SU-MIMO BF feedback subphase an MBIFS following the reception of an EDMG BRP-RX/TX packet with the BRP CDOWN field set to 0 from the responder. All frames transmitted during the SU-MIMO BF feedback subphase should be sent using the DMG control mode. In the SU-MIMO BF feedback subphase, the initiator shall send to the responder a MIMO BF Feedback frame with the TA field set to the MAC address of the initiator and the RA field set to the MAC address of the responder. The MIMO BF Feedback frame shall carry the dialog token in the Dialog Token field that identifies the SU-MIMO BF training. In the MIMO Feedback Control element of the MIMO BF Feedback frame, the SU/MU field shall be set to 0 and the Link Type field shall be set to 1. If the MIMO BF Feedback frame contains SU-MIMO BF feedback for responder link, the ComeBack Delay field shall be set to zero. Otherwise the ComeBack Delay field shall be set to a non-zero value which indicates when the initiator will be ready with SU-MIMO BF feedback for responder link. If the ComeBack Delay field is set to zero, in case of channel aggregation, the Channel Aggregation Present subfield of the MIMO FBCK-TYPE field should be set to 1…

The responder shall send a MIMO BF Feedback frame to the initiator a SIFS following reception of a MIMO BF Feedback frame from the initiator. The TA field of the MIMO BF Feedback shall be set to the MAC address of the responder and the RA field shall be set to the MAC address of the initiator. The MIMO BF Feedback frame shall carry the dialog token in the Dialog Token field that identifies the SU-MIMO BF training. In the MIMO Feedback Control element of the MIMO BF Feedback frame, the SU/MU and Link Type fields shall be set to 0. If the MIMO BF Feedback frame contains SU-MIMO BF feedback for initiator link, the ComeBack Delay field shall be set to zero. Otherwise the ComeBack Delay field shall be set to a non-zero value which indicates when the responder will be ready with SU-MIMO BF feedback for initiator link. If the ComeBack Delay field is set to zero, in case of channel aggregation, the Channel Aggregation Present subfield of the MIMO FBCK-TYPE field should be set to 1…

If the ComeBack Delay field of the MIMO BF Feedback frame transmitted by the initiator is set to a non-zero value and the ComeBack Delay field of the MIMO BF Feedback frame received from the responder is set to zero, the initiator shall send a MIMO BF Feedback frame which contains SU-MIMO BF feedback for responder link immediately after its comeback delay has elapsed and the MIMO BF Feedback frame has been received from the responder subject to the DMG channel access rule in DTI (see 10.37).

If the ComeBack Delay field of the MIMO BF Feedback frame transmitted by the initiator is set to a non-zero value and the ComeBack Delay field of the MIMO BF Feedback frame received from the responder is also set to a non-zero value, the intiator shall send a MIMO BF Feedback frame which contains SU-MIMO BF feedback for responder link immediately after initiator’s and responder’s comeback delays have elapsed subject to the DMG channel access rule in DTI. In this case, the responder shall respond with a MIMO BF Feedback frame which contains SU-MIMO BF feedback for initiator link a SIFS following the reception of the MIMO BF Feedback frame which contains SU-MIMO BF feedback for responder link.

If the ComeBack Delay field of the MIMO BF Feedback frame transmitted by the initiator is set to zero and the ComeBack Delay field of the MIMO BF Feedback frame received from the responder is set to a non-zero value, the initiator shall send a MIMO BF Poll frame with the SU/MU and Poll Type fields set to 0 to the responder immediately after the responder’s comeback delay has elapsed subject to the DMG channel access rule in DTI. In this case, the responder shall respond with a MIMO BF Feedback frame which contains SU-MIMO BF feedback for initiator link a SIFS following the reception of the MIMO BF Poll frame.

**10.38.9.2.2.3.3 Reciprocal MIMO phase**

**Change the following paragragh as follows (P2110L1):**

The responder shall initiate the SU-MIMO BF feedback subphase an MBIFS following the reception of an EDMG BRP-RX/TX packet with the BRP CDOWN field set to 0 from the initiator. The responder shall send a MIMO BF Feedback frame (see 9.6.22.6) to the initiator with the TA field set to the MAC address of the responder and the RA field set to the MAC address of the initiator. The MIMO BF Feedback frame shall carry the dialog token in the Dialog Token field that identifies the SU-MIMO BF training. In the MIMO Feedback Control element (see 9.4.2.261) of the MIMO BF Feedback frame, the SU/MU and Link Type field shall be set to 0. If the MIMO BF Feedback frame contains SU-MIMO BF feedback for initiator link, the ComeBack Delay field shall be set to zero. Otherwise the ComeBack Delay field shall be set to a non-zero value which indicates when the responder will be ready with SU-MIMO BF feedback for initiator link. If the ComeBack Delay field is set to zero, in case of channel aggregation, the Channel Aggregation Present subfield of the MIMO FBCK-TYPE field should be set to 1….

If the ComeBack Delay field of the MIMO BF Feedback frame received from the responder is set to a non-zero value, the initiator shall send a MIMO BF Poll frame with the SU/MU and Poll Type fields set to 0 to the responder immediately after the responder’s comeback delay has elapsed subject to the DMG channel access rule in DTI. In this case, the responder shall respond with a MIMO BF Feedback frame which contains SU-MIMO BF feedback for initiator link a SIFS following the reception of the MIMO BF Poll frame.

