IEEE P802.11  
Wireless LANs

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| LB240 First Path Indication CIDs | | | | |
| Date: 2019-07-01 | | | | |
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Abstract

This document proposes resolutions to CIDs related to first path beamforming indication: 2381, 1440, 1080, 1240, 1239, 2348, 2345, 2346, 1442

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| --- | --- | --- | --- | --- | --- |
| 2381 | 119.00 | 11.22.6.4.7.1 | The below sentence shall be removed   "An PEDMG ISTA may send a Fine Timing Measurement Request 14 frame with the trigger set to 2 only if the RSTA has set the First Path Training Supported subfield to 1 in the Beamforming field of the EDMG capabilities element and the ISTA and RSTA have 16 performed beamforming training for first path as defined in 10.39.9.6"   as it contradicts to the early statement "For DMG and EDMG, an FTM session shall be preceded by a first path beamforming training as 6 described in 10.39.9.6 First Path Beamforming Training." which implicitly means the all PEDMG devices support FPBT. | As suggested. | Revise as in  11-19-1074 |
| 1440 | 119.05 | 11.24.6.4.7 | "For DMG and EDMG, an FTM session shall be preceded by a first path beamforming training as described in 10.39.9.6 First Path Beamforming Training." First path beamforming is only specified for EDMG, and can only be perfomerd if EDMG Capabilities allow. | Either correct the description or completely remove as this is again mentioned (with correct behaviour) in 11.22.6.4.7.1 | Accept |
| 1080 | 79.25 | 11.22.6.1 | The section "For DMG and EDMG, an FTM session shall be preceded by a first path beamforming training as described in 10.39.9.6 First Path Beamforming Training." in 11.22.6.1 is incorrect, FPBT is stated to be for EDMG only "An EDMG STA shall not initiate first path beamforming training FPBT with a peer EDMG STA that is not capable of performing first path beamforming capable FPBT procedure." in 10.43.9.6. Which one is correct ????? | Fix the text |  |
| 1240 | 79.25 | 11.22.6.1 | "For DMG and EDMG, an FTM session shall be preceded..." This pargraph shall be remvoed as it contradicts the previous pargraph. DMG devices cannot perform first path beamforming training | remove this paragraph. | 11-19-1074 |
| 1239 | 79.22 | 11.22.6.1 | "shall be preceded by a First Path Beamforming Training" - implies immidiately preceding? | replace "shall be preceded by a First Path Beamforming Training" with shall be preceded | Remove |

**Discussion:**

We do not agree with the commenter that FPBT must be mandatory for all PEDMG devices. There are features that PEDMG devices may support, such performing direction measurement.

We therefore thing that the text in 11.22.6.4.7 (which is an orphan anyway) should be removed.

***TGaz Editor: Remove the text in P126L5-6 (11.2.6.4.7)***

***TGaz Editor: Change of the first paragraph of 11.22.6.4.7.1 General:***

(#2381) An PEDMG ISTA and RSTA that have both indicated support for first path beam forming by setting to one the First Path Training Supported field in the Beamforming Capability subelement of the EDMG Capability element, shall perform first path beamforming training as defined in 10.43.10.6 (First path beamforming training) before performing and FTM exchange. An RSTA that has set the First Path Training Supported field to 1 that receives an FTM request from an ISTA that has set this field to 0, may refuse the request.

***TGaz Editor: Change the text in P91L32-33 as follows:***

capabilities element to 1. A STA shall not set the Secure ToF Supported field to 1 if it has not also set to 1 the First Path Training Supported fieldin the Beamforming Capability subelement of the EDMG Capability element .

