IEEE P802.11  
Wireless LANs

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| Clause 9 CIDs | | | | |
| Date: 2019-04-14 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Assaf Kasher | Qualcomm |  |  | akasher@qti.qualcomm.com |
| Alecsander Eitan | Qualcomm |  |  | eitana@qti.qualcomm.com |
| Solomon Trainin | Qualcomm |  |  | strainin@qti.qualcomm.com |

Abstract

This document presents resolutions to Clause 9 CIDs: 2053, 2055, 2056, 1449, 1451, 2091, 2093, 1684, 2251, 2439, 2336, 2378, 1430, 2095, 1214, 1215, 1223, 1070, 1071, 1075, 1400, 1401, 1402, 1493, 1403, 1404, 1405, 1406, 1407, 1408, 1430, 1385, 1226, 2440, 1662, 1685, 1686, 1074, 2252, 1428, 1094, 1076

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| 2053 | 30.06 | 6 | 9.4.2.166 | [Re-raising this comment from the comment collection, as it is not possible to determine from 18/1544r8 whether/how it was addressed. References are to the CC draft and hence may be wrong against D1.0.] It would be better to make the field positions the same for DMG and EDMG | Put Direction Measurement Density before L-RX and then say that L-RX's top two bits are unused for DMG, then have a single figure | **Revised:** Resolved per 11-18-1728-04. |

Proposed Resolution: **Revised**

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| 2055 | 30.12 | 12 | 9.4.2.166 | [Re-raising this comment from the comment collection, as it is not possible to determine from 18/1544r8 whether/how it was addressed. References are to the CC draft and hence may be wrong against D1.0.] What about non-single-carrier EDMG modes? | Add these to the table, or state that they cannot be used for 11az | **Revised:** Resolved per page 4 of 11-19-145 |

Proposed Resolution: **Revise**

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| 2056 | 32.01 | 1 | 9.4.2.166 | [Re-raising this comment from the comment collection, as it is not possible to determine from 18/1544r8 whether/how it was addressed. References are to the CC draft and hence may be wrong against D1.0.] "The Secure ToF Measurement field is set to 1 to enable a secure ToF measurement exchange between an ISTA and an RSTA. Otherwise the Secure ToF Measurement field is set to 0. " -- specify that it is not set to 1 unless both ISTA and RSTA have set Secure ToF Supported field to 1 | As it says in the comment | **Revised** |

Discussion:

This has been resolved in 11-18-2003, However, this has not made it into the draft.

***TGaz Editor: Replace the two pargraphs in P39L8-13 as follows***

(#2056) The Secure ToF Measurement field is set to 1 by an ISTA to request a secure ToF measurement exchange between an ISTA and an RSTA (see 11.22.6.3.3). The Secure ToF Measurement field is set to 1 by an RSTA to acknowledge a secure ToF Measurement exchange. Otherwise the Secure ToF Measurement field is set to 0.

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| 1449 | 32.16 | 16 | 9.4.2.166 | Figure 9-aac is ranging operations parameters field which is part fo the EDMGz specific parameters subelement which is included in a Fine Timing Mesurement Request Frame. Which means the "secret key" and "salt" are sent in the clear in the initial request frame. | do not send secrets in the clear. Figure out a way to protect this exchange | **Revised:** Changes are in 11.22.6.3.5 |

***TGaz Editor: Modify the text in the second pargraph of 11.22.6.3.5 P91L24 as follows:***

An ISTA may request a Secure ToF measurement by setting the Secure ToF Measurement subfield in the Measurement Parameters field in the initial (#1449) Protected Fine Timing Measurement Request frame. An ISTA shall not set to Secure Tof Measurement subfield in a request to an RSTA if the RSTA has not set the Secure ToF Supported field in the EDMG Capabilities field to 1. An RSTA that support Secure ToF measurement shall acknowledge a request for Secure ToF measurementby setting the Secure ToF Measurement subfield in the Measurement Parameters field in the initial (#1449) Protected Fine Timing Measurement frame.