**10.39.9.2.3 MU-MIMO beamforming**

**10.39.9.2.3.3 MIMO phase**

**10.39.9.2.3.3.2 Non-reciprocal MIMO phase**

**Change the following paragragh as follows (P214L50):**

The initiator shall initiate the MU-MIMO BF feedback subphase a MBIFS following the transmission of the EDMG BRP RX-TX packet with the BRP CDOWN field set to 0. In the MU-MIMO BF feedback subphase, the initiator shall transmit a MIMO BF Poll frame to poll each remaining responder to collect MU-MIMO BF feedback from the preceding MU-MIMO BF training subphase. The MIMO BF Poll frames should be sent using the DMG control mode. The TA field of each MIMO BF Poll frame shall be set to the BSSID of the initiator and the RA field shall be set to the MAC address of the corresponding responder. Each MIMO BF Poll frame carries the dialog token in the Dialog Token field that identifies the MU-MIMO BF training. In the MIMO Poll Control element of each MIMO BF Poll frame, the SU/MU field shall be set to 1 and the Poll Type field shall be set to 0. Upon receiving a MIMO BF Poll frame for which a remaining responder is the addressed recipient, the responder shall transmit a MIMO BF Feedback frame to the initiator. The RA field of the MIMO BF Feedback frame shall be set to the BSSID of the initiator and the TA field shall be set to the MAC address of the responder. The MIMO BF Feedback frame carries the dialog token in the Dialog Token field that identifies the MU-MIMO BF training. In the MIMO Feedback Control element of the MIMO BF Feedback frame, the SU/MU field shall be set to 1 and the Link Type field shall be set to 0. If the MIMO BF Feedback frame contains MU-MIMO BF feedback, the ComeBack Delay field shall be set to zero. Otherwise the ComeBack Delay field shall be set to a non-zero value which indicates when the responder will be ready with MU-MIMO BF feedback.

If the ComeBack Delay field is set to zero, in case of channel aggregation, the Channel Aggregation Present subfield of the MIMO FBCK-TYPE field should be set to 1. The Number of TX Sector Combinations Present subfield of the MIMO FBCK-TYPE field shall indicate the number of transmit sector combinations, $N\_{tsc}$. The EDMG Channel Measurement Feedback element (see 9.4.2.253) in the MIMO BF Feedback frame shall indicate $N\_{tsc}$ transmit sector combinations in the EDMG Sector ID Order field and the BRP CDOWN field, which are obtained through the channel measurement data captured from the MU-MIMO BF training subphase. The Channel Measurement Feedback element (see 9.4.2.136) in the MIMO BF Feedback frame shall indicate SNRs corresponding to $N\_{tsc}$ transmit sector combinations in the SNR field. If the Channel Measurement Requested subfield of the MIMO FBCK-REQ field in the MIMO BF Setup frame received from the initiator in the preceding MU-MIMO BF setup subphase is 1, the Channel Measurement Present subfield of the MIMO FBCK-TYPE field in the MIMO Feedback Control element shall be set to 1 and the Channel Measurement Feedback element shall contain the channel measurements corresponding to $N\_{tsc}$ transmit sector combinations in the Channel Measurement field. If the Tap Delay Requested subfield of the MIMO FBCK-REQ field in the MIMO BF Setup frame received from the initiator in the preceding MU-MIMO BF setup subphase is 1, the Tap Delay Present subfield of the MIMO FBCK-TYPE field in the MIMO Feedback Control element shall be set to 1 and the EDMG Channel Measurement Feedback element shall contain tap delays corresponding to the $N\_{tsc}$ transmit sector combinations in the Tap Delay field.

If the ComeBack Delay field of the MIMO BF Feedback frame received from the responder is set to a non-zero value, the initiator shall send a MIMO BF Poll frame to the responder immediately after the responder’s comeback delay has elapsed subject to the DMG channel access rule in DTI; in this case, the responder shall respond with a MIMO BF Feedback frame which contains MU-MIMO BF feedback.

Each MIMO BF Poll frame and MIMO BF Feedback frame shall be separated by SIFS.

**10.39.9.2.3.3.3 Reciprocal MIMO phase**

**Change the following paragragh as follows (P217L21):**

The initiator shall initiate an MU-MIMO BF training subphase a MBIFS following the transmission of the MIMO BF Setup frame. In the MU-MIMO BF training subphase, the initiator shall transmit a MIMO BF Poll frame (see 9.6.22.5) to each remaining responder in the MU group. Each MIMO BF Poll frame should be sent using the DMG control mode or using a non-EDMG duplicate PPDU transmitted with the DMG control modulation class. The TA field of each MIMO BF Poll frame shall be set to the BSSID of the initiator and the RA field shall be set to the MAC address of the corresponding responder. Each MIMO BF Poll frame carries the dialog token in the Dialog Token field that identifies the MU-MIMO BF training. In the MIMO Poll Control element (see 9.4.2.260) of each MIMO BF Poll frame, the SU/MU and Poll Type fields shall be set to 1. ….