IEEE P802.11
Wireless LANs

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| --- |
| 802.11[802.11az Negotiation Protocol (Update)](relative to IEEE 802.11 REVmd D1.0 and 802.11az D0.3) |
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**Abstract**

This submission is an update to 802.11az D0.3 related to the Negotiation Protocol.

History:

R0: Initial Version

R1: Updated to conform to ‘amendment text conventions described in 18-1261’

R2: fixed typos, added Format and Bandwidth subfield to Ranging Parameters field,

R3: fixed the depiction of MaxToAAvailableExp subfield and its description

R4: fixed the depiction of MaxToAAvailableExp subfield in the HEz Specific subelement

R5: fixed error in describing the range of values allowed for MaxToAAvailableExp subfield

R6: same as R5 content-wise. This a non-macro-enabled MS-Word format of R5 (R5 was saved as a .docm file while r6 is a .docx format).

**6.3.58 Fine timing measurement**

* + - 1. **MLME-FINETIMINGMSMT.request**

**6.3.58.2.1 Function**

This primitive requests the transmission of a Fine Timing Measurement frame to a peer entity.

**6.3.58.2.2 Semantics of the service primitive**

***Insert new parameter and modify the description as shown below:***

***Note: in the table that describes the parameters not all parameters are shown.***

***802.11az Editor: Modify the parameter list as shown below:***

The primitive parameters are as follows:

MLME-FINETIMINGMSMT.request(

Peer MAC Address,
Dialog Token,
Follow Up Dialog Token,
t1,

Max t1 Error Exponent,
t4,
Max t4 Error Exponent,
FTM Synchronization Information,
LCI Report,
Location Civic Report,
Fine Timing Measurement Parameters,

Ranging Parameters,

VendorSpecific
)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** |
| Dialog Token | Integer | 0-255 | The dialog token to identify the Fine TimingMeasurement frame. A value of 0 indicates theend of the FTM session. |
| Follow Up Dialog Token | Integer | 0-255 | The dialog token of a Fine Timing Measurementframe which the current frame follows, or 0 ifthere is no such frame. See 11.22.6 (Fine timingmeasurement (FTM) procedure).  |
| t1 | Integer | 0–(248–1) | The value of t1 (see Figure 6-17 (Fine timingmeasurement primitives and timestampscapture)) for the Fine Timing Measurementframe identified by the Follow Up Dialog Token,in units of picoseconds, or null if the Follow UpDialog Token is 0. |
| Max 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 Follow Up Dialog Token is 0.  |
| t4 | Integer | 0–(248–1) | The value of t4 (see Figure 6-17 (Fine timingmeasurement primitives and timestampscapture)) for the Fine Timing Measurementframe identified by the Follow Up Dialog Token,in units of picoseconds, or null if the Follow UpDialog Token is 0. |
| Max 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 Follow Up Dialog Token is 0.  |
| FTM Synchronization Information | As defined in9.4.2.173 (FTMSynchronizationInformationelement) | As defined in9.4.2.173 (FTMSynchronizationInformationelement) | Optional element to report synchronizationinformation of sender. Not present if NGP Parameters is included in thr request. |
| Fine Timing Measurement Parameters | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | Optional element containing the requested FTMconfiguration |
| Ranging Parameters | As defined in 9.4.2.246 (Ranging Parameters) | As defined in 9.4.2.246 (Ranging Parameters) | Optional element containing theconfiguration for the proposed NDP sounding based ranging session |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| VendorSpecific | A set of elements | As defined by9.4.2.26 (VendorSpecific element) | Zero or more elements |

**6.3.58.4 MLME-FINETIMINGMSMT.indication**

**6.3.58.4.1 Function**
This primitive indicates that a Fine Timing Measurement frame has been received and the corresponding Ack frame has been transmitted.

