IEEE P802.11
Wireless LANs

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| 802.11[Resolutions to comment collection #28 CIDs(relative to IEEE 802.11 REVmd D1.0 and P802.11az D0.4) |
| Date: 2018-11-12 |
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**Abstract**

This submission proposes resolutions to MLME related CIDs from Comment Collection #28 (1, 2, 195, 196, 525).

History:

R0: Initial Version

R1: Added CID 2 to the list of comments addressed by this submission

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | Alireza Raissinia | 6.3.58.2.2 | 9 |  | Description of t1 needs to be updated to include HEz and VHTz behavior as well | As per comment | REVISE: apply changes described in this submission |
| 2 | Alireza Raissinia | 6.3.58.2.2 | 10 |  | Description of t4 needs to be updated to include HEz and VHTz behavior as well | As per comment |  |
| 195 | Mark Rison | 6.3.58.2.2 | 8 |  | No new parameter is apparent | Use standard 802.11 change-tracking |  |
| 196 | Mark Rison | 6.3.58.4.1 | 11 |  | No new parameter is apparent (except strange comma at 12.5) | Use standard 802.11 change-tracking. Also in 6.3.70 subclauses |  |
| 525 | Solomon Trainin | 6.3.58.2.2 | 8 |  | Seems that the existent definition should be replaced by the new text, but it is clearly stated in the editor instruction. | Make the instruction clear to substitute the text |  |

**Discussion:**

t1, t2, t3 and t4 are timestamps used by the position estimation logic. The capture of these timestamps depend on the underlying ranging protocol (802.11-2016 FTM, Trigger Based Ranging or non-Trigger Based Ranging). Add Figures 6-17b to describe the sequence of messages exchanged for non-Trigger Based Ranging and 6-17c to describe the sequence of messages exchanged for Trigger Based Ranging. Describe the timestamps generically in Cl. 6.3.56.1 and update the MLME primitives accordingly.

**Resolution: Revise. Apply changes as described below.**

**REVISE:**

***Insert Figures 6-17b and 6-17c after Figure 6-17 in Cl. 6.3.56.1:***



Figure 16-7b non-Trigger Based Sounding Exchange for Ranging



Figure 16-7c Trigger Based Sounding Exchange for Ranging

***Update the notes in Cl. 6.3.56.1 as shown below:***

NOTE 1—In Figure 6-17 (Fine timing measurement primitives and timestamps capture), t1 and t3 correspond to the point in time at which the start of the preamble for the transmitted frame appears at the transmit antenna connector. In Figures 6-17b (non-Trigger Based Sounding Exchange for Ranging) and 6-17c (Trigger Based Sounding Exchange for Ranging), t1 and t3 correspond to the point in time at which the transmitted Ranging NDP appears the transmit antenna connector. The points where the timestamps are captured are therefore not shown for the non-Trigger Based and Trigger Based Sounding Exchanges. An implementation may capture a timestamp during the transmit processing earlier or later than the point at which it actually occurs and offset the value to compensate for the time difference.

NOTE 2—In Figure 6 17 (Fine timing measurement primitives and timestamps capture), t2 and t4 correspond to the point in time at which the start of the preamble for the incoming frame arrives at the receive antenna connector. In Figures 6-17b (non-Trigger Based Sounding Exchange for Ranging) and 6-17c (Trigger Based Sounding Exchange for Ranging), t2 and t4 correspond to the point in time at which the incoming Ranging NDP arrives at the receive antenna connector. The points where the timestamps are captured are therefore not shown for the non-Trigger Based and Trigger Based Sounding Exchanges. Because time is needed to detect the frame or the relevant LTF in the preamble and synchronize with its logical structure, an implementation determines when the start of the preamble or the relevant LTF in the preamble for the incoming frame arrived at the receive antenna connector by capturing a timestamp some time after it occurred and compensating for the delay by subtracting an offset from the captured value.

