IEEE P802.11
Wireless LANs

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| Comment Resolution on EDMG Channel Measurement Feedback |
| Date: 2018-1-11 |
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Abstract

This submission proposes resolution of comments on EDMG channel measurement feedback received from LB# 231 (TGay Draft 1.0).

- 5 CID: 1154, 1974, 1995, 1821, 1977

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Page** | **Line** | **Clause** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 1154 | 47 | 12 | 9.4.2.130 | DMG Beacons, SSW frame, short SSW packet and EDMG BRP-TX packet can be used in TXSS. Depending on the TXSS packet type, the feedback information included in EDMG Channel Measurement Feedback element should be different. Using 1-bit Short SSW Packet Used field is not enough to differentiate different TXSS packet types. | a contribution will be submitted for this purpose. | Revised.TGay editor to make the changes shown in 11-18/0092r0 under all headings that include CID 1154. |
| 1974 | 68 | 3 | 9.4.2.253 | The Sector ID order subfield should indicate also AWV IDs | Add AWV ID to the list of indications in the EDMG Sector ID order subfield | Revised.TGay editor to make the changes shown in 11-18/0092r0 under all headings that include CID 1974. |
| 1995 | 68 | 23 | 9.4.2.253 | Typo in "BRP CODWN" | Change to "BRP CDOWN". | Accepted.TGay editor to make the changes shown in 11-18/0092r0 under all headings that include CID 1995. |
| 1821 | 68 | 23 | 9.4.2.253 | "CODWN\_i" (here, "\_i" means subscript i) must be "CDOWN\_i". | The Sector ID order subfield should indicate also AWV IDs | Accepted.TGay editor to make the changes shown in 11-18/0092r0 under all headings that include CID 1821. |
| 1977 | 67 | 1 | 9.4.2.253 | EDMG Channel Measurement Feedback element - size of the element may not be a multiple of 8 - padding at the end is needed | Add a padding to octets at the end of table 7 | Accepted.TGay editor to make the changes shown in 11-18/0092r0 under all headings that include CID 1977. |

**Discussion:**

* When the Short SSW Packet Used field is added to the DMG Beam Refinement element, only DMG Beacon frame, SSW frame or Short SSW Packet can be used in sector sweep. So one-bit Short SSW Packet Used field is enough to differentiate feedback content contained in the EDMG Channel Measurement Feedback element in the BRP frame for different frames used in the last sector sweep.
* However, after BRP TXSS is introduced into 11ay, in addition to DMG Beacon frame, SSW frame or Short SSW packet, BRP frame can also be used in sector sweep. Furthermore, when BRP frame is used in sector sweep, the feedback content contained in the EDMG Channel Measurement Feedback element is different from that when DMG Beacon frame, SSW frame or Short SSW packet is used.
* We propose the one-bit Short SSW Packet Used field in the DMG Beam Refinement element is replaced by a **two-bit Sector Sweep Frame Type field**.

**Proposed changes to D1.0:**

* + - 1. DMG Beam Refinement element
1. ***L10P47: Change Figure 9-512 as follows (CID#1154)***

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B7 | B8 B15 | B16 | B17 | B18 | B19 | B20 | B21 B26 | B27 B28 | B29 B33 |
|  | Element ID | Length | Initiator | TX-train-response | RX-train-response | TX-TRN-OK | TXSS-FBCK-REQ | BS-FBCK | BS-FBCK Antenna ID | FBCK-REQ |
| Bits: | 8 | 8 | 1 | 1 | 1 | 1 | 1 | 6 | 2 | 5 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B34 B51 | B52 | B53 | B54 B55 | B56 B60 | B61 |
|  | FBCK-TYPE | MID Extension | Capability Request | Reserved | BS-FBCK MSB | BS-FBCK Antenna ID MSB |
| Bits: | 18 | 1 | 1 | 2 | 5 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B62 B65 | B66 | B67 | B68 B69 | B70 | B71 | B72 | B73 B79 |
|  | Number of Measurements MSB | EDMG Extension Flag | EDMG Channel Measurement Present | Sector Sweep Frame Type | DBFFBCK REQ | Aggregation Requested  | Aggregation Present | Reserved |
| Bits: | 4 | 1 | 1 | 2 | 1 | 1 | 1 | 7 |

***2. L5P49: Change the following paragraph (CID#1154)***

The Sector Sweep Frame Type field is set to 0 to indicate that DMG Beacon frames or SSW frames are used in the last sector sweep; set to 1 to indicate that Short SSW packets are used in the last sector sweep; and set to 2 to indicate that BRP frames are used in the last sector sweep. The value of 3 is reserved.

