IEEE P802.11
Wireless LANs

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**Abstract**

This submission proposes resolutions of comments received from TGaz CC28.

* CIDs: 36, 61, 62, 63, 65, 98, 99, 100, 154, 155, 156, 157, 158, 159, 160, 161, 164, 166, 173, 174, 296, 301, 302, 303, 304, 306, 309, 311, 312, 317, 319, 320, 325, 326, 338, 366, 367, 368, 369, 370, 371, 373, 374, 375, 376, 377, 378, 383, 385, 469, 529, 531, 532, 537, 544 (total 55 CIDs)

The comments are based on TGaz Draft 0.4 and the proposed changes are relative to TGaz Draft 0.5 and TGmd Draft 1.0.

Revision 0: initial draft

Revision 1 : minor correction

Revision 3: Adopted updates from docs:

11-18-1742-04-00az-cc28-cr-hez-protocol-rewrite-hez-protocol-rewrite and

11-18-1741-03-00az-cc28-cr-vhtz-protocol-rewrite

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 36 | 11.22.6.1.1 | 46 | Remove VHTz as it is not RSTA centric channel access mechanism | As per comment | Accepted.Section 11.22.6.1 updated with two channel access mechanism. Section 11.22.6.1.1 has only ‘RSTA centric schedule’ specific details |
| 61 | 11.22.6.3.1 | 49 | Proposed rewording hopefully with some greater clarity? Is this an XOR or just an OR? Because the list of conditions goes on to specify that the ISTA can choose whether to impose non-ASAP operation, what would happen if the ISTA does have such an element in its Request, but the RSTA doesn't and also does not support non-ASAP? | Change to "If the Fine Timing Measurement Request frame or the first Fine Timing Measurement Response frame include a Fine Timing Measurement Parameters element, then the following constraints apply:"Also resolve the other issue somehow? | Rejected: This clause has been removed from D0.5Line 30 Draft 0.4 allows RSTA to be non-ASAP if it doesn’t support ASAP |
| 62 | 11.22.6.3.1 | 49 | The transmitter of the FTM Request is already settled for the purpose of these conditions and should be a "The STA". The same goes for the receiver of the FTM Request and trasnmitter of the FTM Response (initial FTM frame): it's a known STA(?). It's not entirely clear to me why an ISTA shall support non-ASAP operation, but is free to choose whether or not to force the non-AP RSTA to use non-ASAP? | As in comment. | Rejected: negotiations is biased towards making andshake ASAP if exchange is happening between non-AP STAs. Whereas if one party is AP then decision of ASAP/non-ASAP is left to AP based on its capability.ASAP is not relevant for TB and non-TB based location measurement. |
| 63 | 11.22.6.3.1 | 48 | Because of the distinction between initiating STA (ISTA) and responding STA (RSTA) the terminology "initial FTM frame" to indicate the response to an FTM Request frame is unfortunately. Why is it not an FTM Response frame? | Change occurrences of "initial FTM frame" to "first FTM Response frame". | Rejected: first FTM frame is also used for negotiation and hence call initial FTM |
| 65 | 11.22.6.3.2 | 50 | It's not clear why the Secure LTF Required subfield set to 1 is optional if the capability exists, and it's not clear what happens if the RSTA requires Secure LTF but the ISTA doesn't (p. 51, line 1-8 appear to give the RSTA the responsibility to handle Secure LTF if it so desires or if it requested to do so?). | Require (make non-optional) Secure LTF? Power-to-the-RSTA should at least be considered/justified. | Accepted: more clarity added in section  |
| 98 | 11.22.6.2 | 47 | "DMG Range Measurement" this field does not exist in the extended capabilities element | Add this field to the extended capabilities element | Accepted: field is added in Table 9-283—Extended Capabilities element |
| 99 | 11.22.6.2 | 47 | "EDMG Range Measurement" this field does not exist in the extended capabilities element | Add this field to the extended capabilities element | Accepted: field is added in Table 9-283—Extended Capabilities element |
| 100 | 11.22.6.2 | 47 | "DMG Ranging Supported subfield of the Beamfoming Capability field in the Extended Capabilities field" - no such field defined | Add this field to the EDMG extended capabilities element | Rejected: comment doesn’t match D0.5 section |
| 154 | 11.22.6 |  | move NDP ranging to a separate subclause. | As in comment. | Rejected: comment doesn’t match to section.  |
| 155 | 11.22.6 |  | The changes to 11baseline is not accurate, e.g. EDMGz is not labeled as the new adding. | make sure that the new text is labelled correctly. | Rejected: specifics of comment is not clear |