***Insert new parameter and modify the description as shown below:***

***Note: in the table that describes the parameters not all parameters are shown.***

***802.11az Editor: Modify the parameter list as shown below:***

**6.3.58.4.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-FINETIMINGMSMT.indication(

Peer MAC Address,
Dialog Token,
Follow Up Dialog Token,
t1,
Max t1 Error Exponent,
t4,
Max t4 Error Exponent,
t2,
Max t2 Error Exponent
t3,
Max t3 Error Exponent,
FTM Synchronization Information,
LCI Report,
Location Civic Report,
Fine Timing Measurement Parameters,

Ranging Parameters,

VendorSpecific

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type**  | **Valid Range** | **Description** |
| Fine Timing Measurement Parameters | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | Optional element containing the requested FTMconfiguration |
| Ranging Parameters | As defined in 9.4.2.246 (Ranging Parameters) | As defined in 9.4.2.246 (Ranging Parameters) | Optional element containing theconfiguration for the proposed NDP Sounding based ranging session |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| VendorSpecific | A set of elements | As defined by9.4.2.26 (VendorSpecific element) | Zero or more elements |

**6.3.70 Fine timing measurement request**

**6.3.70.1 General**

The following set of primitives supports triggering a FTM procedure or stopping an ongoing FTM procedure.

**6.3.70.2 MLME-FINETIMINGMSMTRQ.request**

**6.3.70.2.1 Function**

This primitive requests the transmission of a Fine Timing Measurement Request frame to a peer entity.

6.3.70.2.2 Semantics of the service primitive

The primitive parameters are as follows:

***Insert new parameters as shown below:***

***802.11az Editor: Modify the parameter list as shown below:***

MLME-FINETIMINGMSMTRQ.request(

Peer MAC Address,
Trigger,
LCI Request,
Location Civic Request,
Fine Timing Measurement Parameters,

Ranging Parameters,

Vendor Specific
)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** |
| Fine Timing Measurement Parameters | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | Optional element containing the requested FTMconfiguration |
| Ranging Parameters | As defined in 9.4.2.246 (Ranging Parameters) | As defined in 9.4.2.246 (Ranging Parameters) | Optional element containing theconfiguration for the requested NDP Sounding based ranging session |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| VendorSpecific | A set of elements | As defined by9.4.2.26 (VendorSpecific element) | Zero or more elements |

**6.3.70.3 MLME-FINETIMINGMSMTRQ.indication**

**6.3.70.3.1 Function**

This primitive indicates that a Fine Timing Measurement Request frame has been received and the corresponding Ack frame has been transmitted.

**6.3.70.3.2 Semantics of the service primitive**

***Insert new parameters as shown below:***

***802.11az Editor: Modify the parameter list as shown below:***

The primitive parameters are as follows:

MLME-FINETIMINGMSMTRQ.indication(

Peer MAC Address,
Trigger,
LCI Request,
Location Civic Request,
Fine Timing Measurement Parameters,

Ranging Parameters,

Vendor Specific
)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** |
| Fine Timing Measurement Parameters | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | As defined in9.4.2.168 (FineTimingMeasurementParameterselement) | Optional element containing the requested FTMconfiguration |
| Ranging Parameters | As defined in 9.4.2.246 (Ranging Parameters) | As defined in 9.4.2.246 (Ranging Parameters) | Optional element containing theconfiguration for the requested NDP Sounding based ranging session |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |
| VendorSpecific | A set of elements | As defined by9.4.2.26 (VendorSpecific element) | Zero or more elements |

# 9

### 9.4.2 Elements

9.4.2.1 General

***Edit the row describing Fine Timing Measurement Paramaters in Table 9-77 (Element IDs) as shown below (header row shown for convenience):***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | Element ID | Element ID Extension | Extensible | Fragmentable |
| Fine Timing Measurement Parameters(see 9.4.2.166 (Fine Timing MeasurementParameters element)) | 206  | N/A  | subelements  | No(11ai) |

***Insert the following new rows into Table 9-77 (Element IDs) (header row shown for convenience):***

***802.11az Editor: Modify the Element IDs list as shown below:***

Table 9-77 -- Element IDs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID Extension** | **Extensible** | **Fragmentable** |
| Ranging Parameters  | 255 | <ANA> | Yes | No |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Secure LTF Parameters | 255 | <ANA> | Yes |  |
| Ranging CSI Information | 255 | <ANA> | Yes |  |

#### 9.4.2.166 Fine Timing Measurement Parameters element

***Change Figure 9-605 as shown below:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Fine Timing Measurement Parameters | Optional subelements |
| Octets | 1 | 1 | 9 | Variable |

Figure 9-605 -- Fine Timing Measurement Parameters element format

***Insert after the last paragraph of 9.4.2.166 the following:***

The Optional Subelements field contains zero or more subelements. The subelement format and ordering of subelements are defined in 9.4.3 (Subelements). The Subelement ID field values for the defined subelements are shown in Table 9-4.a (Optional subelement IDs for Fine Timing Measurement Parameters).