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| 1450 | 33.45 | 45 | 9.4.2.166 | how is the secret key generated? | explain where this secret comes from |

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| 1451 | 33.45 | 45 | 9.4.2.166 | "The Secret Key subfield is used to carry the secret key whch is used along with Salt value contined in the Salt subfield, to generate the random sequence(s) as described in Setion ???" | what is ??? | Revised |

***TGaz Editor: Modify the text in P42L4:***

contained in the Salt subfield, to generate the random sequence(s) as described in Section 12.2.11 (#1451)

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| 2091 | 39.35 | 35 | 9.6.7.32 | [Re-raising this comment from the comment collection, as it is not possible to determine from 18/1544r8 whether/how it was addressed. References are to the CC draft and hence may be wrong against D1.0.] Adding the "if" appears to restrict the presence in retransmissions, but legacy devices have no such restriction | Make the "if" only apply to 11az devices. Also change "Ranging protocol(s)" to "ranging protocol(s)" (also at 40.7) | **Revise** |
| 2093 | 40.20 | 20 | 9.6.7.32 | [Re-raising this comment from the comment collection, as it is not possible to determine from 18/1544r8 whether/how it was addressed. References are to the CC draft and hence may be wrong against D1.0.] Adding the "if" appears to restrict the presence in retransmissions, but legacy devices have no such restriction | Make the "if" only apply to 11az devices | **Revise** |
| 1684 | 67.00 |  | 9.6.7.32 | "The Fine Timing Measurement Parameters field is present in the initial Fine Timing Measurement Request frame (see 11.24.6.3 (Fine timing measurement procedure negotiation)) and its retransmissions if the responder selects Fine Timing Measurement as the ranging protocol for the ranging phase; and is not present in subsequent Fine Timing Measurement Request frames. If present, it contains a Fine Timing Measurement Parameters element as defined in 9.4.2.168 (Fine Timing Measurement Parameters element)." Responders do not transmit Fine Timing Measurement Request frames. | Replace with "The Fine Timing Measurement Parameters field is present in the initial Fine Timing Measurement Request frame (see 11.24.6.3 (Fine timing measurement procedure negotiation)) and its retransmissions if the initiator requests negotiation of parameters with the responder in order to perform Fine Timing Measurement as the ranging protocol as defined in 11.22.6.4.2 (RSTA centric EDCA based measurement exchange); and is not present in subsequent Fine Timing Measurement Request frames. If present, it contains a Fine Timing Measurement Parameters element as defined in 9.4.2.168 (Fine Timing Measurement Parameters element)." |  |
| 2251 | 67.18 | 18 | 9.6.7.32 | In 9.6.7.32 the statement talks about iFTMR from responder - that should be Initialtor, I think - "The Fine Timing Measurement Parameters field is present in the initial Fine Timing 16 Measurement Request frame (see 11.24.6.3 (Fine timing measurement procedure negotiation)) 17 and its retransmissions if the responder selects Fine Timing Measurement as the ranging protocol 18 for the ranging phase;" | See comment | **Revise** |
| 2439 | 67.26 | 26 | 9.6.7.32 | Does the retransmission need to be emphasised? Delete "and its retransmission". And the description that the field is optional is missing. | As in comment. | **Revise** |

**Discussion:**

This has not been resolved in D1.0.

***TGaz Editor: Modify the text in P67L16-21 (9.6.7.32) as follows:***

(#2091) If the initiator requests negotiation of parameters with the responder in order to perform Fine Timing Measurement as the ranging protocol as defined in 11.22.6.4.2 (RSTA centric EDCA based measurement exchange, the Fine Timing Measurement Parameters field is present in the initial Fine Timing Measurement Request frame (see 11.24.6.3 (Fine timing measurement procedure negotiation)) and its retransmissions; and is not present in subsequent Fine Timing Measurement Request frames. If present, it contains a Fine Timing Measurement Parameters element as defined in 9.4.2.168 (Fine Timing Measurement Parameters element).

***TGaz Editor: Modify the text in P68L33-36 (9.6.7.33) as follows:***

(#2091) If the initiator requested negotiation of parameters with the responder in order to perform Fine Timing Measurement as the ranging protocol as defined in 11.22.6.4.2 (RSTA centric EDCA based measurement exchange, the Fine Timing Measurement Parameters field is present in the initial Fine Timing Measurement Frame (see 11.22.6.3 (Fine timing measurement procedure negotiation)) and its retransmissions, and is not present in subsequent Fine Timing

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| 2336 | 66.31 | 31 | 9.6.7.32 | I think these new columns should be placed to the right of those in Figure 9-876, as opposed to the left. Otherwise I don't understand how the field will work. | Within the editor's instructions change "left" to "right" | Accept |