| 156 | 11.22.6 |  | The text is not applicable to FTM STA, e.g. ISTA centric method. | define the applicable type of STAs for each method. | Rejected: what is FTM STA is not specified in comment. In any exchange there is initiating and responding STA and accordingly they are named as ISTA and RSTA respectively.  |
| 157 | 11.22.6.1.1 |  | This is not true for VHTz. | Rewrite the sentence. | Accepted: resolution similar to CID36. EDCA channel access text is moved out of RSTA Centric description |
| 158 | 11.22.6.1.1 |  | The text is in line with FTM which his not in line with Hez, VHTz. | Rewrite the subcaluse. | Accepted: medium access related text which is specific to HEz, VHTz is moved out of this section and positioned in “11.22.6.1 Overview”. RSTA centric operation is defined in indepent section. Refer resolution of CID 36 |
| 159 | 11.22.6.1.2 |  | There is no such thing of conflict period of available window in VHTz ranging. | Redraw the figure. | Accepted: new figure and text included.Availability window concept for non-TB is not fully finalized. This topic is discussed in 1986r1  |
| 160 | 11.22.6.2 |  | A MIB variable should be defined for VHTz support. | As in comment. | Accepted. Defined MIB variable dot11NonTriggerBasedRangingImplemented |
| 161 | 11.22.6.2 |  | A MIB variable should be defined for HEz support. | As in comment. | Accepted. Defined MIB variable dot11TriggerBasedRangingImplemented |
| 164 | 11.22.6.3.1 |  | Whether the request is successful or not, the request should include the bandwidth and format information. | Fix the issue mentioned in the comment. | Rejected: if request is not successful, FTM session ends. There is no use of bandwidth and format information. This text is removed from D0.5 |
| 166 | 11.22.6.3.1 |  | The following text "a new LTF Generation SAC and a new LTF Sequence Generation Information associated with the LTF Generation SAC" is not good. | change to "An initial Fine Timing Measurement frame shall contain a Secure LTF Parameters field when one of the following conditions is met" | Accepted.  |
| 173 | 11.22.6.4.3.3 |  | it may not be possible to transmit downlink LMR in DL MU PPDU, e.g. when a single STA finishes Hez ranging with the AP. | Fix the issue mentioned in the comment. | Accepted. HE SU PPDU can be used by RSTA is single ISTA complets exchange successfully |
| 174 | 11.22.6.4.3.3 |  | The sentence is not needed since the suclause is about LMR feedback discussion. | Remove the sentence. | Rejected. Section is about Measurement reporting phase. Hence LMR discussion is appropriate here |
| 296 | 11.22.6.1.1 |  | If "burst instance" is being changed to "availability window instance", it should be changed everywhere (including in the baseline) | As it says in the comment | Rejected: change already present in Draft 0.5 |
| 301 | 11.22.6.1.1 |  | What's "an FTM Request"? If it's a frame, say which and say "frame" | As it says in the comment | Accepted. “Frame” added post “FTM request”. Refere CID 36 resolution |
| 302 | 11.22.6.1.1 |  | "In HEz" should be "In trigger based channel access" | As it says in the comment | Accepted. Change already part of Draft 0.5  |
| 303 | 11.22.6.1.1 |  | Duplicate of sentence at line 14 | Delete sentence starting at line 12 | Accepted. Change as suggested. Refere CID 36 resolution |
| 304 | 11.22.6.1.1 |  | The FTMR is sent at the start of the burst instance (or whatever that's called now) | Say so, as is said for TBCA | Rejected: this is duplicate line removed. Refere CID 36 resolution |
| 306 | 11.22.6.1.2 |  | "ISTA centric scheduling FTM operation is called VHTz operation" is not clear. Is this trying to say that the only ISTA centric mode is one used with VHTz (I note VHTz can also use RSTA centric mode, per 46.9) | Clarify | accepted. Revised section 11.66.6.1 and 11.22.6.1.1;Refer resolution of CID36ISTA centric & RSTA centric sections are separated out |
| 309 | 11.22.6.1.2 |  | F11-35a seems to suggest that FTM frames cannot be sent at times where both RSTAs are available, but there is no justification and indeed the text below suggests either RSTA would be available if addressed during those times | Show one double-ended arrow overlapping with one dotted bubble | WIP: clarification added as suggested in comment. Need more discussion on availiabity window for non-TB mode |
| 311 | 11.22.6.2 |  | "Single User Range Measurement field of the Extended Capabilities element" -- no such field. Ditto "Multi User" | Add to EC element | Accepted. Resolution as per CID 160 & 161 |
