IEEE P802.11
Wireless LANs

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| LB240 Resolution of CID1295 |
| Date: 2019-09-10 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Solomon Trainin | Qualcomm |  |  | strainin@qti.qualcomm.com |
| Assaf Kasher | Qualcomm |  |  | akasher@qti.qualcomm.com |
| Alecsander Eitan | Qualcomm |  |  | eitana@qti.qualcomm.com |

Abstract

Resolution of CID1295, 1059

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| 1059 | 37.07 | 9.4.2.127 | Names mixup related to DMG Capabilities element. In some parts it is DMG in other DMG/EDMG. In Table 9.547a there is no DMG or EDMG in the names but in the following text explaining the fields the names are with DMG/EDMG. | Update the entier section 9.4.2.127 with consistent names | **Revise as in 11-19-1537** |

Discussion:

The text in 9.4.2.127 refers to DMG/EDMG where in many cases DMG STA is OK because it also covers EDMG STAs. However, it may be better to use the terms PDMG/PEDMG STA, however these terms are defined only by a capability bits (DMG Ranging Measurement, EDMG Ranging Measurement), and no behaviour is realy dependent on this bits. We propose to remove these bits, and define PDMG and PEDMG by capability bits that actual control protocol behaviour.

***TGaz Editor: Modify the text in P54L5-6 (9.4.2.127.9) as follows:***

The DMG Direction Measurement Capabilities field advertises capabilities for performing direction measurement as part of PDMG or PEDMG exchanges

***TGaz Editor: Modify the text in P54L9-25 (9.4.2.127.9) as follows:***

A PDMG STA sets the AOA TX Capability subfield to 1 to indicate the ability to attach a TRN field to an FTM frame for the purpose of allowing the receiver of that frame to perform Angle of Arrival (AOA) estimation.

A PDMG STA sets the AOA RX Capability subfield to 1 to indicate the ability to estimate the AOA based on a TRN field attached to an FTM frame.

A PDMG STA sets the AOD TX Capability subfield to 1 to indicate the ability to attach a TRN field, possibly with different antenna settings to different TRN subfields, to an FTM frame, or the purpose of allowing the responder to estimate the Angle of Departure (AOD) of the packet.

A PDMG STA sets the AOD RX Capability subfield to 1 to indicate the ability to estimate the AOD based on a TRN field attached to a Fine Timing Measurement frame and send a report.

A PDMG STA sets the AOD Feedback Best TRN subfield to 1 to indicate the ability to send a best TRN subfield index, based on measurement on a TRN field sent by the receiver STA, for the purpose of AOD estimation.

A PDMG STA sets the AOD Channel Measurement Feedback subfield to 1 to indicate the ability to send a Channel Measurement Feedback element based on measurement on a TRN field sent by the peer RSTA, for the purpose of AOD estimation

***TGaz Editor: Modify the text in P55L15 as follows:***

For Secure PEDMG ranging, the Secure ToF Measurement subfield is set to 1 by an ISTA to request a

***TGaz Editor: Modify the text in P55L15 as follows:***

exchange. Otherwise the Secure ToF Measurement field is set to 0. In cases other than Secure PEDMG ranging, the Secure ToF Measurement subfield is reserved.

***TGaz Editor: in table 9-618 replace “EDMG Ranging Priority” with “PEDMG Ranging Priority”***

***TGaz Editor: Modify the text in P59L12 as follows:***

For PEDMG ranging, the PEDMG Ranging Priority subfield of the Fine Timing Measurement Parameters field of the Fine Timing Measurement Parameters element in the initial Fine Timing Measurement Request frame contains the ISTA’s Ranging Priority request which indicates the time sensitivity of a ranging operation, and it is set according to Table 9-281c. In cases other than PEDMG ranging, PEDMG Ranging Priority subfield is reserved

***TGaz Editor: in P59L19-25 replace “EDMG Ranging” with “PEDMG Ranging” (including figure caption)***

***TGaz Editor: in P60L2-6 replace “EDMG Ranging” with “PEDMG Ranging” (including figure caption)***

***TGaz Editor: in P104L35-46, P105L1-2 change the text as follows:***

A PDMG STA, capabale of performing PDMG Ranging,: shall include a DMG Direction Measurement Capabilities field in the DMG Capabilities element and set one of the first 4 subfields (AOA TX Capability, AOA RX Capability, AOD TX Capability, AOD RX Capability) of this field to 1 Otherwise it shall set the Multi User Range Measurement field of the Extended Capabilities element to 0.

A PEDMG STA capable of EDMG Ranging, Shall set at least one of the following fields to 1:

* The First Path Training Supported field of the Beamformign Capability subelement of the EDMG capabilities element.
* The LOS Assesment TX or LOS Assesment RX subfield of the DMG Direction measurement Capabillites field of the DMG capabilities element
* The Secure ToF supported field of the Beamformign Capability subelement of the EDMG capabilities element.