***TGaz Editor: Modify the editor instruction in P66L31as follows:***

***Insert new columns to the (#2336) right of Figure 9-876 (Fine Timing Measurement Request Action field format) as shown below:***

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| ***2378*** | ***67.00*** | ***9.6.7.32*** | "The Trigger field set to 1 indicates that the initiating STA requests that the responding STA start or continue sending Fine Timing Measurement frames (see 11.22.6 (Fine timing measurement (FTM) procedure)). The Trigger field set to 0 indicates that the initiating STA requests that the responding STA stop sending Fine Timing Measurement frames. The Trigger field is set to 2 to indicate the initiation of a PDMG/PEDGM FTM measurement exchange using the first path AWV (see 11.22.6.4.7.1 (General)). The Trigger field is set to 3 to indicate that the following FTM burst shall contain an LOS assessment measurement. If the FTM burst is performed over 12 the first path AWV and shall contain an LOS assessment measurement the Trigger field is set to 4. 13 Trigger field values 23-255 are reserved"  Trigger field value 1 and 0 apply to all STAs (legacy, EDMG/DMG) that are in the ranging session. For ASAP=0, in which the FTM Request is only sent once, how would an EDMG/DMG device sets the trigger value for session is using first path AWV (Trigger field value =2) and wants to start ranging (Trigger field value=1) ?  Also, there is no need to have value=2 since it should be implicit that PDMG/PEDMG shall use first path AWV for ranging. | Remove this sentence "The Trigger field is set to 2 to indicate the initiation of a PDMG/PEDGM FTM measurement exchange using the first path AWV (see 11.22.6.4.7.1 (General)).:" and reorder other Trigger value accordingly | ***Reject*** |

***Discussion:***

The are two wrong assumptions that the commenter is making. One, that PDMG/PEDMG devices will always use first path AWV for ranging. PDMG devices simply don’t support first path AWV training because that is part of 11ay, DMG devices are not aware of that. Even for PEDMG devices, first path BF training is not mandatory. The second wrong assumption is that once the initiator requests ranging using the FTM requests, both devices will maintain the first path AWV. Since the time between bursts, and even the first burst is long (~10ms), the devices may communicate, even with other devices. When communicationg, they will not use the first path AWV. They therefore need some burst initiation (FTM with a trigger) to know to switch the antennas to the first path AWV.

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| 1430 | 67.06 | 6 | 9.6.7.32 | For DMG/EDMG there is a trigger specifically specifying first path AWV. However trigger 1 can apply to both first path and regular AWV. It may be cleaner to define a trigger for regular AWV and one for first path AWV. | Explicitly specify the AWVs to be used by the triggers for the DMG/EDMG positioning and explicitly allow a trigger for strongest path AWV. | **Revise** |

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| 2095 | 41.19 | 19 | 9.6.7.33 | [Re-raising this comment from the comment collection, as it is not possible to determine from 18/1544r8 whether/how it was addressed. References are to the CC draft and hence may be wrong against D1.0.] "The Invalid Measurement field contains an invalid indication for the TOA field. " has no value | Delete | Revise |

Proposed Resoloution: **Revise**

**Discussion**

The intent of the commenter is not clear (even when examining D0.4). However, this field should be removed because it is not used by any text in 11.6.22. A similar field in the LMR is used frequently.

***TGaz Editor: Remove P68L20-30 (invalid measurement)***

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| 1214 | 45.03 | 3 | 9.4.2.250.2 | Inaccurate editor instruction | Replace "Change the Beamforming Capability subelement is defined in Figure 44:" with "Change the Beamforming Capability subelment data field as defined in figure 46 (Data field of the Beamforming Capability subelement format)" | Accept |

***TGaz Editor: Modify the text P45L3 (9.4.2.250.2) as follows:***

***Change the Beamforming Capability subelement (#1214) data field as defined in Figure 44*** (***Data field of the Beamforming Capability subelement format):***

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| 1215 | 45.06 | 6 | 9.4.2.250.2 | Missing Editor instruction | Add the editor instruction "Insert the following at the end of 9.4.2.250.2 (Beamforming Capability subelement" | Accept |

***TGaz Editor: Add the following text at P45L6:***

***Insert the following at the end of 9.4.2.250.2 (Beamforming Capability subelement) (#1215)***

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| 1223 | 54.31 | 31 | 9.4.2.281 | "It is transmitted as part of the Location Measurement Report." - this is incorrect, it is transmitted as part of the FTM frame | Replace with "It is transmitted as part of the Fine Timing Measurement Frame" | Accept |

***TGaz Editor: modify the text in P54L32 (9.4.2.281)***

Departure measurement results. It is transmitted as part of the (#1223) Fine Timing Measurement frame .

