IEEE P802.11
Wireless LANs

|  |
| --- |
| DMG Bi Static Sounding and BRP Frame |
| Date: 2022-01-25 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Assaf Kasher | Qualcomm |  |  | akasher@qti.qualcomm.com |
|  |  |  |  |  |

Abstract

This document presents draft PDT text for DMG Bi Static Sounding and BRP Frame

**Discussion**

(*7.3.5.2.2 Sounding*

(Motion 45, 21/1865r1) EDMG transmitter initiator bistatic sensing is based on a BRP Request frame in a BRP-RX/TX, BRP-TX, BRP-RX PPDU (as defined in Clause 28 of 802.11) and a BRP Response frame. Feedback for DMG sensing measurement is carried in the BRP Response frame:

* Feedback may be delayed
* Feedback may be aggregated (single feedback for some measurements, to facilitate Doppler measurement)

(Motion 46, 21/1865r1) EDMG/DMG sensing receiver initiator bistatic sensing is based on a BRP Request frame that includes a request for the sensing responder to transmit a BRP-RX/TX, BRP-TX, BRP-RX PPDU (as defined in Clause 28 of 802.11).

***TGbf Editor: insert the following text as clause 9.5.4***

**9.5.4 BRP Request field**

***Editor: Change figure 9-1074 BRP Request field format as follows:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 B16 |
|  | L-RX | TX-TRN-REQ | MID-REQ | BC-REQ | MID-Grant | BC-Grant | Chan-FBCK-CAP | TX Sector ID |
| Bits: | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B17 B24 | B25 B26 | B27 | B28 | B29 | ~~B29~~B30 B31 |
|  | Other\_AID | TX DMG Antenna ID | EDMG-SHORT-BRP | EDMG-SHORT-FBCK | DMG Sensing | Reserved |
| Bits: | 8 | 2 | 1 | 1 | 1 | ~~3~~2 |

***Editor: Insert the following text at the end of subclause 9.5.4. BRP Request field***

The DMG Sensing subfield is set to 1 to indicate that the PPDU that carries the BRP frame is used for sensing and will not be use beamforming training.

***TGbf Editor: insert the following text as new element 9.4.2.xx1***

***Editor: insert the following as new subclause 9.4.2.xx1***

**9.4.2.xx1 BRP Sensing element**

The BRP Sensing element is sent in a BRP frame if the DMG Sensing subfield in the BRP Request field is set to 1.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element Id | Length | Element Id Extension | UID/AID | Measurement Setup Id | Measurement Burst Id | Sensing Instance Number | First Beam Index | Report Control |
| octets: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

The Element ID, Element Length, Element Id Extension fields are defined in 9.4.2.1 (General).

The UID/AID, Measurement Setup Id, Measurement Burst Id and Instance Number fields identify the sensing measurement and the instance. The First Beam Index field is an index that indicates the first beam to be used in the transmission of the TRN field of the PPDU that carries the BRP frame as defined in the TX Beam List in the DMG Sensing Measurement Setup element.

The Report Control field is shown in Figure 1.

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B2 | B3 B4 | B5 B7 |
|  | Report Type | Report Delay | Reserved |
| bits: | 3 | 2 | 3 |

Figure 1 - Report Control field format

The interpretation of the Report Type subfield is TBD.

The Report Delay field takes values from Table 1:

Table 1 - Report Delay Values

|  |  |
| --- | --- |
| Value | Interpretation |
| 0 | No report in this instance |
| 1 | One report in instance |
| 2 | Report of more than one instance |

***TGbf Editor: insert the following as subclause 9.6.21.3***

**9.6.21.3 BRP Frame format**

***Editor: Insert the following as the last row in table 9-571 BRP frame Action field format***

|  |  |
| --- | --- |
| 12 | BRP Sensing element |

 ***Editor: Insert the following at the end of 9.6.21.3***

The BRP Sensing element is defined in 9.4.2.xx1

***TGbf Editor: replace subclause11.21.18.3.5.3 with the following***

**11.21.18.3.5.3 DMG Bi-Static Measurement instance.**

**11.21.18.3.5.3.1 General**

A transmit initiator DMG Bi-Static sensing measurement instance is composed of one or more BRP frames with TRN field transmitted by the initiator followed after a BRPIFS with a BRP frame from the responder. In a transmit initiator instance the measurement covers the number of transmit AWV combinations indicated by the Num Tx Beams Per Instance field in the scheduling subelement of the DMG Sensing Measurement Setup element. Per each of these AWV combinations, all the AWV combinations indicated in RxBeamList subelement of the responder are covered.