It may also set the EDMG OFDM Range Measurement field of the Beamforming Capabilities subelement to 1 if it additionally supports OFDM ranging. A STA that additionally supports Direction Measurement shall include a DMG Direction Measurement Capabilities field in the DMG Capabilities element and set one of the first 4 subfields (AOA TX Capability, AOA RX Capability, AOD TX Capability, AOD RX Capability) of this field to 1.

***TGaz Editor: in P106L35 replace “EDMG Ranging” with “PEDMG Ranging”***

***TGaz Editor: in P108L37 replace “EDMG Ranging” with “PEDMG Ranging”***

***TGaz Editor: in P151L13 replace “EDMG Ranging” with “PEDMG Ranging”***

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| **CID** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution**  |
| 1295 | 10 | 1 | 1 | No clear method for DMG/EDMG devices to perform FTM without association | Add a method of DMG/EDMG devices to perform FTM measurement without association. | **Revise** |

Discussion:

DMG/EDMG STAs may complete partial (Tx sector) or full (Tx Sector and Rx sector) beamforming prior to association. So, no problem to perform FTM before association.

There are capabilities that shall be known before association to enable the FTM and the ranging protocols. The capabilities should be included in the beacon:

-The FTM support is indicated by Fine Timing Measurement Responder field and Fine Timing Measurement Initiator Field of the Extended Capabilities element.

-The support of the ranging protocol is indicated by DMG Range Measurement field and EDMG Range Measurement field of the of the Extended Capabilities element.

- “PDMG/PEDMG supporting APs in the area” field in the Extended Capabilities element indicates that APs providing location services using PDMG/PEDMG are in the vicinity of the AP.

In the DMG, the beacon transmission is very time consuming because it shall be sent multiple times to cover the area. In the 802.11ad we tried to optimize size of the information sent in the beacon to minimize overhead and not to use the Extended capabilities element that is long and many of the options indicated in the element is not applicable for DMG.

The solution is adding the mentioned capabilities to the DMG Capabilities element that is optimized for DMG.

***TGaz editor: Add the following text before 9.4.2.127 (P20L16);***

*Editor in all occurances replace*

***“***Fine Timing Measurement Responder field of the Extended Capabilities element” by

“Fine Timing Measurement Responder field of the Extended Capabilities element for non-DMG STA or the Fine Timing Measurement Responder subfield of the DMG Capabilties element for DMG STA”

“Fine Timing Measurement Initiator field of the Extended Capabilities element” by

“Fine Timing Measurement Initiator field of the Extended Capabilities element for non-DMG STA or the Fine Timing Measurement Initiator subfield of the DMG Capabilties element for DMG STA”

***TGaz editor: in all occurances replace***

“DMG Range Measurement field of the Extended Capabilities element” by “DMG Range Measurement subfield of the DMG Capabilities element”

“EDMG Range Measurement field of the Extended Capabilities element” by “EDMG Range Measurement subfield of the DMG Capabilities element”

“PDMG/PEDMG supporting APs information field to 0 in the Extended Capabilities element” by “PDMG/PEDMG supporting APs information subfield to 0 in the DMG Capabilities element”

“PDMG/PEDMG supporting APs information field to 1 in the Extended Capabilities element” by “PDMG/PEDMG supporting APs information subfield to 1 in the DMG Capabilities element”

*P44*

***TGaz editor in the Table 9-153—Extended Capabilities element remove the following rows***

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***TGaz Editor: Add a column to the figure in P46L1 (9.4.2.147)***

|  |  |  |
| --- | --- | --- |
|  | DMG Direction Measurement Capabilities  | DMG Fine Timing and Range Measurement capability Information |
| Octets:  | 1 | 1 |

***TGaz Editor: Add the following subclause after 9.4.2.127.9 (P47L9)***

*Editor insert the following new subclause:*

**9.4.2.127.10 DMG Fine Timing and Range Measurement Capabilty Information field**

The DMG Fine Timing and Range Measurement Capabilty Information field advertises capabilities for performing Fine Timing Measurements and Range Measurements as part of DMG or EDMG exchanges.

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| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B5 B7 |
|  | Fine TimingMeasurementResponder | Fine TimingMeasurementInitiator | PDMG/PEDMG supporting APs in the area | Reserved |
| Bits: | 1 | 1 | 1 | 5 |

**Figure xyz - DMG Fine Timing and Range Measurement Capabilty Information field format**

A Fine Timing Measurement Responder is defined in 9.4.2.26 (Extended Capabilities element).

A Fine Timing Measurement Responder is defined in 9.4.2.26 (Extended Capabilities element).

A DMG STA in the role of AP sets the PDMG/PEDMG supporting APs in the area field to 1 to indicate that APs providing location services using PDMG/PEDMG are in the vicinity of the AP STA and sets it to 0 otherwise. Definition of vicinity is implementation dependent. The AP may be capable of providing information about those PDMG/PEDMG. The subfiled is reserved if the DMG STA is not in the role of AP.

**References:**

1. P802.11az/D1.3, August 2019
2. IEEE P802.11ay/D4.1, August 2019
3. IEEE P802.11-REVmd/D2.4, August 2019