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| 1070 | 55.06 | 6 | 9.4.2.281 | Number of bits for AZ and EL should be the same in Fig 1013. If reserved bits are needed add a byte. | Make both 11bits | **Reject:** Azimuth covers 360º while elevation covers 180º, therefore to achieve the same accuracy, the fields should have different sizes |
| 1071 | 57.02 | 2 | 9.4.2.283 | Number of bits for AZ and EL should be the same in Fig 1016. If reserved bits are needed add a byte. | Make both 11bits | **Reject:** Azimuth covers 360º while elevation covers 180º, therefore to achieve the same accuracy, the fields should have different sizes |
| 1075 | 55.06 | 6 | 9.4.2.281 | AoA Results should include the LOS Likelihood. | Add the LOS Likelihood field | **Reject:** The LOS likelihood element is added outside this element in the FTM frame as a separate element, covering all measuements results (TOA, direction etc.) |

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| 1400 | 55.09 | 9 | 9.4.2.281 | "The AOA Azimuth subfield contains the Angle of Arrival (AOA) azimuth result in degree/4 resolution" - arbitrary and not good use of bits | Change to "The AOA Azimuth subfield contains the Angle of Arrival (AOA) azimuth result in degree/4 resolution" | **Revise (?)** |
| 1401 | 55.09 | 9 | 9.4.2.281 | "The AOA Azimuth subfield contains the Angle of Arrival (AOA) azimuth result in degree/4 resolution. This subfield is an unsigned two's complement number taking values between 0 and 1439." - arbitrary and not good use of bits, also why unsigned? | Change to "The AOA Azimuth subfield contains the Angle of Arrival (AOA) azimuth result in 360/2048 degree resolution. This subfield is a signed two's complement number taking values between -1024 and 1023." | **Revise (accept in principle)** |
| 1402 | 55.15 | 15 | 9.4.2.281 | "The AOA Elevation subfield contains the AOA elevation result in degree/4 resolution. This subfield is a signed two's complement number taking values between -360 and 360." | Change to "The AOA Elevation subfield contains the AOA elevation result in 360/2048 degree resolution. This subfield is a signed two's complement number taking values between -512 and 511." | **Revise: (Accept in principle)** |
| 1793 | 55.16 | 16 | 9.4.2.281 | The AoA Azimuth is a range from 0 to 1439, which makes sense. But then, AoA elevation, which also indicats a 360 degree range, uses another scale. This is not only uselessly adding complexity, but also creating confusion by ovarlaps (what is the difference between +180 and -180?). | Set the same scale for AoA Azimuth and AoA elevation. As AoA Azimuth is 11 bits, we can move things to the right for AoA elevation (borrwo one bit right-ward), which is easy as tehre is one ("tw') bits 'unused' on the end right. | **Revise** |
| 1403 | 55.22 | 22 | 9.4.2.281 | "The AOA Azimuth Accuracy subfield contains the AOA Azimuth result's estimated accuracy in degree/4 resolution" - Should define a value (0x3f) indicating no azimuth measurements (elevation only); add a bit indicating limited range, e.g., only [-90:90] degrees | As per comment | **Revise** |
| 1404 | 55.25 | 25 | 9.4.2.281 | "The AOA Elevation Accuracy subfield contains the AOA Elevation result's estimated accuracy in degree/4 resolution." - Should define a value (0x3f) indicating no elevation measurements (azimuth only); add a bit indicating limited range, e.g., only [0:90] degrees | As per comment | **Revise** |

***TGaz Editor: Modify the text in P54L9-16 as follow (9.4.2.281)***

The AOA Azimuth subfield contains the Angle of Arrival (AOA) azimuth result in (#1070) 360º/2048 resolution. This subfield is an unsigned two’s complement number taking values between 0 and 2047. When the AOA Reference subfield is set to 1, the AOA Azimuth subfield is in earth coordinates (i.e. direction 0 is north). When the AOA Reference subfield is set to 0, the AOA Azimuth subfield is in coordinates relative to the device.