Table 9.4.a -- Optional Subelement IDs for Fine Timing Measurement Parameters

|  |  |  |
| --- | --- | --- |
| Subelement ID | Name | Extensible |
| 0 | DMG Direction Measurement Parameters | Yes |
| 1 | EDMG Direction Measurement Parameters | Yes |
| 2-220 | Reserved |  |
| 221 | Vendor Specific |  |
| 222-255 | Reserved |  |

The DMG Direction Measurement Parameters subelement is included in the initial FTM request to describe the requested set of parameters that the initiator proposes to use and in the initial FTM frame from the responder when either STA is a non-EDMG STA.

The format of the Data field of the DMG Direction Measurement Parameters subelement is shown in 9-4.c (DMG Direction Measurement Parameters Data field format)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B1 | B2 | B3 | B4 | B5 B10 | B11 B13 | B14 B16 |
|  | I2R AOA Request | R2I AOA Request | I2R AOD Request | R2I AOD Request  | L-RX  | Direction Measurement Density | Reserved |
| bits: | 1 | 1 | 1 | 1 | 6 | 3 | 3 |

Figure 9.4.c - DMG Direction Measurement Parameters Data field format

A value of 1 in the I2R AOA Request subfield indicates a request for FTM initiator to FTM responder Angle of Arrival measurement.

A value of 1 in the R2I AOA Request subfield indicates a request for FTM responder to FTM initiator Angle of Arrival measurement.

A value of 1 in the I2R AOD Request subfield indicates a request for FTM initiator to FTM responder Angle of Departure measurement.

A value of 1 in the R2I AOD Request subfield indicates a request for FTM responder to FTM initiator Angle of Departure measurement.

The L-RX field indicates how many TRN-units are requested by the sender for Angle of Arrival measurements. The interpretation of this field is explained in 9.5.4 (BRP Request field).

The Direction Measurement Density indicates how often in a burst a direction measurement is performed. The interpretation of the values is defined in Table 9-4.d (Direction Measurement Density field interpretation)

Table 9-4.d Direction Measurement Density field interpretation

|  |  |
| --- | --- |
| Value | Interpretation |
| 0 | Only the first FTM measurement exchange in a burst is a direction measurement |
| 1 | Every measurement in a burst is a direction measurement |
| 2 | Every second measurement in a burst is a direction measurement |
| 3 | Every 4th measurement in a burst is a direction measurement |
| 4 | Every 8th measurement in a burst is a direction measurement |
| 5-7 | Reserved |

The EDMG Direction Measurement Parameters subelement is included in the initial FTM request to describe the requested set of parameters that the initiator proposes to use and in the initial FTM frame from the responder when both STA are EDMG STAs.

The format of the Data field of the EDMG Direction Measurement Parameters subelement is shown in 9-4.f (EDMG Direction Measurement Parameters Data field format)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B1 | B2 | B3 | B4 | B5 B12 | B13 B15 | B16 |
|  | R2I AOA Request | I2R AOA Request | I2R AOD Request | R2I AOD Request  | L-RX  | Direction Measurement Density | Reserved |
| bits: | 1 | 1 | 1 | 1 | 8 | 3 | 1 |

Figure 9-4.f EDMG Direction Measurement Parameters Data field format

All the fields definitions are the same as in the definition of DMG Direction Measurement Data field format.

***TGaz Editor: Modify the Cl. 9.4.2.246:***

9.4.2.246 Ranging Parameters

The Ranging Parameters element contains a set of fields. The Ranging parameters element is optionally included in the initial Fine Timing Measurement Request frame, as described in 9.6.7.32 (Fine Timing Measurement Request frame format), and the initial Fine Timing Measurement frame, as described in 9.6.7.33 (Fine Timing Measurement frame format). The use of the Ranging Parameters element is described in 11.22.6 (Fine timing measurement (FTM) procedure).