* + - 1. EDMG Channel Measurement Feedback element

***3. L1P67: Change this clause as follows (CID#1154, #1974, #1995, #1821, #1977):***

1. —EDMG Channel Measurement Feedback element format

|  |  |  |
| --- | --- | --- |
| Field | Size | Meaning |
| Element ID | 8 bits | Defined in 9.4.2.1 |
| Length | 8 bits | Defined in 9.4.2.1 |
| Element ID Extension | 8 bits | Defined in 9.4.2.1 |
| EDMG Sector ID Order | Sector ID1/CDOWN1/AWV Feedback ID1 | 11 bits |  |
| TX Antenna ID1 | 3 bits |  |
| RX Antenna ID1 | 3 bits |  |
| Sector ID2/CDOWN2/AWV Feedback ID2 | 11 bits |  |
| TX Antenna ID2 | 3 bits |  |
| RX Antenna ID2 | 3 bits |  |
| … | … |  |
| Sector IDNmeas/CDOWNNmeas/AWV Feedback IDNmeas | 11 bits |  |
| TX Antenna IDNmeas | 3 bits |  |
| RX Antenna IDNmeas | 3 bits |  |
| BRP CDOWN | BRP CDOWN1 | 6 bits |  |
| BRP CDOWN2 | 6 bits |  |
| … | … |  |
| BRP CDOWNNmeas | 6 bits |  |
| Tap Delay | Relative Delay Tap #1 | 12 bits | The delay of tap #1 in units of TC/NCB relative to the path with the shortest delay detected, where NCB is the integer number of contiguous 2.16 GHz channels over which the measurement was taken. |
| Relative Delay Tap #2 | 12 bits | The delay of tap #2 in units of TC/NCB relative to the path with the shortest delay detected, where NCB is the integer number of contiguous 2.16 GHz channels over which the measurement was taken. |
| … | … |   |
| Relative Delay Tap #Ntaps | 12 bits | The delay of tap #Ntaps in units of TC/NCB relative to the path with the shortest delay detected, where NCB is the integer number of contiguous 2.16 GHz channels over which the measurement was taken. |
| Additional EDMG Sector ID Order | Sector ID1/CDOWN1/AWV Feedback ID1 | 11 bits |  |
| TX Antenna ID1 | 3 bits |  |
| RX Antenna ID1 | 3 bits |  |
| Sector ID2/CDOWN2/AWV Feedback ID2 | 11 bits |  |
| TX Antenna ID2 | 3 bits |  |
| RX Antenna ID2 | 3 bits |  |
| … | … |  |
| Sector IDNmeas/CDOWNNmeas/AWV Feedback IDNmeas | 11 bits |  |
| TX Antenna IDNmeas | 3 bits |  |
| RX Antenna IDNmeas | 3 bits |  |
| Additional BRP CDOWN | BRP CDOWN1 | 6 bits |  |
| BRP CDOWN2 | 6 bits |  |
| … | … |  |
| BRP CDOWNNmeas | 6 bits |  |
| Additional Tap Delay | Relative Delay Tap #1 | 12 bits |  |
| Relative Delay Tap #2 | 12 bits |  |
| … | … |  |
| Relative Delay Tap #Ntaps | 12 bits |  |
| Padding |  | 0~7 bits | Zero padding to make the EDMG Channel Measurement Feedback element length a multiple of 8 bits |

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1.