The AOA Elevation subfield contains the AOA elevation result in (#1403) 180º/1024 resolution. This subfield is a signed two’s complement number taking values between -512 and 511.

***TGaz Editor: Modify the text in P55L22-25***

The AOA Azimuth Accuracy subfield contains the AOA Azimuth result’s estimated accuracy in 360º/2048 resolution. Accuracy larger than 126×360º/2048 is represented by the value of 126. A value of 127 indicates no ability to estimate azimuth accuracy.

The AOA Elevation Accuracy subfield contains the AOA Elevation result’s estimated accuracy in 360º/2048 resolution. Accuracy larger than 125×360º/2048 is represented by the value 125. Value of 126 indicates no elevation measurement. Value of 127 indicates no ability to estimate elevation accuracy.

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| 1405 | 57.04 | 4 | 9.4.2.283 | "The AOD Azimuth subfield contains the Angle of Departure (AOD) azimuth result in degree/4 resolution. This subfield is an unsigned two's complement number taking values between 0 and 1439." - arbitrary and not good use of bits, also why unsigned? | Change to "The AOD Azimuth subfield contains the Angle of Departure (AOD) azimuth result in 360/2048 degree resolution. This subfield is a signed two's complement number taking values between -1024 and 1023." | **Revise: (Accept in principle)** |
| 1406 | 57.10 | 10 | 9.4.2.283 | "The AOD Elevation subfield contains the AOD elevation result in degree/4 resolution. This subfield is a signed two's complement number taking values between -360 and 360." | Change to "The AOD Elevation subfield contains the AOD elevation result in 360/2048 degree resolution. This subfield is a signed two's complement number taking values between -512 and 511." | **Revise** |
| 1407 | 57.16 | 16 | 9.4.2.283 | "The AOD Azimuth Accuracy subfield contains the AOD Azimuth result's estimated accuracy in degree/4 resolution. If the accuracy is greater or equal to 31.75 degrees the field saturates to 0xFF." - include a value to indicate no azimuth measurement, also 0xff is not a valid value in a 7 bit subfield | Change to "The AOD Azimuth Accuracy subfield contains the AOD Azimuth result's estimated accuracy in degree/4 resolution. A value of 0x3F indicates an invalid AOD Azimuth measurement." | **Revise** |
| 1408 | 57.20 | 20 | 9.4.2.283 | "The AOD Elevation Accuracy subfield contains the AOD Elevation result's estimated accuracy in degree/4 resolution. If the accuracy is greater or equal to 31.75 degrees the field saturates to 0xFF." | Change to "The AOD Elevation Accuracy subfield contains the AOD Elevation result's estimated accuracy in 19 degree/4 resolution. A value of 0x3F indicates an invalid AOD Elevation measurement." | **Revise** |

***TGaz Editor: Modify the text in P57L4 (9.4.2.283) as follows:***

The AOD Azimuth subfield contains the Angle of Departure (AOD) azimuth result in 360º/2048 (#1405) resolution. This subfield is an unsigned two’s complement number taking values between 0 and 2047. When the AOD Reference field is set to 1, the AOD Azimuth is in earth coordinates (i.e. direction 0 is north). When the AOD Reference subfield is set to 0, the AOD Azimuth subfield is in coordinates relative to the device.

The AOD Elevation subfield contains the AOD elevation result in 180º/1024 resolution. This subfield is a signed two’s complement number taking values between -512 and 511.

When the AOD Reference field is set to 1, the AOD is in earth coordinates (i.e. elevation 0 is horizon). When the AOD Reference subfield is set to 0, the AOD Elevation subfield is in coordinates relative to the device.