The format of the Ranging Parameters element is shown in 9-610a (Ranging Parameters element format).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID (255) | Length | Element ID Extension | Ranging Parameters | Ranging subelements |  |  |  |  |
| **Octets** | 1 | 1 | 1 | <3> | variable | <TBD> | <TBD> |  |  |

Figure 9-610a Ranging Parameters element format

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1 (General).

The format of the Ranging Parameters field is shown in 9-610b (Ranging Parameters field)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Status Indication | Value | Secure LTF Required | ~~Reserved~~ Secure LTF Support  | ISTA2RSTA LMR Feedback | Format and Bandwidth | Number of Antennas |
| Bits | 2 | 5 | 1 | 1 | 1 | 6 | 8 |

Figure 9-610b Ranging Parameters field format

The Status Indication field indicates the responding STA’s response to the Fine Timing Request. The encoding of the Status Indication field is shown in Table 9-272 (Status Indication field values).

The Status Indication field and Value field are reserved in the initial Fine Timing Measurement Request frame. When the Status Indication field is set to 3 by the responding STA, the Value field contains a duration in units of seconds; otherwise the Value field is reserved.

The Secure LTF Required field is set to 1 to enable a secure LTF measurement exchange between an ISTA and an RSTA. Otherwise the Secure LTF Required field is set to 0.

The Secure LTF Support field is set to 1 in the initial Fine Timing Measurement Request frame to indicate that an ISTA supports a secure LTF measurement exchange. Otherwise the Secure LTF Support field is set to 0. The Secure LTF Support field is reserved in the initial Fine Timing Measurement frame (see 11.22.6.3 (Fine timing measurement procedure negotiation)).

***802.11az Editor: Insert a new paragraph describing the ISTA2RSTA LMR Feedback subfield as shown below:***

The ISTA2RSTA LMR Feedback subfield in the Ranging Parameters field is set to 1 in the Initial Fine Timing Measurement Request frame indicates that the ISTA is willing to report the estimated LMR to the RSTA; when included in the Initial Fine Timing Measurement frame indicates that the RSTA requires a LMR report from the ISTA at the end of each ranging exchange. Otherwise the ISTA2RSTA LMR Feedback subfield is set to 0. See 11.22.6.4.2.4 (HEz Measurement Reporting Part) and 11.22.6.4.3.3 (Measurement Report)

The Format and Bandwidth subfield indicates the requested or allocated PPDU format and bandwidth used to transmit the uplink and downlink NDP frames exchanged as part of the VHTz or HEz ranging protocol (See 11.22.6.4.2 (Measurement exchange in HEz mode) and 11.22.6.4.3 (Measurement exchange in VHTz mode)). The encoding of this subfield is <TBD>

The Number of Antennas subfield is 8 bits wide where bits 0 thru 3 indicate the number of transmit antennas and bits 4 thru 7 indicate the number of receive antennas.

***802.11az Editor: Modify the rest of Cl. 9.4.2.246 as shown below:***

The Ranging subelements field contains one or more subelements. The subelement format and ordering of the subelements are defined in 9.4.x (Sublements). The Subelement ID field values for the defined subelements are shown in Table 9-4.x (Ranging subelement IDs for Ranging Parameters).

Table 9.4.x -- Ranging Subelement IDs for Ranging Parameters

|  |  |  |
| --- | --- | --- |
| Subelement ID | Name | Extensible |
| 0 | VHTz-specific subelement | Yes |
| 1 | HEz-specific subelement | Yes |
| 2-220 | Reserved |  |
| 221 | Vendor Specific |  |
| 222-255 | Reserved |  |

The VHTz Specific Parameters subelement is included in the initial FTM Request to describe the requested set of parameters that the initiator proposes to use and in the initial FTM, if the initiator and the responder successfully negotiate and FTM session where the megotiated ranging protocol is VHTz

The format of the VHTz Specific subelement is as shown in Table 9-610c (VHTz Specific subelement format)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Subelement ID (0) | Length | MinTimeBetween Measurements (#Ed) | MinToAReady | Reserved | MaxToAAvailableExp (#Ed) |
| **Bits** | 8 | 8 | 8 | 8 | 4 | 4 |

Figure 9-610c VHTz Specific subelement format

The Element ID and Length fields are defined in 9.4.3 (Subelements).

