IEEE P802.11
Wireless LANs

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| 802.11[Resolutions to LB240 CIDs – Part 4.(relative to IEEE 802.11 REVmd D2.0 and P802.11az D1.2) |
| Date: 2019-08-14 |
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**Abstract**

This submission proposes resolutions to the following LB240 CIDs 1693, 1764,1777.

History:

R0: Initial Version

R1: Updated based on 8/14/2019 teleconference.

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| 1693 | Ganesh Venkatesan | 72.32 | 9.6.7.49 | When new Public Action frames are defined, the corresponding Action field value need to be defined and Table 9-362 Public Action field values in Cl. 9.6.7.1.Similar comment applies for 9.6.7.50 and 9.6.7.51 as well. | Update Table 9-362 with a new item defining the Action field for ISTA Passive Location Measurement Report frame. Also the reference to the clause where Public Action field values are listed should be 9.6.7.1. |  |

Discussion: Most of the issues raised by this comment are addressed by submission 11-19-466r4 (updating Table 9-372). The only remaining item is fixing the reference to where the Public Action field is defined (should be 9.6.7.1 and not 9.6.8.1) in Cl. 9.6.7.49, Cl, 9.6.7.50 and Cl. 9.6.7.51.

Resolution: REVISE

***TGaz Editor: Modify reference in Cl. 9.6.7.49 as shown below:***

**9.6.7.49 ISTA Passive Location Measurement Report frame format**

The Public Action field is defined in 9.6.7.1 (Public Action frames).

***TGaz Editor: Modify reference in Cl. 9.6.7.49 as shown below:***

**9.6.7.50 Primus RSTA Broadcast Passive Location Measurement Report frame format**

The Public Action field is defined in 9.6.7.1 (Public Action frames).

***TGaz Editor: Modify reference in Cl. 9.6.7.49 as shown below:***

**9.6.7.51 Secundus RSTA Broadcast Passive Location Measurement Report frame format**

The Public Action field is defined in 9.6.7.1 (Public Action frames)

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| 1764 | Jarkko Kneckt | 93.13 | 11.22.6.4.2 | It is unclear why EDCA is part of the title: 11.22.6.4.2 (RSTA Centric EDCA based measurement scheme. Typically channel access mechanism is not mentioned in the title. AP uses EDCA when it transmits Trigger frames. | Please, rename the clause with shorter and more precise title and ensure that the same title is used throughout the spec. Avoid using EDCA as an antonym for Triggered. |  |

Discussion: Agree that EDCA is probably not the best choice. The intent was to distinguish the measurement exchange in IEEE802.11-2016 where measurements are made on Fine Timing Measurement frames that were transmitted after gaining access to the medium via EDCA mechanism from the trigger based and non-trigger based measurement exchanges in P802.11az where the measurements are made on NDP frame exchanges (and the transmission of the NDP frames do not involve gaining access to the medium via EDCA mechanisms).

Option-1: Reject based on the above argument

Resolution: REJECT. The intent is to distinguish the measurement exchange in IEEE802.11-2016 where measurements are made on Fine Timing Measurement frames that were transmitted after gaining access to the medium via EDCA mechanism from the trigger based and non-trigger based measurement exchanges in P802.11az where the measurements are made on NDP frame exchanges (and the transmission of the NDP frames do not involve gaining access to the medium via EDCA mechanisms).

Option-2: rename EDCA based measurement scheme/exchange with Fine Timing Measurement based measurement exchange (FTM based measurement exchange)

Resolution: REVISE.

Option-3: NDP versus non-NDP based measurement exchange

***TGaz Editor: Replace all “EDCA based measurement exchange” with “FTM based measurement exchange”.***

***TGaz Editor: Note that the prefix RSTA Centric is removed as a result of submission 11-19-1277r3.***

***The following are two examples of the proposed change:***

***P17L1:***

(#11-19-1277r3) FTM (#1764) based measurement exchange (11.22.6.4.2): the MLME constructs a Fine Timing Measurement frame with the specified parameters. This frame is then scheduled for transmission.

***P87L30:***

**11.22.6.3.2 FTM (#1764) based ranging session negotiation**

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| 1766 | Jarkko Kneckt | 16.20 | 6.3.56.2.3 | Please clarify why an MLME primitive is needed to be prepared to respond to a trigger frame. If such an MLME is needed, then please add MLME primitives for all trigger types. | Delete the MLME that sets a STA to be prepared to response to a specific Trigger frame type or add MLME primitive for all Trigger frame types. | REVISE. The ISTA that has an active Trigger Based FTM Session with a peer has a choice to make when the RSTA polls it with a Trigger Frame of type Ranging and subtype Poll – to participate in a TB Ranging measurement exchange or to skip it. The invocation of this primitive by the SME helps the ISTA (MAC) make the choice. |

 Discussion: The ISTA that has an active Trigger Based FTM Session with a peer has a choice to make when the RSTA polls it with a Trigger Frame of type Ranging and subtype Poll – to participate in a TB Ranging measurement exchange or to skip it. The invocation of this primitive by the SME helps the ISTA (MAC) make the choice.