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| 2348 | 119.05 | 11.24.6.4.7 | Several terms are used for best path AWV, i.e. best path AWV and regular AWV. | Please unify. No preference which term. I think 11ay uses best path AWV | Revise (accept in principle) |

***TGaz Editor: Modify the text inP120L24 as follows***

ISTA is a LOS assessment FTM PPDU. A LOS assessment FTM burst over the best path AWV is

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| 2345 | 119.08 | 11.22.6.4.7.1 | "that does not require AOA or AOD" measurments is not clear, because AOD/AOD measurements may apparently be done for DMG devices | Please clarify what is the trigger field value for PDMG with AOA/AOD measurements. It can't be 1 and it can't be 2 as 2 is for EDMG only. | Corrected in D1.2 |
| 1442 | 119.08 | 11.22.6.4.7.1 | "A PDMG/PEDMG ISTA/RSTA performs an FTM exchange that does not require AOA or AOD measurements as defined in 11.24.6.4.1, with the trigger field set to 1 in the Fine Timing Measurement Request initiating the exchange." Behaviour here is not clear. If PEDMG STA, capable of doing First Path beamforming but does not require AOA or AOD measurement, would still request trigger 1? On the otehr hand, if Trigger 1 is intended for non-directional measurements, then this contradicts behaviour in 11.22.6.4.7.2 where PDMG (which cannot perform First Path Beamforming thus can only use trigger 1) still requests directional measurements. | please write the behaviour more clearly. | Corrected in D1.2 |
| 2346 | 119.08 | 11.22.6.4.7.1 | For trigger field 1, it's not clear which AWV shall be used by the STA for FTM frame and ACK as it is done for tigger field 2. This may result in different AWVs applied for (a) each STA or (b) each frame | Please clarify similarly to what has been done for trigger field 2. If one would like to keep open if first path AWV or non-first path AWV should be used, it is still required to specify that it is same for case (a) + (b) | Revise – corrected in D1.2 |

***TGaz Editor: Change the text in p12L18-29 (11.22.6.4.7.1):***

timing Measurement Request that initiates the exchange. In both cases the best path AWV used for data transfer between the devices shall be used for transmission and reception of the preamble and data portion of the PPDUs.. **(#1442, 2345, 2346)**

Proposed Spec changes:

***TGaz Editor: Add the following line to Table 43 – TXVECTOR and RXVECTOR parameters***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FIRST\_PATH\_AWV\_TRN | FORMAT is EDMG, EDMG\_MODULATION is EDMG\_SC\_MODE, NUM\_USERS is 1, NUM\_STS is 1 | Enumerated Type  FIRST\_PATH\_AWV\_ON\_TRN  BEST\_PATH\_AWV\_ON\_TRN  Indicates whether the TRN field of the PPDU is transmitted using the first path AWV or the best path AWV. | Y | N |
| Otherwise | Not present | N | N |

***TGaz Editor: Modify the last line of table 54 EDMG-MCS field definition when the Number of SS field is 0 as follows:***

|  |  |  |  |
| --- | --- | --- | --- |
| First Path AWV TRN | 1 | 8 | When set to 1, indicates that the TRN field is transmitted (and shall be received) using the first path AWV antenna setting. Otherwise the TRN field is transmitted and shall be received using the best path AWV antenna setting. |
| Reserved | 7 | 9 |  |

***TGaz Editor: Add the following subclause after 11.22.6.4.7.3***

**11.22.6.4.7.4 First Path AWV FTM exchange**

A first path AWV FTM burst is started when an ISTA sends the RSTA a Fine Timing Measurement Request frame with trigger field set to 2. An PEDMG ISTA may send a Fine Timing Measurement Request frame with the trigger set to 2 only if the RSTA has set the First Path Training Supported subfield to 1 in the Beamforming field of the EDMG capabilities element and the ISTA and RSTA have performed beamforming training for first path as defined in 10.43.9.6. All the Fine Timing Measurement frames sent from the RSTA to the ISTA during the FTM burst and all the ACK frames sent from the RSTA to the ISTA in response the Fine Timing Measurement Frame shall have the setting described in Table 1 (TXVECTOR parameter setting for first path AWV FTM exchange), except when used of AOD and AOA estimation:

Table 1- TXVECTOR parameter setting for first path AWV FTM exchange

|  |  |
| --- | --- |
| TXVECTOR Parameter | Value |
| EDMG\_PACKET\_TYPE | EDMG-TRN-T-PACKET |
| EDMG\_TRN\_LEN | 4 |
| RX\_TRN\_PER\_TX\_TRN | 1 |
| EDMG\_TRN\_P | 0 |
| EDMG\_TRN\_M | 4 |
| EDMG\_TRN\_N | 3 |
| TRN\_SEQ\_LENGTH | Normal |
| FIRST\_PATH\_AWV\_TRN | FIRST\_PATH\_AWV\_ON\_TRN |

The setting of TXVECTOR when the frames are used for AOA and AOD estimation is described in 11.2.6.7.4.2.