The MinTimeBetweenMeasurements field is one octet wide and indicate the minimum time between subsequent range measurements initiated by an ISTA, in units of 100 microseconds. The the MinTimeBetweenMeasurements field is set the same value as the MinToAReady field if the MinToAReady field value is nonzero.

The MinToAReady field is one octet wide and indicate respectively the minimum time the responder requires to compute the ToA value, in units of 100 microseconds. When set to a nonzero value indicates a delayed response, in which case the ToD and ToA values in the corresponding LMR frame are from the previous range measurement. The MinToAReady field value 0 indicates an immediate response, in which case the ToD and ToA values included in the corresponding Location Measurement Report (LMR) frame are from the current range measurement. The MinToAReady field is reserved in an initial FTM Request frame.

The MaxToAAvailableExp field is four bits wide and indicates the maximum time duration for which the responder retains the computed ToA value. The MaxToAAvailableExp field is reserved in an initial FTM Request frame.

Maximum time duration for which the responder retains the computed ToA value = 2^(MaxToAAvailableExp+8) milliseconds. The range of valid values for MaxToAAvailableExp is 0 to 15 with corresponding maximum time duration values ranging from 256 msecs to 140 minutes.

The HEz Specific Parameters subelement is included in the initial FTM Request to describe the requested set of parameters that the initiator proposes to use and in the initial FTM, if the initiator and the responder successfully negotiate and FTM session where the negotiated ranging protocol is HEz

The format of the HEz Specific subelement is as shown in Figure 9-610d (HEz Specific subelement format)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Subelement ID (1) | Length | Availability Window | Ranging ID | Response | Reserved | MaxToAAvailableExp (#Ed) | BSS Color |
| **Octets** | 8 | 8 | TBD | 16 | 1 | 3 | 4 | 8 |

Figure 9-610d HEz Specific Parameters subelement format

The Element ID and Length fields are defined in 9.4.3 (Subelements).

The definition of Availability Window is TBD

The Ranging ID is the same as the AID if the initiator is associated with the responder; and is similar to AID and is assigned by the responder to identify the unassociated initiator. The Ranging ID and the AID are derived the same space and are non-conflicting.

The Response field is either set to 0 or 1, indicating Immediate or Delayed response. If the Response field is set to Immediate then the ToD andToA values included in the corresponding Location Measurement Report (LMR) frame are from the current range measurement; and if the Response field is set to Delayed then the ToD and ToA values in the corresponding LMR frame are from the previous range measurement.

The MaxToAAvailableExp field is the same as described under VHTz Specific subelement.

The BSS Color field is an unsigned integer in the range 1 to 63 whose value is set to the same BSS Color value contained in the HE Operation element that an RSTA transmit.

One or more of the VHTz specific or the HEz specific subelements are included in the initial FTM Request. Only one of the VHTz specific or the HEz specific subelement shall be included in the Ranging Parameters element contained in the initial FTM and indicates the range measurement protocol selected by the responder for the negotiated FTM session.

*802.11az Editor: Delete Cl. 9.4.2.247 through Cl. 9.4.2.250*

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***Modify clause after 9.6.7.32 as shown below:***

**9.6.7.32 Fine Timing Measurement Request frame format**

***Add a new column to Figure 9-812 as shown below:***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category | Public Action | Trigger | LCI Measurement Request (optional) | Location Civic Measurement Request (optional) | Fine Timing Measurement Parameters (optional) | Ranging Parameters (optional) |
| Octets | 1 | 1 | 1 | variable | variable | variable | variable |

Figure 9-809 Fine Timing Measurement Request Action field format

***Change the last paragraph of Clause 9.6.7.32 as shown below:***

The Fine Timing Measurement Parameters field is present in the initial Fine Timing Measurement Request frame (see 11.22.6.3 (Fine timing measurement procedure negotiation)) and its retransmissions if the initiator requests negotiation of parameters with the responder in order to perform FTM, DMGz and/or EDMGz Ranging protocol(s) 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 9.4.2.166 (Fine Timing Measurement Parameters element).

***Insert after the last paragraph of Clause 9.6.7.32 the following:***

The Ranging Parameters field is present in the initial Fine Timing Measurement Request frame (see 11.22.6.3 (Fine timing measurement procedure negotiation)) and its retransmissions if the initiator requests negotiation of parameters with the responder in order to perform VHTz and/or HEz Ranging protocol(s) with the responder in the ranging phase. If present, it contains a Ranging Parameters element as defined in 9.4.2.246 (Ranging Parameters).