| 312 | 11.22.6.2 |  | " DMGz Ranging, it shall set the DMG Range Measurement field of the ExtendedCapabilities element to 1. Otherwise it shall set the Multi User Range Measurement field of the Extended Capabilities element to 0" -- wrong field | Change "Multi User Range Measurement field" to "DMG Range Measurement field". Ditto at line 15 for EDMG | Rejected: comment doesn’t match with Draft 0.5. The text has be amended from draft 0.5 |
| 317 | 11.22.6.2 |  | Two things look suspect with e). It's for the same case as d). The subfield referred to does not exist | Refer to the EDMG Ranging Supported subfield, and merge with d) | Accepted: change already present in Draft 0.5Duplicate text removed |
| 319 | 11.22.6.3.1 |  | What is a "range measurement parameter"? Also missing preposition | Clarify, and prepend "of" | Accepted. Added “of” in statement. Reference to Ranging Parameter is added |
| 320 | 11.22.6.3.1 |  | "FTM parameters element" | "Fine Timing Measurement Parameters" element | Accepted. Already part of Draft 0.5 |
| 325 | 11.22.6.3.2 |  | "in the Ranging Parameters field" -- but there might not be such a field. Ditto "the Ranging Parameters field" below. Ditto next page | Maybe change "the" to "a", or say "if present" | Rejected: section discusses “Secure LTF measurement setup. Ranging Parameter field must be there to enable this handshake |
| 326 | 11.22.6.3.2 |  | " when one of the following conditions is met:" -- what if both are? | Change to "when at least one of the following conditions is met" | Accepted: wording change to “any”. Also details table added explaining frame schange. Please refere CID 166 resolution |
| 338 | 11.22.6.4.1 |  | "RSTA centric EDCA based" is confusing -- is there any EDCA-based mode that is not RSTA-centric? | Change to "FTM, DMGz and EDMGz scheduling mode". Ditto heading for 11.22.6.4.2 | Accepted.  |
| 366 | 11.22.6.4.3.3 |  | " The Location Measurement part iscomposed by one or more TF of type Location subtype Sounding allocating uplink resources toone or more ISTAs." -- is it Location Measurement of Range Measurement Sounding? | Pick one term, make it lowercase, and use it consistently everywhere. Oh, and "composed of" not "composed by" | Accepted. This change is already present in 11-18-1742 r4 |
| 367 | 11.22.6.4.3.3 |  | What is "Code" in the Figure? | Clarify. Oh, and "Freqeuncy" -> "Frequency" on the vertical axis | Accepted. This change is already present in 11-18-1742 r4 |
| 368 | 11.22.6.4.3.3 |  | " The Location Measurement part iscomposed by one or more TF of type Location subtype Sounding allocating uplink resources toone or more ISTAs. Each TF Location Sounding frame shall be (#Ed) followed by one or moreuplink NDP multiplexed in the frequency (the detail is TBD) and/or spatial stream domain (#Ed).SIFS time after the last UL sounding, the RSTA shall transmit an NDPA frame followed by a DL 7NDP sounding frame. " is not clear. What is "the last UL sounding"? "is composed by" -- it contains other things | Say something like "The location measurement part consists of a SIFS-separated sequence of one or more location measurement subparts. Each location measurement subpart consists of a Location Sounding Trigger frame [will need to explain somewhere this means type Location subtype Sounding] transmitted by the RSTA, followed by UL NDPs from the ISTAs, followed after SIFS by an NDP Announcement frame from the RSTA, followed after SIFS by DL NDPs from the RSTA." | Accepted. This section is rewritten in 11-18-1742 r4 |
| 369 | 11.22.6.4.3.3 |  | "a DL NDP sounding frame" -- what is this? | Clarify (and is it a frame or an NDP?) | Accepted. This section is re-written in 11-18-1742 r4 |
| 370 | 11.22.6.4.3.3 |  | " Using P-matrix " -- the surrounding text makes no reference to this | Clarify what this means for the location measurement part, and what other things could be used instead | Accepted. This change is already present in 11-18-1742 r4 |
| 371 | 11.22.6.4.3.3 |  | "The DL NDP is used by all ISTA taking part in the exchange. " -- but the figure shows more than one DL NDP, so which is "the DL NDP"? On the other hand it says "the RSTA shall transmit an NDPA frame followed by a DL NDP sounding frame" which suggests only one DL NDP | Clarify. It seems to me that each ISTA has its own dedicated DL NDP, no? | Rejected. DL NDP is time multiplexed spatially multiplexed. Ranging NDPA allocate LTF using offset, DL N\_STA and DL Rep |
| 373 | 11.22.6.4.3.3 |  | The figure shows a sequence of SIFS-separated transmissions. Will they fit within the TXOP limit? | Clarify what to do if the sequence does not fit within the TXOP Limit, and which AC's TXOP Limit is used. Also add a SIFS arrow between the first two transmissions | Accepted. This change is already present in 11-18-1742 r4Frame exchange should fit on one TXOP as explained in 11.22.6.4.3.2 TB Ranging Polling Part |