Discussion: The decription of when this primitive is generated is misleading.

Resolution: REVISE

***TGaz Editor: Modify the contents of Cl. 6.3.56.2.3 When Generated as shown below:***

**6.3.56.2.3 When Generated**

***Change the following paragraph as follows (not all existing parameters in the baseline are shown):***

This primitive is generated by the SME in the context of an active FTM Session to initiate a measurement exchange. If the FTM session is:

— RSTA Centric EDCA based measurement exchange (11.22.6.4.2): the SME generates this primitive to request that a Fine Timing Measurement frame be sent to a peer entity
— Non-TB Sounding Exchange (11.22.6.4.4): the SME generates this primitive to request that a non-TB Sounding Exchange be initiated with the specified peer entity. Note that the sounding exchange initiation will be according to the MinProcessingTime and MaxToaAvailable thresholds that are defined when the corresponding FTM session was established.

— TB Sounding Exchange (11.22.6.4.3): the SME generates this primitive to request that a TB Sounding Exchange be initiated with the specified peer entity. Note that this causes the MLME to respond to the Trigger frame with type set to Location and subtype set to Polling to the specified peer entity.

***TGaz Editor: Modify the contents of Cl. 6.3.56.2.4 When Generated as shown below:***

**6.3.56.2.4 Effect of receipt**

***Change the following paragraph as follows (not all existing parameters in the baseline are shown):***
On receipt of this primitive:

— If there is no active FTM session with the specified peer entity, the MLME returns an error to the SME.

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| 1774 | Jarkko Kneckt | 80.04 | 11.22.6.1.1 | The first frame transmission from a STA in the FTM defines the STA availability. | Define whether an initiating STA or responding STA sends the first frame in the FTM session | REVISE. Incorporate the editor instructions corresponding to this comment in 11-19-1436. |

Discussion: The paragraph that defines the problem where the RSTA is not aware when the ISTA is available and the paragraph that provides a solution are separated by a Figure. Hence the confusion of which STA does the transmission. It would be better to combine both the paragraphs. In addition, there are several (some editorial and some in relation to the baseline text along with missing corresponding editor instructions) that needs to be resolved in the pertinent text.

Resolution: REVISE

**11.22.6 Fine timing measurement (FTM) procedure**

 **11.22.6.1 Overview**

***Change the following paragraphs of Clause 11.22.6.1 as shown below:***

The FTM procedure allows a STA to determine its ~~distance~~ range, relative range and its direction to or from another STA. In order for a STA to obtain its location, the STA may perform this procedure with multiple STAs whose locations are known.

An FTM session is an instance of an FTM(#1022) procedure between an initiating STA and a responding STA along with the associated scheduling and operational parameters ~~instance~~ (see 9.4.2.167 (Fine Timing Measurement Parameters element) and 9.4.2.279 (Ranging Parameters element)). An FTM session is composed of a negotiation, measurement exchange and termination. A STA might have multiple concurrent FTM sessions. Concurrent FTM sessions might occur with responding STAs that are members of different BSSs and possibly different ESSs, or possibly outside of a BSS, each session using its own scheduling, channel and operational parameters.

A responding STA (RSTA) might be required to establish overlapping FTM sessions with a large number of
initiating STAs (e.g., an AP providing measurements to STAs at a mall or a store). On the other hand, an
initiating STA (ISTA) might have multiple ongoing FTM sessions on the same or different channels with different
responding STAs, while being associated with an AP for the exchange of data or signaling.

~~To support the constraints of both the initiating and responding STAs, during the negotiation phase the initiating STA initially requests a preferred periodic time window allocation. The responding STA subsequently responds by accepting or overriding the allocation request based on its resource availability and capability.~~

Since some of the initiating STA’s activities may be nondeterministic and might have higher precedence than the FTM session (e.g., data transfer interaction with an associated AP), the FTM procedure provide scheduling mechanisms to avoid and handle such conflicts: RSTA scheduling and ISTA centric scheduling ~~a conflict might prevent the initiating STA from being available at the beginning of the burst instance determined by the responding
STA~~. In RSTA centric scheduling the RSTA assigns the ISTA a set of known availability time windows during which measurements occur, and the RSTA has full control of the measurement timing. In ISTA centric scheduling the ISTA initiates a measurement based on loose scheduling limitations provided by the RSTA.