The AOD Azimuth Accuracy subfield contains the AOD Azimuth result’s estimated accuracy in 360º/2048 resolution. Accuracy larger than 126×360º/2048 is represented by the value of 126. A value of 127 indicates no ability to estimate azimuth accuracy.(#1407)The AOD Elevation Accuracy subfield contains the AOD Elevation result’s estimated accuracy in degree/4 resolution. Accuracy larger than 125×360º/2048 is represented by the value 125. Value of 126 indicates no elevation measurement. Value of 127 indicates no ability to estimate elevation accuracy. (#1407)

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| 1430 | 67.06 | 6 | 9.6.7.32 | For DMG/EDMG there is a trigger specifically specifying first path AWV. However trigger 1 can apply to both first path and regular AWV. It may be cleaner to define a trigger for regular AWV and one for first path AWV. | Explicitly specify the AWVs to be used by the triggers for the DMG/EDMG positioning and explicitly allow a trigger for strongest path AWV. | Revise |

Discussion:

It is best to describe and clarify behaviour in clause 11 rather than in clause 9. The term first path AWV is confusing because in most of the cases it will not be different from the first path. So most DMG FTM exchanges are made on first path using trigger value 1. Trigger value 2 is used when there is a need to switch between the best path AWV and the first path AWV. This will be clarified in clause 11.

***TGaz Editor: Modify the text in P118L11-18 as follows:***

A PEDMG ISTA initiates an FTM measurement exchange using the first path AWV setting by setting the value of the trigger field of the Fine Timing Measurement Request frame that initiates the exchange 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 10.39.9.6. (#1430) When the trigger is set to 2 in the Fine Timing Measurement request that initiates the burst, t he first path AWV settings shall be used in transmission and reception of FTM and ACK frames sent by the ISTA and RSTA during the FTM burst.

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| 1385 | 67.09 | 9 | 9.6.7.32 | Trigger field values of 2 and 4 are dangerous as they could signal an "FTM stop" (Trigger = 0) signal to older FTM implementations which parse the LSB of the Trigger field. Please change the Trigger field values to be odd. | Rewrite the new Trigger field values with the recommendation in mind | **Reject** |

**Discussion**

The trigger values 2 and 4, are indicating a behavior (first path AWV usage) that is introduced only in new devices and is based the first path BF training capability. Legacy devices will not be confused because they will not be asked to participate in such exchages. Their behavior as 3rd party devices is not relevant.

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| 1226 | 67.14 | 14 | 9.6.7.32 | "Trigger field values 23-255 are reserved" now values of 5-255 are reserved. | Replace with "Trigger field values 25-255 are reserved" | **Accept** |

***TGaz Editor: Modify the text in P66L14 as follows:***

Trigger field values (#1226) ~~2~~5–255 are reserved

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| 2440 | 67.29 | 29 | 9.6.7.32 | The descriptions of LCI Report and Location Civic Report fields are missing. Add them. | As in comment. | **Revise** |

***TGaz Editor: Add the following at the end of 9.6.7.32***

(#2440) The LCI Report field and the Location Civic Report field are described in 9.6.7.33

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| 1662 | 68.00 |  | 9.6.7.33 | The Channel Measurement Feedback, Direction Measurement Results, Multiple Best AWV ID, Multiple AoD Feedback and LoS Likelihood elements that are listed as optional elements that may be included in the [initial?] Fine Timing Measurement frame only in the case of [Enhanced] Directed Multi Gigabit (DMG). Hence these elements are best represented as [optional] subelements in Fine Timing Measurement Parameters element. | Define Channel Measurement Feedback, Direction Measurement Results, Multiple Best AWV ID, Multiple AoD Feedback and LoS Likelihood elements as Optional Subelements in Table 9-281a. | **Revise** |

**Discussion:**

The intent is that these are fields, containing elements, rather than subelements, and they are defined as such. However, their description is missing or wrong from 9.6.7.33

***TGaz Editor: Modify P69L18-21 as follows***

The Channel Measurement Feedback field is present in the Fine Timing Measurement frame if the frame is sent after a LOS Assessment ACK PPDU and optionally in response to an ISTA to RSTA angle of departure TRN field on an ACK frame. This field contains the Channel Measurement Feedback element (see 9.4.2.136).

***TGaz Editor: Modify P68L618 (9.6.7.32) as follows:***

The Channel Measurement Feedback field is present in the Fine Timing Measurement frame if the frame is sent after an LOS Assessment ACK PPDU and optionally in response to an ISTA to RSTA angle of departure TRN field on an ACK frame. This field contains the channel measurement feedback (see 9.4.2.136).

The Multiple Best AWV ID field is present in the Fine Timing Measurement frame when the frame is sent from an ISTA to an RSTA as part of an AOD feedback exchange after an FTM exchange (see 11.24.6.4.7.3). It contains the Multiple Best AWV ID element.