| 374 | 11.22.6.4.3.3 |  | "the time at which the DL NDP arrives (t3) " -- nope | "the time at which the DL NDP is transmitted (t3) " | Accepted. This change is already present in 11-18-1742 r4 |
| 375 | 11.22.6.4.3.3 |  | The figure is missing the RSTA toISTA4 LMR | Add to figure | Accepted. This change is already present in 11-18-1742 r4 |
| 376 | 11.22.6.4.3.3 |  | "an NDPA frame" -- it's actually a Ranging NDP Announcement frame | As it says in the comment. Also fix in 11.22.6.4.3.4, 11.22.6.4.4.3 (2x) | Accepted. This change is already present in 11-18-1742 r4 |
| 377 | 11.22.6.4.3.3 |  | "set the TXVECTOR parameter CH\_BANDWIDTH to be the same value as the BW subfield" -- TXVECTOR params do not come from the same space as subfields so should not be assumed to have the same values/encoding | Change to say that the same bw is indicated. Same in sentences below | Accepted. This change is already present in 11-18-1742 r4 |
| 378 | 11.22.6.4.3.3 |  | "An RSTA transmitting a Ranging NDP Announcement frame and a DL NDP after receiving an UL NDP as a response of a Location variant HEz Uplink Sounding Trigger frame shall" makes it sound as if the NDPA/DL NDP are only sent if the UL NDP is received. But the text above suggests they are always sent | Clarify whether the RSTA shall not send the NDPA/DL NDP if it doesn't receive an UL NDP from some/all of the ISTAs, or whether it may send them blind | WIP:Failure in measurement polling and sounding need to be discussed with group. General outline of response to TF-location-poll and TF-location-sounding is documented. |
| 383 | 11.22.6.4.3.3 |  | "with respect to a time base" -- needs to be the same as the one for the TOA, else it's useless | Change to "with respect to the same time base" | Accpeted. Time base for TOD and TOA within RSTA is same. Same is for ISTS |
| 385 | 11.22.6.4.3.3 |  | "If the Range Measurement Sounding phase instance includes more than a single TF Location Sounding frame, the ISTA and RSTA shall refer the t1 and t2 to the UL NDP frame instance associated with their (#Ed) HEz FTM procedure, refer to figure 11-35e. " -- the figure shows a single t2 | Show the other t2 | Accepted. Figure modified as suggested |
| 469 | 11.22.6.4.9.3 |  | "The RSTA shall send two broadcast Passive Location Measurement Report frames a SIFS timeafter receiving the Location Measurement Report frame " -- does this mean an MU transmission has to be used? | Clarify. I think this is trying to say that following the LMR frame rx the RSTA sends one LMR frame after SIFS, then another LMR frame SIFS after the first | Accepeted. Corrected as per suggestion.  |
| 529 | 11.22.6.1.2 | 47 | Why the ISTA centric scheduling FTM operation is limited to VHTz operation? The ISTA centric scheduling FTM operation should not be linked to a particular HT. Suggest to allow HE based mesurement in the ISTA centric scheduling FTM as well. |  | Rejected: In ISTA based scheduling ISTA initiates the measurement using EDCA scheme. For all other scheduling RSTA need to initiate measurement by sending TF. This is called RSTA centric operation. Please refer section 11.22.6.4.1 |
| 531 | 11.22.6.4.3.3 | 56 | It should be "departs" instead of "arrives" |  | Accepted. Same as CID 374 |
| 532 | 11.22.6.4.3.3 | 57 | In the Figure 11-35e, the second TF Location Sounding could be merged with the first one as TF could be able to schedule more than one transmission. |  | Rejected. Figure represents what happens when there are more than one trigger frame in ‘measurement sounding’ phase |
| 537 | 11.22.6.3.2 | 50 | "an RSTA with dot11SecureLTFImplemented equal to true may set the Secure LTF Required subfield in the Ranging Parameters field in an initial Fine Timing Measurement frame to 1 to activate a secure LTF measurement exchange mode between the ISTA and the RSTA"This rule is applied only if the ISTA2RSTA LMR is used. Add this condition. | As in comment. | rejected. ISTA2RSTA LMR support is different capablity. Secure LTF is negotiated independent of ISTA2RSTA LMR negotiation  |
| 544 | 11.22.6.2 | 48 | "VHTz Ranging, it shall set the Single User Range Measurement field of the Extended Capabilities element to 1. Otherwise it shall set the Single User Range Measurement filed of the Extended Capabilities element to 0."Because VHTz Ranging is not related with VHT (Very High Throughput) feature, please rename it. | As in comment. | Accepted. No change. Draft 0.5 name this scheme as non-TB ranging |