NOTE 3 In the MLME-FINETIMINGMSMT.request primitive corresponding to the message exchange described in Figure 6-17 (Fine timing measurement primitives and timestamps capture), the t1, Max t1 Error Exponent, t4 and Max t4 Error Exponent parameters are set to the values in the prior MLME-FINETIMINGMSMT.confirm primitive for that Peer MAC Address and with a Dialog Token parameter equal to the Follow Up Dialog Token parameter in the request, or 0 if there was none. In the MLME-FINETIMIMGMSMT.confirm primitive the t1, Max t1 Error Exponent, t4 and Max t4 Error Exponent parameters are set to the values determined for the Fine Timing Measurement frame and its acknowledgment. This primitive is not issued if no acknowledgment is received in response to the transmitted Fine Timing Measurement frame (Fig 6-17); or if the corresponding non-Trigger Based (Fig 6-17b) or the Trigger Based (Fig 6-17c) Sounding Exchange did not complete. In the MLMEFINETIMINGMSMT.indication primitive the t1, Max t1 Error Exponent, t4 and Max t4 Error Exponent parameters are set to the values in the Fine Timing Measurement frame and the t2, Max t2 Error Exponent, t3 and Max t3 Error Exponent parameters are set to the values determined for the Fine Timing Measurement frame and its acknowledgment (Fig 6-17) or to the values in the corresponding LMR Feedback frame (Fig 6-17b and Fig 6-17c).

#### 6.3.57.2 MLME-FINETIMINGMSMT.request

***Change Cl. 6.3.57.2.1 as shown below:***

**6.3.57.2.1 Function**

This primitive requests the

1. transmission of a Fine Timing Measurement frame to a peer entity to initiate the RSTA Centric EDCA based measurement exchange (11.22.6.4.2), or
2. initiation of a Trigger Based (11.22.6.4.3 Measurement Exchange in TB mode) or a non-Tigger Based (11.22.6.4.4 Measurement Exchange in non-TB Mode) Sounding Exchange with the specified peer entity.

***Change Cl. 6.3.57.2.2 as shown below. Also, add a new column titled “Applies to nTB or TB Ranging?” and set it to No for the rows identified below; for all other rows label the corresponding cell as ‘not applicable’:***

**6.3.57.2.2 Semantics of the service primitive**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** | **Applies to nTB or TB Ranging?** |
| Dialog Token | Integer | 0-255 | The dialog token to identify the Fine Timing Measurement frame in RSTA Centric EDCA based measurement exchange (11.22.6.4.2). A value of 0 indicates the end of the FTM session | No |
| Follow Up Dialog Token | Integer | 0-255 | The dialog token of a Fine Timing Measurement frame which the current frame follows, or 0 if there is no such frame. See 11.22.6.4.2 (Fine timing measurement (FTM) procedure).  | No |
| t1 | Integer | 0 – (248 – 1) | For RSTA Centric EDCA based measurement exchange (11.22.6.4.2), the value of t1 (see Figure 6-17 (Fine timing measurement primitives and timestamps capture)) for the Fine Timing Measurement frame identified by the Follow Up Dialog Token, in units of picoseconds, or null if the Follow Up Dialog Token is 0. | No |
| Max t1 Error Exponent | Integer | 0-31 | The maximum error in the t1 value. is represented using a function of the Max t1 Error Exponent parameter as defined in Equation (9-4), or is null if the Follow Up Dialog Token is 0.  | No |
| t4 | Integer | 0 – (248 – 1) | For RSTA Centric EDCA based measurement exchange (11.22.6.4.2), the value of t4 (see Figure 6-17 (Fine timing measurement primitives and timestamps capture)) for the Fine Timing Measurement frame identified by the Follow Up Dialog Token, in units of picoseconds, or null if the Follow Up Dialog Token is 0. | No |
| Max t4 Error Exponent | Integer | 0-31 | The maximum error in the t4 value. This is represented using a function of the Max t4 Error Exponent parameter as defined in Equation (9-4), or is null if the Follow Up Dialog Token is 0.  | No |

***Change Cl. 6.3.57.2.3 as shown below:***

**6.3.57.2.3 When generated**

This primitive is generated by the SME in the context of an active FTM Session. If the FTM session is

1. 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
2. Non-Trigger Based Sounding Exchange (11.22.6.4.4): the SME generates this primitive to request that a non-Trigger Based 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.
3. Trigger Based Sounding Exchange (11.22.6.4.3): the SME generates this primitive to request that a Trigger Based 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 abd sub-type set to Polling from the specified peer entity.