**9.6.7.33 Fine Timing Measurement frame format**

*802.11az Editor: Rename the Next Generation Positioning Parameters column to Ranging Parameters in Figure 9-810 as shown below:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category | Public Action | Dialog Token | Followup Dialog Token | ToD | ToA | ToD Error |
| Octets | 1 | 1 | 1 | variable | variable | variable | 1 |
|  | ToA Error | LCI Report (optional) | Location Civic Report (optional) | Fine Timing Measurement Parameters (optional) | Fine Timing Measurement Synchronization Information (optional) | Ranging Parameters (optional) | Secure LTF Parameters (optional)  |
| Octets | 1 | 1 | Variable | variable | variable | variable | <TBD> |

Figure 9-810 Fine Timing Measurement Action field format

***Change the last-2 paragraph of Clause 9.6.7.33 the following:***

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 if the responder selects Fine Timing Measurement, DMGz or EDMGz as the ranging protocol for the ranging phase, and is not present in subsequent Fine Timing Measurement frames. If present, it contains a Fine Timing Measurement Parameters element as defined in 9.4.2.166 (Fine Timing Measurement Parameters element).

***Insert after the last paragraph of Clause 9.6.7.33 the following:***

The Ranging Parameters field is present in the initial Fine Timing Measurement Frame if the responder selects VHTz or HEz ranging protocols for the ranging phase, and is not present n subsequent Fine Timing Measurement frames. If present, it contains a Ranging Parameters element as defined in 9.4.2.246 (Ranging Parameters).

***Insert after the last paragraph of Clause 9.6.7.33 the following:***

The Secure LTF Parameters field is present in the initial Fine Timing Measurement frame if the responder has received the initial Fine Timing Measurement Request frame where the Secure LTF Required subfield of the NGP Parameters field is equal to 1. The Secure LTF Parameters field is optionally present in the initial Fine Timing Measurement frame if the responder has received the initial Fine Timing Measurement Request frame where the Secure LTF Support subfield of the NGP Parameters field is equal to 1. Otherwise, it not present. If present, it contains a Secure LTF Parameters element as defined in 9.4.2.251 (Secure LTF Parameters).

11.22.6 Fine timing measurement (FTM) procedure

***Change the subclause 11.22.6.1 as follows:***

11.22.6.1 Overview

The FTM procedure allows a STA to determine its distance and (for DMGz and EDMGz STAs) 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 a FTM procedure between an initiating STA and a responding STA along with the associated scheduling and operational parameters of that instance (see 9.4.2.168 (Fine Timing Measurement Parameters element)) and 9.4.2.246 (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.

*Change Clause 11.22.6.3 as shown below:*

**11.22.6.3 Fine timing measurement procedure negotiation**

***Change the 3rd and 4th paragraphs as follows:***

The initial Fine Timing Measurement Request frame shall have:

— the Trigger field set to 1,

— a set of scheduling parameters in a Fine Timing Measurement Parameters element or a set range measurement parameters in a Ranging Parameters element that describe the initiating STA’s availability for measurement exchange.

The first Fine Timing Measurement frame in the FTM session is called the *initial* Fine Timing Measurement frame. The responding STA should transmit an initial Fine Timing Measurement frame within 10 ms in response to the initial Fine Timing Measurement Request frame. This initial Fine Timing Measurement frame shall include the Fine Timing Measurement Parameters element or a Ranging Parameters element. The FTM parameters element includes a DMGz Specific subelement or the EDMGz Specific subelement if the Measurement Exchange (11.22.6.4 Measurement Exchange) is performed over a 60 GHz link. If a Ranging Parameters element is included in the initial Fine Timing Measurement frame, it shall contain one of the VHTz Specific subelement or the HEz Specific subelement. The value of the Status Indication field indicates the outcome of the request.

***802.11az Editor: Modify the third paragraph of Cl. 11.22.6.4.4.3 Measurement Report as shown below:***

An ISTA shall not initiate a new measurement exchange sequence until the minimum time interval between subsequent range measurements specified in the MinTimeBetweenMeasurements field in the VHTz Specific subelement subfield in the Ranging Parameters field in an initial Fine Timing Measurement frame has expired.