***CID 36:***

***TGaz Editor: Add following at the end of Section ‘11.22.6.1 Overview’ in Draft 0.5 as indicated below***

***11.22.6.1 Overview***

The method to indicate availability depends on the channel access method used for FTM. There are two basic channel access methods. ~~For RSTA centric scheduling~~ Trigger Based channel access used by TB and

EDCA based channel access used by legacy FTM, Non-TB, DMGz and EDMGz.

In Trigger Based channel access, at the beginning of each availability window the RSTA polls the ISTAs to indicate their need for measurement resources and allocates medium for channel sounding based on the ISTAs’ responses. In EDCA based measurement for FTM measurement Exchange, the ISTA transmits an Fine Timing Measurement Request frame at the start of measurement phase to indicate its on channel availability. In EDCA based measurement for non-TB ranging, ISTA transmits Ranging NDPA to start measurement phase. ~~In EDCA based method the ISTA transmits a Fine Timing Measurement Request frame~~ (see 11.22.6.4.4 Measurement Exchange in -TB Mode).

***TGaz Editor: modify following at the end of Section ‘11.22.6.1.1 RSTA Scheduled operation overview’ as indicated below***

***11.22.6.1.1 RSTA Centric Scheduled operation overview***

The initiating STA in Figure 11-35 (Concurrent FTM sessions) establishes sessions with responding STA 1 and responding STA 2 on different channels. The sessions’ 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. The method to indicate availability depends on the channel access method used for FTM. Trigger Based channel access method is used in RSTA centric scheduling.

***CID 61:***

Rejected: not change.

Negotiation is such that if both ISTA and RSTA support ASAP, the aggregment will be to use ASAP. Line 30 in draft 0.4 “If the responding STA is ASAP capable, the responding STA’s selection of ASAP should be the same as that requested by the initiating STA.” allows RSTA to fall back to non-ASAP if its not capable.

***CID 62/63:***

Rejected

***CID 65:***

***TGaz Editor: Add following text and table after line 24 in Draft 0.5 Section ‘11.22.6.3.2 Secure LTF measurement setup’***

Table below summarizes the secure negotiation frame exchange and significance of “Secure LTF support” and “secure LTF required” field Ranging parameter element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **ISTA Ranging Parameters** | **RSTA Ranging****Parameters** | **Negotiation****Result** | **Description** |
| # | **SLS** | **SLR** | **SLS** | **SLR** |  |  |
| 1 | 0 | 0 | 1 or 0 | 0 | *Successful.* *Secure LTF measurement exchange* ***is not*** *used.* | Secure LTF is not supported on ISTA, and supported on RSTA but RSTA does not require secure LTF. |
| 2 | 1 | 0 or 1 | 1 | 1 | *Successful.* *Secure LTF measurement is used* | Secure LTF is supported on ISTA and RSTA |
| 3 | 1 | 0 | 1 | 0 | *Successful.* *Secure LTF measurement exchange* ***is not*** *used.* | Secure LTF is supported on ISTA and RSTA but may not request it |
| 4 | 1 | 1 | 1 | 0 | *failed* | **Invalid** configuration. Secure LTF is supported on ISTA and RSTA. ISTA request secure LTF but RSTA ignores request.(This handshake is invalid assuming ISTA knows that RSTA support secure LTF and set SLR to 1; but RSTA decline secure LTF exchange) |
| 5 | 1 | 0 | 0 | 0 | *Successful.**Secure LTF measurement exchange* ***is not*** *used.*  | Secure LTF is supported on ISTA, RSTA don’t support it neither requires it. |
| 6 | 1 | 1 | 0 | 0 | *Failed* | Secure LTF is supported and required on ISTA but RSTA does not support it.(This is **invaild** handshake. Without knowing RSTA’s secure LTF capability ISTA should not set SLR to 1. This handshake is invalid assuming ISTA knows that RSTA support secure LTF and set SLR to 1; but RSTA indicates that secure LTF support is absent) |
| 7 | 0 | 0 | 1 | 1 | *Failed* | Secure LTF is supported and required on RSTA, but ISTA does not support it.(This is **invalid** handhshake. ISTA doesn’t support Secure LTF. RSTA should not set SLR to 1. RSTA can still set SLS to 1 to indicate its capability) |
| 8 | 1 | x  | 0  | 1 | *Failed* | **Invalid** configuration of RSTA that requires secure LTF, but indicates it does not support it. ISTA **should** terminate the ranging session. |
| 9 | 0 | 0 | 0 | 1 | *Failed* | **Invalid** configuration of RSTA that requires secure LTF, but indicates it does not support it. ISTA **should** terminate the ranging session. |
| 10 | 0 | 1 | 0 | 0 or 1 | *Failed* | **Invalid** Configuration on ISTA that requires secure LTF but does not support it.  RSTA **should** terminate the ranging session. |
| 11 | 0 | 1 | 1 | x | *Failed* | **Invalid** Configuration on ISTA that requires secure LTF but does not support it. RSTA **should** terminate the ranging session. |