When a Fine Timing Measurement frame is sent with the FIRST\_PATH\_AWV\_TRN parameter set to FIRST\_PATH\_AWV\_ON\_TRN the Ack frame sent in response to this frame shall have the FIRST\_PATH\_AWV\_TRN parameter set to FIRST\_PATH\_AWV\_ON\_TRN. In both these frames the TRN field shall be received by the ISTA and RSTA using the first path AWV receive antenna setting.

***TGaz Editor: Modify the text in P119L29-37 as follows:***

An FTM exchange in which the trigger field in the Fine Timing Measurement Request that initiated the exchange is set to 2 is denoted as a first path AWV FTM exchange.In a Direction Measurement FTM pair that agreed on R2I AOA, the ISTA shall add a TRN field to the FTM frames in the exchanges specified by the Direction Measurement Density field by setting the TRN\_LEN to the value of the L\_RX field sent by the RSTA and PACKET\_TYPE to 0. In a first path AWV FTM exchange the ISTA shall set the FIRST\_PATH\_AWV\_TRN TXVECTOR parameter set to FIRST\_PATH\_AWV\_ON\_TRN in the Fine Timing Measurement frames it sends to the RSTA. The ISTA may receive the TRN field using implementation dependent AWV settings.

In a Direction Measurement FTM pair that agreed on I2R AOA, the RSTA shall add a TRN field to the Ack frames in the exchanges specified by the Direction Measurement Density field by setting the TRN\_LEN to the value of the L\_RX field of the DMG Direction Measurement Parameters received from the ISTA and PACKET\_TYPE to 0. In a first path AWV FTM exchange the RSTA shall set the FIRST\_PATH\_AWV\_TRN TXVECTOR parameter set to FIRST\_PATH\_AWV\_ON\_TRN in the Ack frames it sends to the RSTA. The RSTA may receive the TRN field using implementation dependent AWV setting. The RSTA shall provide the AOA measurement results in the Direction Measurement Result element included in the next FTM frame sent to the ISTA.

In a Direction Measurement FTM pair that agreed on R2I AOD, the RSTA shall add a TRN field to the FTM frames in the exchanges specified by the Direction Measurement Density field by setting the TRN\_LEN to a non-zero value and PACKET\_TYPE to 1. In a first path AWV FTM exchange the ISTA shall set the FIRST\_PATH\_AWV\_TRN TXVECTOR parameter set to FIRST\_PATH\_AWV\_ON\_TRN in the Fine Timing Measurement frames it sends to the RSTA. The RSTA shall receive the TRN field using the first path AWV setting. The ISTA may use implementation dependent AWV (such as sectors) in the TRN field.

In a Direction Measurement FTM pair that agreed on I2R AOD, the ISTA shall add a TRN field to the Ack frames in the exchanges specified by the Direction Measurement Density by setting the TRN\_LEN to a non-zero value and PACKET\_TYPE to 1. In a first path AWV FTM exchange the RSTA shall set the FIRST\_PATH\_AWV\_TRN TXVECTOR parameter set to FIRST\_PATH\_AWV\_ON\_TRN in the Ack frames it sends to the RSTA. The ISTA shall receive the TRN field using the first path AWV setting. The RSTA may use implementation dependent AWV (such as sectors) in the TRN field. The RSTA shall set the Best AWV Id field in the Fine Timing Measurement frames sent to the ISTA following these Ack frames to the AWV Id or the Best Sector Index of the TRN field (if the ACK was an EDMG/DMG PPDU respectively). If the RSTA has set the AOD Channel Measurement Feedback subfield to 1 in the DMG Direction Measurement Capabilities field, it shall also append a Channel Measurement Feedback element to the Fine Timing Measurement frames sent to the ISTA following the reception of the Ack frames with PACKET-TYPE equal to TRN-T-PACKET or EDMG-PACKET-TYPE equal to EDMG-TRN-T-PACKET and TRN-LEN greater than 0 or EDMG-TRN-LEN greater than 0.

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**References:**