The initiator shall choose the format of TRN field (by setting TX-VECTOR parameters: TRN\_SEQ\_LENGTH, EDMG\_TRN\_LEN, RX\_TRN\_PER\_TX\_TRN, EDMG\_TRN\_P, EDMG\_TRN\_M, EDMG\_TRN\_N) in each of the transmitted BRP frames in a way that it is compatible with the responder capabilities and covers all the desired Tx and Rx beams. For example, if the number Rx beams is small, BRP RX/TX PPDUs may be used. If the number of Rx beams is large, a BRP RX PPDU can be used per each Tx Beam. If there is a single Rx beam, a BRP TX PPDU may be used, covering several TX beams. If either the initiator or responder is a non-EDMG STA or the responder have set to 1 the DMG TRN RX Only Capable field in the Beamforming Capability subelement of the EDMG Capabilities element, the initiator shall use BRP-RX PPDUs unless the number of Rx Beams is 1 in which case BRP-TX PPDUs should be used. In each BRP frame, the First Beam Index field indicates which is the first beam that is used in the TRN field of the PPDU. The initiator will go through the Num Tx Beams Per Instance Tx beams. If the Repeat per Instance field of the Scheduling subelement ( is greater than 1, the initiator will cover the Num Tx Beams Per Instance Tx Beams in instance times, going to the first one after the last one. All BRP frames transmitted by the initiator shall be separated by SIFS. The responder shall respond after BRPIFS with a BRP frame containing a report. The report may be based on Channel Measurement Feedback Elements or DMG Sensing Report elements. The presence and type of the report is indicated by the Report Control field of the DMG Sensing Report Element.

A receive initiator DMG Bi-Static measurement instance is composed of a BRP frame transmitted by the initiator followed after a BRPIFS with one or more BRP Frames with TRN field transmitted by the responder. The first transmit beam to be used by the responder is indicated by the First Beam Index of the BRP Sensing element of the BRP frame sent by the initiator. The responder shall start transmitting using this beam (indicating it in the same field in the first BRP frame it transmits. The responder shall continue with the number of Tx Beams indicated in the Num Tx Beams Per Instance field in the scheduling subelement of the DMG Sensing Measurement Setup element. For each of these beams, it will allow the initiator to go through all the beams indicated in its RxBeamList. The method to allow these transmit/receive beam combination is the same as in the transmit initiator DMG Bi-Static measurement instance. All BRP frames transmitted by the responder shall be separated by SIFS. There is not reporting in receive initiator DMG Bi-Static measurement instance.

**11.21.18.3.5.3.1 Coordinated DMG Bi-Static Measurement instance.**

A coordinated DMG Bi-Static Measurement instance is initiated by a set of DMG Bi-Static Sensing requests answered by DMG sensing responses. It is then followed by a set of DMG-Bi-Static Measurement instances.

In the coordinated bistatic instance of one or more sensing responders the following rules shall apply:

* Number of the sensing responders in each instance of the same DMG Measurement Setup ID may be different
* The sensing initiator shall send a DMG Bistatic Instance Request frame to each sensing responder it invites to participate in the sensing instance
* The sensing responder shall respond with a DMG Sensing Response frame to the sensing initiator within SIFS time
* The sensing responder that responded to the sensing initiator shall remain active to receive the BRP PPDU.
* The order of sounding is indicated in the DMG Bistatic Instance Request Frame

**References:**

<https://mentor.ieee.org/802.11/dcn/21/11-21-0504-07-00bf-specification-framework-for-tgbf.docx>