***CID 98 and 99:***

***TGaz Editor: Add following text and ‘table 9.4.2.26 Extended Capabilities element’ in Draft 0.5 Section***

|  |  |  |
| --- | --- | --- |
| **Bits** | **Information** | **Notes** |
| <ANA> | DMG Range Measurement | A DMG STA sets this field to 1 to indicate support for the ranging protocols defined in 11.24.6.4.7 |
| <ANA> | EDMG Range Measurement | An EDMG STA sets this field to 1 to indicate support of the ranging protocols defined in 11.24.6.4.7 |

***CID 159:***

***TGaz Editor: replace “Figure 30 —Figure 11-35a ISTA Scheduled Concurrent FTM Sessions” in section “11.22.6.1.2 ISTA centric Scheduling operation overview “***



***TGaz Editor: Add folloing in the end of section “11.22.6.1.2 ISTA centric Scheduling operation overview “***

ISTA’s availablty is known to RSTA by means of Ranging NDPA frame transmitted by ISTA at the start of measurement instance

***CID 160/161/311:***

***TGaz Editor: Modify section “11.22.6.2” of draft 0.5 as follows***

***11.22.6.2 FTM capabilities***

If the STA in which dot11FineTimingMsmtRespActivated is true or dot11FineTimingMsmtInitActivated is true supports

(a) Non-TB Ranging, a STA in which dot11NonTriggerBasedRangingImplemented is true shall set the Single User Range Measurement field of the Extended Capabilities element to 1. Otherwise it shall set the Single User Range Measurement filed of the Extended Capabilities element to 0.

(b) TB Ranging, a STA in which dot11TriggerBasedRangingImplemented  is true shall set the Multi User Range Measurement field of the Extended Capabilities element to 1. Otherwise it shall set the Multi User Range Measurement field of the Extended Capabilities element to 0.

***TGaz Editor: Add following text and ‘table 9.4.2.26 Extended Capabilities element’ in Draft 0.5 Section***

|  |  |  |
| --- | --- | --- |
| **Bits** | **Information** | **Notes** |
| <ANA> | Single User Range Measurement | The STA sets the Single User Range Measurement field to 1 when dot11NonTriggerBasedRangingImplemented is true and sets it to 0 otherwise. See 11.22.6 (Fine timing measurement (FTM) procedure). |
| <ANA> | Multi User Range Measurement | The STA sets the Multi User Range Measurement field to 1 when dot11TriggerBasedRangingImplemented is true and sets it to 0 otherwise. See 11.22.6 (Fine timing measurement (FTM) procedure). |

***TGaz Editor: Add following in Annex C section C.3 MIB Details***

Dot11WirelessMgmtOptionsEntry ::=

SEQUENCE {

 :

dot11NonTriggerBasedRangingImplemented

dot11TriggerBasedRangingImplemented

}

dot11NonTriggerBasedRangingImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by an external management entity or the SME.

Changes take effect at the next occurrence of an MLME-START.request or MLME-JOIN.request primitive.

This attribute, when true, indicates that the station capability for non-TB range Measurement. False indicates the station doesn’t have non-TB range measurement capability or that the capability is present but is disabled."

DEFVAL { false}

::= { dot11WirelessMgmtOptionsEntry xx }

dot11TriggerBasedRangingImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by an external management entity or the SME.

Changes take effect at the next occurrence of an MLME-START.request or MLME-JOIN.request primitive.

This attribute, when true, indicates that the station capability for TB range Measurement. False indicates the station doesn’t have TB range measurement capability or that the capability is present but is disabled."

DEFVAL { false}

::= { dot11WirelessMgmtOptionsEntry xx }

dot11FineTimingMeasurement OBJECT-GROUP

OBJECTS {

dot11WirelessManagementImplemented,

dot11FineTimingMsmtRespActivated,

dot11FineTimingMsmtInitActivated,

dot11LciCivicInNeighborReport,

dot11RMFineTimingMsmtRangeRepImplemented,

dot11RMFineTimingMsmtRangeRepActivated,

dot11RMLCIMeasurementActivated,

dot11RMLCIConfigured,

dot11RMCivicMeasurementActivated,

dot11RMCivicConfigured,

dot11NonTriggerBasedRangingImplemented,

dot11TriggerBasedRangingImplemented

}

STATUS current

DESCRIPTION

"Attributes that configure the Fine Timing Measurement feature for IEEE Std 802.11."

