IEEE P802.11  
Wireless LANs

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| CR for Location | | | | |
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**Abstract**

This submission proposes resolutions of comments received from TGaz CC28.

* CIDs: 36, 61, 62, 63, 65, 98, 99, 100, 103, 154, 155, 156, 157, 158, 159, 160, 161, 164, 166, 172, 173, 174, 296, 301, 302, 303, 304, 306, 309, 311, 312, 317, 319, 320, 325, 326, 331, 332, 338, 366, 367, 368, 369, 370, 371, 373, 374, 375, 376, 377, 378, 383, 384, 385, 469, 529, 531, 532, 537, 544,

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.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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 D0.5  Line 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. | |
| 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 | |
| 64 | 11.22.6.3.1 | 49 | The conditions here are a bit hairy: if the requested value indicates no preference for any particular value, then the value in the response should be less than or equal to the non-preferred value? Except the non-preference can only be set according to a set of conditions that appear to give a specific value?  It's also not clear what happens if the condition is not true (i.e. what happens if there is preference indicated set in the FTM per Bursts field?) | Clarify as per comment. | WIP | |
| 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 not valide for D0.5 | |
| 103 | 11.22.6.3.1 | 48 | Measurement sessions should be able to indicate a sounding only session by including a flag during the sounding negotiation. | The inclusion of a "sounding only session" flag during the Range measurement negotiation in the initial fine timing measurement request indicates that no LMR is expected at the end of the measurement phase, even if the RSTA is capable of providing the LMR. | WIP. Clarification sought | |
| 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 accoreingly 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 | |
| 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” | |
| 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 | |
| 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 used on bandwidth and format information | |
| 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. | |
| 172 | 11.22.6.4.3.3 |  | I assume that "UL power control" is the power control through uplink power headroom. An unassociated STAs can't do such thing in mandatory HEz ranging procedure. | Fix the issue mentioned in the comment. | WIP | |
| 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 PPSU 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 CID36 | |
| 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 | Accepted: clarification added as suggested in comment | |
| 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 Extended Capabilities 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: doesn’t match with 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 0.5 | |
| 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 65 resolution | |
| 331 | 11.22.6.3.3 |  | "shall not be set by both the ISTA and RSTA" -- I don't think that's what's actually intended | Change to "shall not be set by either the ISTA and RSTA", and also delete the preceding comma | Pending | |
| 332 | 11.22.6.3.3 |  | Do lines 19 to 34 only apply to EDMG STAs? The fact that "EDMG" is not used, but it is used from line 35, suggest that they apply to non-EDMG STAs | Add "EDMG" before every "STA" or "ISTA" or "RSTA" | Pending | |
| 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 is composed by one or more TF of type Location subtype Sounding allocating uplink resources to one 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. Consistant naming is used in section | |
| 367 | 11.22.6.4.3.3 |  | What is "Code" in the Figure? | Clarify. Oh, and "Freqeuncy" -> "Frequency" on the vertical axis | Accepted. Clarification added | |
| 368 | 11.22.6.4.3.3 |  | " The Location Measurement part is composed by one or more TF of type Location subtype Sounding allocating uplink resources to one or more ISTAs. Each TF Location Sounding frame shall be (#Ed) followed by one or more uplink 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 7 NDP 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. Partially. Section 11.22.6.4.3.1 and 11.22.6.4.3.3 are modified. Refere resolution of CID 366. Note that Measurement Sounding frame contains multiple TF subtype sounding and UL NDP before NGP NDPA frame is transmitted by RSTA | |
| 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. Addressed in CID 366/368. Text changed. | |
| 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. Clarification added | |
| 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? | Accepted. RSTA transmits DL NDP per ISTA. Text modified as in CID 366/368 | |
| 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 | Accpeted. SIFS modification is accepted. TXOP details are TBD (highlighted in draft) | |
| 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. As in comment | |
| 375 | 11.22.6.4.3.3 |  | The figure is missing the RSTA to ISTA4 LMR | Add to figure | Accepted. Figure modified | |
| 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) | Accpeted. As commented.  Fixed as part of CID 366 text correction. Its called NGP NDPA in Draft 0.5 | |
| 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. As in comment | |
| 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 | Accepted: updated section 11.22.6.4.3.1 General | |
| 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" | Rejected: this description is agnostic of RSTA and ISTA | |
| 384 | 11.22.6.4.3.3 |  | "The UL power control and timing and frequency synchronization requirements in the HEz mode 3 of associated and unassociated STAs shall follow the same rules as those of any other HE STA in 4 associated mode (8). " -- so need not be stated (and what's "(8)"?) | Delete |  | |
| 385 | 11.22.6.4.3.3 |  | "If the Range Measurement Sounding phase instance includes more than a single TF Location 22 Sounding frame, the ISTA and RSTA shall refer the t1 and t2 to the UL NDP frame instance 23 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 | |
| 469 | 11.22.6.4.9.3 |  | "The RSTA shall send two broadcast Passive Location Measurement Report frames a SIFS time after 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 HE based measurement, RSTA need to initiate measurement by sending TF. This is called RSTA centric operation |
| 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 for Measurement sounding phase |
| 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’ 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 TB 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 to indicate its on channel availability. In EDCA based measurement for non-TB ranging, ISTA transmits 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’ 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 burst instance 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 20 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** | **Comment [Girish]** |
| # | **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. | This is valid handshake. Good here |
| 2 | 1 | 0 or 1 | 1 | 1 | *Successful.*  *Secure LTF measurement is used* | Secure LTF is supported on ISTA and RSTA | Valid handshake |
| 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 | Valid handshake |
| 4 | 1 | 1 | 1 | 0 | *failed* | Secure LTF is supported on ISTA and RSTA. ISTA request secure LTF but RSTA ignores request | Invalid handshake |
| 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. | This is valid handshake. Good here |
| 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 handshake. 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. | In this invalid config. Good here |
| 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. | In this invalid config. Good here |
| 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. | In this invalid config. Good here |
| 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. | In this invalid config. Good here |