***Change Cl. 6.3.57.2.4 as shown below:***

**6.3.57.2.4 Effect of receipt**

On receipt of this primitive,

1. If there is no active FTM session with the specified peer entity, the MLME returns an error to the SME
2. If there is an active FTM session where the corresponding measurement exchange is:
	1. RSTA Centric EDCA based measurement exchange (11.22.6.4.2): the the MLME constructs a Fine Timing Measurement frame with the specified
	parameters. This frame is then scheduled for transmission.
	2. Non-Trigger Based Sounding Exchange (11.22.6.4.4): the MLME generated a Ranging NDPA with the specified parameters and transmits it to the specified peer entity
	3. Trigger Based Sounding Exchange (11.22.6.4.3): the MLME responds to the next Trigger Frame with type set to Location and sub-type set to Polling from the specified peer entity

**6.3.57.3 MLME-FINETIMINGMSMT.confirm**

***Change Cl. 6.3.57.3.1 as shown below:***

**6.3.57.3.1 Function**

For RSTA Centric EDCA based measurement exchange (11.22.6.4.2), this primitive indicates that a Fine Timing Measurement frame has been received by the peer STA to which
it was sent. For Trigger Based (11.22.6.4.3 Measurement Exchange in TB mode) or non-Tigger Based (11.22.6.4.4 Measurement Exchange in non-TB Mode) Sounding Exchange this primitive indicates that the corresponding sounding exchange completed successfully with the specified peer entity; and a RSTA to ISTA Location Measurement Report is expected imminently.

***Change Cl. 6.3.57.3.2 as shown below. Also, add a new column titled “Applies to nTB or TB Ranging?” and set it to No for the rows identified below; for all other rows label the corresponding cell as ‘not applicable’:***

**6.3.57.3.2 Semantics of the service primitive**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** | **Applies to nTB or TB Ranging?** |
| **Dialog Token** | **Integer** | **0-255** | The dialog token to identify the Fine TimingMeasurement frame in RSTA Centric EDCA based measurement exchange (11.22.6.4.2). A value of 0 indicates theend of the FTM session | No |
| **t1** | **Integer** | **0-248-1** | For RSTA Centric EDCA based measurement exchange (11.22.6.4.2), the value of t1 (see Figure 6-17 (Fine timingmeasurement primitives and timestampscapture)) for the Fine Timing Measurementframe identified by the Dialog Token, in units ofpicoseconds, or null if the Dialog Token is 0 | No |
| **t1\_Error Exponent** | **Integer** | **0-31** | The maximum error in the t1 value. This isrepresented using a function of the Max t1 ErrorExponent parameter as defined in Equation (9-4),or is null if the Dialog Token is 0. | No |
| **t4** | **Integer** | **0-248-1** | For RSTA Centric EDCA based measurement exchange (11.22.6.4.2), the value of t4 (see Figure 6-17 (Fine timingmeasurement primitives and timestampscapture)) for the Fine Timing Measurementframe identified by the Dialog Token, in units ofpicoseconds, or null if the Dialog Token is 0 | No |
| **t4\_Error Exponent** | **Integer** | **0-31** | The maximum error in the t4 value. This isrepresented using a function of the Max t4 ErrorExponent parameter as defined in Equation (9-4),or is null if the Dialog Token is 0. | No |

***Change Cl. 6.3.57.3.3 as shown below:***

**6.3.57.3.3 When generated**

This primitive is generated by the MLME

1. when an Ack frame corresponding to the Fine Timing
Measurement frame is received from the peer STA, when the ranging protocol is RSTA Centric EDCA based measurement exchange (11.22.6.4.2), or
2. when the sounding exchange corresponding to the underlying nTB (11.22.6.4.4) or TB (11.24.6.4.3) sounding exchange is successfully completed