::= { dot11Groups 93 }

***CID 166/326:***

***TGaz Editor: modify text in section “11.22.6.3.2 Secure LTF measurement setup as follows” line number 25***

Secure LTF parameter field contains a new LTF Generation SAC and a new LTF Sequence Generation Information associated with the LTF Generation SAC. Measurement result SAC is reserved in this initial Fine Timing Measurement frame. An initial Fine Timing Measurement frame shall contain a Secure LTF Parameters field when any of the following conditions is met:

— An RSTA received an initial Fine Timing Measurement Request frame where the Secure LTF Required subfield in the Ranging Parameters field in the received initial Fine Timing Measurement Request frame is equal to 1.

— An RSTA sets the Secure LTF Required subfield in the Ranging Parameters field in a transmitted initial Fine Timing Measurement frame to 1.

***CID 173:***

***TGaz Editor: modify text in section “11.22.6.4.3.4 TB Measurement Reporting Part ” pag 56, of draft 0.5; modified baseline text adopted from 11-18-1742-04-00az-cc28-cr-hez-protocol-rewrite-hez-protocol-rewrite***

11.22.6.4.3.4 TB Measurement Reporting Part

The last part of each polling/sounding/reporting triplet is the measurement reporting part, which appears SIFS time after the measurement sounding part (see Figure 11-35c). The measurement results shall be carried in LMR frames (see subclause 9.6.7.37 Location Measurement Report frame format). LMR frames shall carry measurement results from the RSTA to the ISTA, and if negotiated also from the ISTA to the RSTA (see Figure 11-35f). The feedback type of the ISTA-to-RSTA and RST-to-ISTA LMRs shall be either immediate (i.e., from the current availability window) or delayed (i.e., from the last availability window in which the ISTA responded to the TF Location Poll and the RSTA allocated resources to that ISTA during the measurement sounding part). The LMR feedback (immediate/delayed) is indicated by the RSTA during the negotiation phase (see subclause 11.22.6.3.1 Range Measurement Negotiation).

Each LMR is a unicast frame. It is carried in Action No Ack frames (see 9.6.7.37) and are therefore neither acknowledged nor retransmitted.

All the ISTAs that were allocated resources in the preceeding measurement sounding part receive an HE MU PPDU containing the RSTA-to-ISTA LMRs if more than single ISTA completes exchange successfully. The RSTA to ISTA is carried in HE SU PPDU if only one ISTA completes exhange successfully. If ISTA-to-RSTA LMR was negotiated, the RSTA shall assign UL resources to the ISTAs using a Trigger frame of variant Location, subvariant TB Ranging LMR (“TF Location LMR”, see subclause 9.3.1.23.9 Location Trigger variant).

***CID 309: WIP***

***TGaz Editor: modify text in section “11.22.6.1.2 ISTA centric scheduling operation overview” as follows:***

***11.22.6.1.2 ISTA centric Scheduling operation overview***

ISTA centric scheduling FTM operation is called Non-TB operation. In Non-TB operation the ISTA determines the measurement timing, based on its scheduling conflicts with other activities and the parameters of the availability window which is a time window referenced to the previous measurement instance. During this measurement time window the ISTA may come to the channel at any time and using contention based access initiate a new measurement round. Because of conflict arising due to other activities, ISTA may not start measurement at start of availability window and RSTA need to wait for start of measurement phase. Dotted region in Figure 11-35a indicates that RSTA may not see start of measurement phase as ISTA is occupied with activities on other channel.

***CID 319 / CID320:***

***TGaz Editor: modify text in section “11.22.6.3.1 Range Measurement Negotiation” of draft .5 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 of

range measurement parameters (refer section 9.4.2.278 Ranging 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. If a Ranging Parameters element is included in the initial Fine Timing Measurement frame, it shall contain one of the Non-TB Specific subelement or the TB Specific subelement. If a Fine Timing Measurement Parameters is included in the initial Fine Timing Measurement frame, the Fine Timing Measurement Parameters element shall contain one of the DMGz Specific Parameter subelement or the EDMGz Specific Parameters subelement. The value of the Status Indication field indicates the outcome of the request.

***CID 338:***

***TGaz Editor: modify text in section “11.22.6.4.1 FTM Measurement exchange overview ” of draft 0.5 as follows:***

11.22.6.4.1 FTM Measurement exchange overview

FTM measurement has following basic Ranging mechanisms:

— RSTA centric EDCA based legacy Ranging mode (including FTM, DMGz and EDMGz) described in section 11.22.6.4.2 and 11.22.6.4.7

— RSTA centric trigger based TB Ranging mode described in section 11.22.6.4.3

— ISTA centric EDCA based Non-TB Ranging mode described in section 11.22.6.4.4

— RSTA centric trigger based TB passive ranging mode described in section 11.22.6.4.10