The Multiple AOD Feedback field is present in the Fine Timing Measurement frame when the frame is sent from an RSTA to an ISTA as part of an AOD feedback exchange after an FTM exchange (see 11.24.6.4.7.3). It contains the Multiple AOD Feedback element.

The LOS Likelihood field may be present in any Fine Timing Measurement frame than contain TOA and TOD or Direction Measurement Results on measurement performed over DMG or EDMG PPDUs. It contains the LOS Likelihood element

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| 1685 | 68.00 |  | 9.6.7.33 | Missing description of the Direction Measurement Results subfield in the Fine Timing Measurement Action field. This subfield is in Fig 9-877 but is not described. | Either remove Direction Measurement Results subfield from the Fine Timing Measurement Action field; or add a description of this subfield. | **Revise** |

***TGaz editor: Add the following text after the description of channel measurement feedback field (P68L9, 9.6.7.32)***

The Direction measurement Results field is present in the Fine Timing Measuremetn frame when the frame is sent from an RSTA to an ISTA following an FTM exchange that included ISTA to RSTA AOA measurement. This field contains the Direction Measurement Results element. (#1685)

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| 1686 | 68.00 |  | 9.6.7.33 | Missing description of what values 2 and 3 of the Invalid Measurement field mean. | State that value 2 and 3 are reserved; or render the field to be one bit wide. | **Revise** |
| 1074 | 68.23 | 23 | 9.6.7.33 | Invalid Measurement field has 2 bits and only two values explained. Add text that other values are reserved. (Or ass table with values) | Add text to explain that other values are Reserved. | **Revise** |

***TGaz Editor: Insert the following text at the end of P68L30:***

(#1686) Values of 2 and 3 are reserved.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2252 | 69.08 | 8 | 9.6.7.33 | ...states that Ranging Parameters field is not present in subsequent Fine Timing Measurement frames. Are there any subsequent FTM frames for TB or non-TB ranging? Is it the same as LMR | Clarify | **Revise** |

***TGaz Editor: Modify the text in P69L7-9***

responder selects non-TB ranging or TB Ranging protocols for the ranging phase. (#2252) If present, it contains a Ranging Parameters element as defined in 9.4.2.279 (Ranging Parameters).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1428 | 56.10 | 10 | 9.4.2.282 | It is unclear who or what decides the number of AWV ID feedbacks, present. | clarify as in comment | **Revise** |

***TGaz Editor: Modify the text in P120L26-29 as follows:***

After the burst the ISTA shall send a Fine Timing Measurement frame containing a Multiple AWV ID element, and with the trigger field set to 0, to the RSTA. The Number of Best AWV ID field in the Multiple AWV ID element shall be set to the number of FTM frames in the burst that contained a TRN field enabling AOD estimation. When the RSTA is ready with the AOD results, it should send an FTM frame containing a Multiple AOD Feedback element containing the AOD results. The Number of AOD Feedbacks field in the Multiple AOD Feedback element shall be set to the value of the Number of Best AWV ID field in the Multiple AWV ID element in the Fine Timing Measurement frame from the ISTA that elicited the Multiple AOD feedback. (#1428)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1094 | 44.01 | 1 | 9.4.2.26 | EDMG Range Measurement definition in Table 9-153 is defined in 11.22.6.4.7 and not 11.22.6.4.8 | Fix the reference |

***TGaz Editor: Modify the value column in the line of EDMG Range Measurement in Table 9-153—Extended Capabilities element as follows:***

An EDMG STA sets this field to 1 to indicate support of the ranging protocols defined in 11.22.6.4.7 (#1094)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1076 | 57.06 | 6 | 9.4.2.282 | AoD field (Tavle 1016) should include the LOS Likelihood. | Add the LOS Likelihood field | **Reject:** The Best AWV ID is sent from the ISTA to the RSTA while the information is needed at the ISTA. The RSTA can estimate the LOS likelihood based on Best AWV IDs of prefereably on channel measurement feedback sent by the ISTA and add the LOS likelihood element to the FTM frame carrying the Multiple AOD feedbac. |

**References:**

[1] Draft P802.11azD1.0

[2] Draft P802.11ayD3.0

[3] Draft P802.11RevMD\_2.1