***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 NPDA frame transmitted by ISTA at the start of measurement instance

***CID 160 and CID 161:***

***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

dot11NonTriggerBasedRangingImplemented

}

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:***

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

An initial Fine Timing Measurement frame shall contain a Secure LTF Parameters field when one of the following conditions is met. 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 frame.

— 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, line number 19 of draft 0.5***

11.22.6.4.3.4 TB Measurement Reporting Part

The last part of each TB Measurement phase instance is the TB Measurement Reporting phase and appears SIFS time after the TB Measurement Sounding phase. The Measurement results shall be carried in a Location Measurement Results (LMR) frames. LMR frames shall carry measurement results from RSTA to ISTA, and if negotiate from ISTA to RSTA. Measurement results carried in a Measurement Report Part shall be either from this availability window or the previous availability window used by ISTA. The TF or NDPA of the preceding Location Sounding part shall indicate using the [TBD field] if associated measurement results are included in the same availability window or the successive availability window that includes medium allocation for sounding to the ISTA. The RSTA to ISTA LMR are carried in an HE MU PPDU if more than single ISTA completes exchange successfully. The RSTA to ISAT 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 using a TF with type Location and sub-type LMR.

***CID 309:***

***CID 309:***

***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 326:***

***TGaz Editor: modify text in section “11.22.6.3.2 Secure LTF measurement setup” of draft 0.5 as follows:***

An initial Fine Timing Measurement frame shall contain a Secure LTF Parameters field with a new LTF Generation SAC and a new LTF Sequence Generation Information associated with the LTF Generation SAC 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 326:***

***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 scheduling mechanisms:

— RSTA centric EDCA based legacy scheduling 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 scheduling mode described in section 11.22.6.4.3

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

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

***CID 366/376:***

***TGaz Editor: modify text in section “11.22.6.4.3 Measurement Exchange in HEzTB Mode” of draft 0.5 as follows:***

11.22.6.4.3.1 General

TB mode is the dynamic trigger based sequence of the FTM procedure. The TB sequence shall appear in scheduled availability time windows assigned to ISTA during the negotiation phase. Within each availability window the RSTA and ISTAs shall perform ranging activities related to ranging polling, measurement and measurement results reporting and group related scheduling indications. Each availability window consists by default of a single TXOP and can be extended to multiple TxOPs by announcement if single TxOP is insufficient to accommodate all ISTAs responding to the polling phase, refer to section (11.22.6.4.3.3 Measurement Sounding Sequence). Each instance of the Position Measurement phase consists of a SIFS-separated sequence of one or more of three ordered parts: measurement polling, measurement sounding and location measurement reporting. Figure 11-35b shows a nominal case of an availability window composed of a single polling, Range Measurement Sounding and Location Measurement Report parts. An RSTA and ISTA participating in a TB mode ranging shall perform TB Ranging measurement and measurement results activities only within the availability window.