RSTA centric scheduling is supported by legacy FTM, TB, PDMG and PEDMG ranging. ISTA centric scheduling is supported by non-TB ranging.

For EDMG STAs that have set to one the First Path Beamforming Training Supported field in the Beamforming Capability subelement, an FTM session shall be preceded by a first path beamforming training as described in 10.43.10.6 First Path Beamforming Training.

***Delete the rest of the contents of Clause 11.22.6.1 (including Figure 11-33 (Concurrent FTM Sessions)):***

~~Figure 11-33 (Concurrent FTM sessions(#1353)) shows an example of such scheduling conflicts.~~

~~The initiating STA in Figure 11-33 (Concurrent FTM sessions) establishes sessions with responding STA 1 and responding STA 2 on different channels. The sessions’ burst instance periodicity might be different as well as the STAs’ clock offsets and thus, over time, some temporal conflicts may occur. To overcome this, during each burst instance the initiating STA indicates its availability by transmitting a Fine Timing Measurement Request frame (see 11.22.6.4 (Measurement exchange)). During each burst instance, the responding STA transmits one or more Fine Timing Measurement frames as negotiated.~~

***Insert a new subclause 11.22.6.1.1 as shown below:***

**11.22.6.1.1 RSTA scheduled operation overview**

To support the constraints of both the initiating and responding STAs, during the negotiation phase the initiating STA initially requests a preferred periodic time window allocation. The responding STA subsequently responds by accepting or overriding the allocation request based on its resource availability and capability.

The initiating STA in Figure 11-33 (Concurrent FTM sessions) establishes sessions with responding STA 1 and responding STA 2 on different channels. The sessions’ burst availability window instance periodicity might be different as well as the RSTAs’ clock offsets and thus, over time, some temporal conflicts may occur. To overcome this, during each availability window the initiating STA indicates its availability.

***TGaz Editor: Insert Figure 11-33 (Concurrent FTM Sessions) here***

The method to indicate availability depends on the measurement exchange mode for the negotiated FTM session, EDCA based of Trigger based. For FTM based the availability indication is performed by the ISTA sending an FTM Request frame, for Trigger based Measurement Exchange the RSTA polls ISTAs using a Trigger frame of type Ranging and subtype Poll, to indicate their availability.

EDCA based measurement exchange is used by DMG and EDMGz STAs. Trigger Based Measurement Exchange is used by HE STAs capable of TB Ranging Measurement Exchange.

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| 1777 | Jarkko Kneckt | 81.01 | 11.22.6.1.1 | The figure 11-35 should provide the operating details of a single device ranging. If ranging is initiated, then how long time it takes to complete one ranging and are all messages transmitted within the ranging window. | Please, modify the figure 11-35 to show at least a single ranging operation is details. The figure should not focus to show how a ISTA schedules between two ranging operations, because these details are out-of-the-scope of the standard. | REJECT. Figure 11-35a is a high-level overview of how an ISTA performs ranging operation with multiple RSTAs. The details of messages exchanged within a ranging window is described in specific subclauses in 11.22.6.4 Measurement Exchange. |

Discussion: Figure 11-35a is a high-level overview of how an ISTA performs ranging operation with multiple RSTAs. The details of messages exchanged within a ranging window is described in specific subclauses in 11.22.6.4 Measurement Exchange.

Resolution: Reject.

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| 1778 | Jarkko Kneckt | 81.01 | 11.22.6.1.1 | The Figure 11-35 should show whether ISTA may skip ranging in a ranging window. | Please clarify in figure 11-35 and in the normative text that ISTA may skip FTM ranging in some availability windows. | REJECT. An ISTA may not to respond to a Trigger (Ranging Poll) if a range measurement is not needed at the time when it is polled by the RSTA. This choice is hard to depict in the Figure. However it is clearly stated in Cl. 11.22.6.4.3.2 (Polling phase of TB Ranging) “Any ISTA addressed by a User Info field in a TF Ranging Poll can request to participate in measurements in this availability window by responding with a CTS-to-self in an S-MPDU within an HE TB PPDU (#1336) in its designated RU allocation as identified in the TF Ranging Poll (see Figure 11-36c)” |

Discussion: An ISTA may not to respond to a Trigger (Ranging Poll) if a range measurement is not needed at the time when it is polled by the RSTA. This choice is hard to depict in the Figure. However it is clearly stated in Cl. 11.22.6.4.3.2 (Polling phase of TB Ranging) “Any ISTA addressed by a User Info field in a TF Ranging Poll can request to participate in measurements in this availability window by responding with a CTS-to-self in an S-MPDU within an HE TB PPDU (#1336) in its designated RU allocation as identified in the TF Ranging Poll (see Figure 11-36c)”

Resolution: Reject.