When the EDMG Channel Measurement Feedback element is included in a BRP frame, the EDMG Sector ID Order subfield indicates the TX sector IDs, TX antenna IDs and RX antenna IDs corresponding to the SNRs in the SNR subfield when the SNR Present subfield is equal to 1 and the Sector Sweep Frame Type subfield is equal to 0 in the DMG Beam Refinement element contained in the frame. The EDMG Sector ID Order subfield indicates the CDOWN values and RX antenna IDs corresponding to the SNRs in the SNR subfield when the SNR Present subfield is equal to 1 and the Sector Sweep Frame Type subfield is equal to 1 in the DMG Beam Refinement element contained in the frame. The TX Antenna ID subfield per channel measurement feedback data is reserved when the Sector Sweep Frame Type subfield is equal to 1 in the DMG Beam Refinement element contained in the frame.

When the EDMG Channel Measurement Feedback element is included in a MIMO BF Feedback frame or when the EDMG Channel Measurement Feedback element is included in a BRP frame with the Sector Sweep Frame Type field of the DMG Beam Refinement element contained in the frame set to 2 the EDMG Sector ID Order subfield indicates AWV feedback IDs, TX antenna IDs and RX antenna IDs; and the BRP CDOWN subfield indicates BRP CDOWN values. The EDMG Sector ID Order field and the BRP CDOWN field can be divided into *Nmeas* SISO ID subsets, each comprising an AWV feedback ID, a TX antenna ID, a RX antenna ID and a BRP CDOWN value. Specifically, the *i* SISO ID subset (*i* = 1,2,…, *Nmeas*) comprises the values of the AWV feedback IDi, TX antenna IDi, RX antenna IDi and BRP CDOWNi subfields, where the AWV feedback IDi subfield indicates the AWV for a TX DMG antenna having its TX antenna ID equal to the TX antenna IDi value, which is used to transmit an EDMG BRP-RX/TX packet or EDMG BRP-TX packet with the BRP CDOWN field set to the BRP CDOWNi value. Every *NTX*×*NRX* consecutive SISO ID subsets constitute a set which corresponds to a specific TX sector combination (or equivalently a specific TX-RX AWV configuration). Each TX sector combination comprises a single TX sector for each of *NTX* TX DMG antennas. *Ntsc* TX sector combinations are ranked in the decreasing order of an implementation dependent metric, where *Ntsc* is the value of the Number of TX Sector Combinations Present field in the accompanying MIMO Feedback Control element (see 9.4.2.261) of the MIMO BF Feedback frame or equals to the number of measurements, which is specified by the Number of Measurements field and the Number of Measurements MSB field of the accompanying DMG Beam Refinement element (see 9.4.2.130) of the BRP frame, divided by (*NTX*×*NRX*). Specifically, the *j* set (*j* = 1, 2, …, *Ntsc*), which corresponds to the *j* TX-RX AWV configuration, comprises the ((*j*-1)×*NTX*×*NRX*+1) SISO ID subset to the (*j*×*NTX*×*NRX*) SISO ID subset. Assume that the MIMO channel corresponding to the *j* TX-RX AWV configuration is defined by:

$$H\_{j}=\left[\begin{matrix}h\_{1,1}^{(j)}&\cdots &h\_{1,N\_{RX}}^{(j)}\\\vdots &\ddots &\vdots \\h\_{N\_{TX},1}^{(j)}&\cdots &h\_{N\_{TX},N\_{RX}}^{(j)}\end{matrix}\right]$$

(*m* =1,2,…, *NTX* and *n* = 1,2,…, *NRX*) represents the channel between the *m* TX DMG antenna and the *n* RX DMG antenna and is indicated by the ((*j*-1)×*NTX*×*NRX*+(*m*-1)×*NRX*+*n*) SISO ID subset. In particular, for the *j* TX sector combination (*j* = 1, 2, …, *Ntsc*), the AWV used by the m TX antenna (*m* =1,2,…, *NTX*) is indicated by the values of the AWV feedback IDl and BRP CDOWNl subfields, where *l* = ((*j*-1)×*NTX*×*NRX*+(*m*-1)×*NRX*+*n* and *n* is any integer between 1 and *NRX*.

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**SP**: Do you agree to accept the comment resolution as proposed in IEEE 802.11-18/0092r0?