11.22.6.4.3.2 Measurement Polling Part

The Measurement polling part is the first part of each Position Measurement phase instance and precedes the Measurement Sounding part. At the beginning of each availability window the RSTA shall transmit a TF with type equal Location and sub-type equal Polling. An ISTA shall request a measurement instance by transmitting a Ranging Poll Response message in its designated time and frequency allocation as identified in the TF Location Polling SIFS time after the TF Location Polling frame. If the available bandwidth () does not allow for the polling of all ISTAs served by this availability window, the RSTA shall schedule an additional poll opportunity within the availability window and shall indicate that in the TF Location Poll frame and the associated subsequent measurement and polling parts.

11.22.6.4.3.3 Measurement Sounding Part

The Measurement Sounding part commences SIFS time after the Mesurement Polling part and is the 2 nd part of the TB Position Measurement Sequence. The Measurement Sounding part is composed of one or more SIFS separated sequence of TF of type Location subtype Sounding allocating uplink resources to one or more ISTAs, followed by UL NDPs from the ISTAs. SIFS time after last UL NDP ,an Ranging NDP Announcement frame is transmitted from the RSTA, followed after SIFS by DL NDPs from RSTA. UL NDPs from ISTAs are multiplexed in the frequency (the detail is TBD) and/or spatial stream domain ().Figure 11-35c shows a range measurement between an RSTA and two ISTAs (ISTA 1 and ISTA 4) responding to the poll. The TF of type Location sub-type Sound allocates a separate time, frequency (the detail is TBD) and spatial stream () to each ISTA. The DL NDPs are used by ISTAs taking part in the exchange.

An RSTA transmitting a Location variant TB Uplink Sounding Trigger frame to an ISTA shall not use a bandwidth wider than that indicated in the initial Fine Timing Measurement frame sent to the ISTA and the RSTA shall set the TXVECTOR parameter CH\_BANDWIDTH to be the same value as the BW subfield of the Common Info field in the Location variant TB Uplink Sounding Trigger frame.

An RSTA transmitting a Ranging NDP Announcement frame and a DL NDP after receiving an UL NDP as a response of a Location variant TB Uplink Sounding Trigger frame shall set the TXVECTOR parameter CH\_BANDWIDTH to be the same value as the BW subfield of the Common Info field in the Location variant TB Uplink Sounding Trigger frame.

11.22.6.4.3.4 Measurement Reporting Part

The last part of each Position Measurement phase instance is the Measurement Reporting phase and appears SIFS time after the Measurement Sounding phase. The Measurement results shall be carried in a Location Measurement Results (LMR) frames. LMR frames shall carry measurement results from RSTA to ISTA, and if negotiate from ISTA to RSTA. Measurement results carried in a Measurement Reporting Part shall be either from this availability window or the previous availability window used by ISTA (). The TF or Ranging NDPA of the preceding Measurement Sounding part shall indicate using the [TBD field] if associated measurement results are included in the same availability window or the successive availability window that includes medium allocation for sounding to the ISTA. The RSTA to ISTA LMR are carried in an HE MU PPDU. If ISTA to RSTA LMR was negotiated the RSTA shall assign UL resources using a TF with type Location and sub-type LMR.

***CID 367/370/375:***

***TGaz Editor: modify Figure 11-35c TB Range Measurement Sounding Using P-matrix for two ranging ISTAs” of draft 0.5 page 57 with figure below:***



***TGaz Editor: add following text in section “11.22.6.4.3.3 HEz TB Range Measurement Sounding” of draft 0.5 on page 54 after line number 24:***

For the polling part, the UL OFDMA is mandatory supported by the ISTA to send the poll response to RSTA and the support of UL MU-MIMO or UL OFDMA+UL MU-MIMO in the poll response depend on the capability exchange between ISTA and RSTA in negotiation. For the measurement sounding part, the full bandwidth UL NDP is transmitted by ISTA and different ISTA’s NDPs are multiplexed by P-matrix (similar to P-matrix multiplexing in UL MU-MIMO). The y-axis label “frequency/OFDMA” indicates the bandwidth difference between the OFDMA polling response and the full-bandwidth channel sounding parts.