***CID 366/367/368/369/370/373/374/375/376/377/531:***

Proposed CR are addressed in doc 11-18-1742-04-00az-cc28-cr-hez-protocol-rewrite-hez-protocol-rewrite

***CID 378:WIP***

***TGaz Editor: Add folloing to the end of section of draft 0.5 (page 56 line 22):***

11.22.6.4.3.1 General

Ranging measurement fail to complete when any of the following events happens

* RSTA doesn’t receive Range Poll Response message from ISTA in response to TF Location Polling transmitted by RSTA
* RSTA doesn’t receive UL NDP in response to TF of type Location subtype Sounding transmitted by RSTA

A particular instance of availability window of Range Measurement part fails to complete if RSTA doesn’t receive CTS to self frame from ISTA in resonse to TF Location Poll tranmitted by RSTA. After transmitting TF Location Poll frame RSTA shall wait for a time interval with a value of aSIFSTime + aSlotTime + aRxPHYStartDelay. This interval begins when the MAC receives a PHY-TXEND.confirm primitive of TF Location Poll frame. If a PHY-RXSTART.indication primitive does not occur during the the time interval, the RSTA shall conclude that the transmission of the TF Location Poll frame has failed. If a PHY-RXSTART.indication primitive occurred during the the time interval, the RSTA shall wait for successful reception of HE TB PPDU frame. Polling part is considered successful on successful reception of atleast one CTS to self frame in reponse to TF location poll. A TB Range Measurement instance ends on failure of TB Polling part

As part of Ranging Measurement Sounding part, after transmitting TF Location Sounding, RSTA shall wait for a time interval with a value of aSIFSTime + aSlotTime + aRxPHYStartDelay. This interval begins when the MAC receives a PHY-TXEND.confirm primitive of TF Location Sounding frame. If a PHY-RXSTART.indication primitive does not occur during the the time interval, the RSTA shall conclude that the transmission of the TF Location Souding frame has failed. If a PHY-RXSTART.indication primitive occurred during the time interval, the RSTA shall wait for reception on NDP PPDUs. Measurement Sounding part is considered successful on reception of atleast one HE TB Ranging NDP PPDU or HE Ranging NDP PPDU in reponse to TF Location Sounding. Range Measurement part is unsuccessful if none of TB Location Sounding Poll frame resulted into reception of HE TB Ranging NDP PPDU or HE Ranging NDP PPDUs and RSTA has no more STAs to which TF Location Souding frame is outstanding in current availalbity window. On such event RSTA shall not transmit NDPA and DL NDP and terminate current range measurement instance. If RSTA has more TF Location Sounding frame outstanding for successfully polled ISTAs in current polling part, RSTA should continue the Measurement Sounding part after timeout of aSIFSTime + aSlotTime + aRxPHYStartDelay

***CID 383:***

***TGaz Editor: Modify folloing to the end of section of draft 0.5 (page 56 line 03) in section 11.22.6.4.3.3 with respect to text adopted from*** 11-18-1742-04-00az-cc28-cr-hez-protocol-rewrite-hez-protocol-rewrite :

The TOA field’s value contains a timestamp that represents the time, with respect to a time base, at which the start of the first HE-LTF of the associated NDP frame arrived at the receive antenna connector. The TOD field’s value contains a timestamp that represents the time, with respect to the same time base, at which the start of the first HE-LTF of the associated NDP frame appeared at the transmit antenna connector.

***CID 385:***

***TGaz Editor: replace ‘Figure 34 —Figure 11-35e TB Measurement Sounding Sequence with UL TDMA***

***Multiplexing’ of section ‘11.22.6.4.3.3 TB Range Measurement Sounding’ of draft 0.5 with folloing:***



Figure 11-35e TB Measurement Sounding Sequence with UL TDMA Multiplexing

***CID 469:***

***TGaz Editor: Modify folloing in section “*11.22.6.4.10.3 TB Passive Range Measurement Reporting” *of draft 0.5 (page 76):***

11.22.6.4.10.3 TB Passive Range Measurement Reporting

The last part of the TB passive range measurement sequence is the TB passive range measurement reporting part and appears a SIFS time after the TB passive range measurement sounding part.

In the passive range measurement reporting part, an RSTA shall send a Location Measurement Report frame and the LMR Sub-variant Location Trigger frames to one or more ISTAs that sent an uplink TB SU sounding NDP PPDU in the preceding TB passive range measurement sounding part according to 11.22.6.4.2.4 (TB Measurement Reporting Part). An ISTA addressed by the LMR Sub-variant Location Trigger frame shall transmit a Location Measurement Report frame a SIFS time after the LMR Sub-variant Location Trigger frame transmission.

The RSTA shall send two broadcast SIFS separated Passive Location Measurement Report frames a SIFS time after receiving the Location Measurement Report frame containing TOF measurements executed at the ISTA.