The “code” in measurement sounding part UL NDP indicates the P-matrix code allocated to each ISTA. During the measurement sounding UL NDP, the ISTAs are multiplexed using P-matrix for a full-band UL NDP transmission. More information on P-matrix is <TBD>.

Details of TXOP used by RSTA is <TBD>

***CID 374:***

***TGaz Editor: modify text in section “11.22.6.4.3.3 TB Range Measurement Sounding” of draft 0.5 as follows:***

11.22.6.4.3.3 TB Range Measurement Sounding

TOF measurement is executed by both STAs capturing timestamps of sounding frames. The ISTA captures the time at which the UL NDP is transmitted (t1). The RSTA captures the time at which the UL NDP arrives (t2) and the time at which the DL NDP is transmitted (t3). The ISTA captures the time at which the DL NDP (t4) arrives. See Figure 11-35d. The timestamp values t2 and t3 shall be the measurement according to the RSTA’s clock (i.e., without applying any frequency offset correction to the time basis ()).

***CID 376:***

***TGaz Editor: modify text in section “11.22.6.4.3 Measurement Exchange in HEzTB Mode” of draft 0.5 as follows:***

11.22.6.4.4.2 Measurement Exchange Sequence

An ISTA may use any AC to transmit the Ranging NDP Announcement frame.

After transmitting the Ranging NDP Announcement frame and NDP frame, the ISTA 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 NDP frame. If a PHY- RXSTART.indication primitive does not occur during the the time interval, the ISTA shall conclude that the transmission of the Ranging NDP Announcement frame + NDP has failed. If a PHY-RXSTART.indication primitive occurred during the the time interval, the ISTA tries to receive the NDP and the LMR frame from the RSTA addressed by the Ranging NDP Announcement frame. If the LMR is correctly received from the RSTA, the frame exchange initiated by the Ranging NDP Announcement is complete.

An ISTA transmitting a RangingNDP Announcement frame shall not use a bandwidth wider than that indicated by an RSTA in the initial Fine Timing Measurement frame. The TA field of the Ranging NDP Announcement frame is a bandwidth signalling TA when the Ranging NDP Announcement frame is sent in a non-HT duplicate PPDU (see 10.7.6.6) An ISTA transmitting an UL NDP shall set the TXVECTOR parameter CH\_BANDWIDTH to the same value as the TXVECTOR parameter CH\_BANDWIDTH in the preceding Ranging NDP Announcement frame.

An RSTA transmitting a DL NDP shall set the TXVECTOR parameter CH\_BANDWIDTH to the bandwidth of the Ranging NDP Announcement frame which is obtained from the RXVECTOR parameter CH\_BANDWIDTH of the Ranging NDP Announcement frame when received in an HE/VHT/HT PPDU or from the RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT when the Ranging NDP Announcement frame is received in a non-HT duplicate PPDU and is 20 MHz when the Ranging NDP Announcement frame is received in a non-HT PPDU.

The frame format of Ranging NDP-A, NDP, and LMR are defined in XXX, YYY and ZZZ, respectively

***CID 377:***

***TGaz Editor: modify text in below section of draft 0.5 as follows (page 56 line 22):***

11.22.6.4.3.3 Measurement Sounding part

An RSTA transmitting a Location variant TB Uplink Sounding Trigger frame to an ISTA shall not use a bandwidth wider than that indicated in the initial Fine Timing Measurement frame sent to the ISTA and the RSTA shall set the TXVECTOR parameter CH\_BANDWIDTH to be the value which specify same bandwidth as indicated by the BW subfield of the Common Info field in the Location variant TB Uplink Sounding Trigger frame.

An RSTA transmitting a Ranging NDP Announcement frame and a DL NDP after receiving an UL NDP as a response of a Location variant HEzTB Uplink Sounding Trigger frame shall set the TXVECTOR parameter CH\_BANDWIDTH to the value which specify same bandwidth as indicated by the BW subfield of the Common Info field in the Location variant TB Uplink Sounding Trigger frame.

An ISTA transmitting an UL NDP as a response of a Location variant HEzTB Uplink Sounding Trigger frame shall set the TXVECTOR parameter CH\_BANDWIDTH to the value which specify same bandwidth as indicated by the BW subfield of the Common Info field in the Location variant TB Uplink Sounding Trigger frame.

***CID 378:***

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

11.22.6.4.3.1 General

Note: 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

Action taken by RSTA on failure of range measurement: <TBD>

***CID 378:***

***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.