IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 802.11  Resolutions to a set of LB240 CIDs (Part-5)  (relative to IEEE 802.11 REVmd D2.0 and P802.11az D1.4) | | | | |
| Date: 2019-09-11 | | | | |
| Author(s): | | | | |
| Name | Company | Address | Phone | Email |
| Ganesh Venkatesan | Intel Corporation | 2111 NE 25th Ave, Hillsboro, OR 97124 | 503 334 6720 | [ganesh.venkatesan@intel.com](mailto:ganesh.venkatesan@intel.com) |
|  |  |  |  |  |

**Abstract**

This submission proposes a set of LB240 CIDs -- 1801, 1611, 1612, 1664, 2355, 2513, 1807, 1808, 1856, 1862, 1909, 1910, 2267, 2308, 2309, 2426, 2453, 2457, 2461, 2462, 2486, 2487, 2488.

History:

R0: Initial Version.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1801 | 84.27 | 11.22.6.3.2 | Line 8 seems to set the conditons (success), from which a series of options are presented (starting with ' the responding STA shall indicate'). Yet line 27 (and following) do not seem to be conditioned by "if" condition on line 8. | Remove list format if 27 and sq are not conditioned by 'if' on line 8. | REVISE. A set of ISTA settings are incorrectly included in the list of bullets that describe RSTA behavior when the negotiation with the RSTA is successful. These conditions need to be moved above P106L27 (D1.4).  TGaz Editor to incorporate editor instructions as defined in 11-19-1559 corresponding to CID 1801. |

Discussion: This is an issue in the baseline (IEEE802.11-2016 and subsequently REVmd D2.0). Since .11az moved the contents of Cl. 11.22.6.3 (**Fine timing measurement procedure negotiation**) to Cl. 11.22.6.3.2 (EDCA-based ranging session negotiation), it is best to address this issue in TGaz.

P106L27 (D1.4) describes how RSTA sets the values for a set of fields/subfields in the Fine Timing Measurement Parameters element in the initial Fine Timing Measurement frame if the negotiation is successful. It is confusing to include statements that describe ISTA behaviour (related what it shall support or how it shall select values for fields/subfields in the Fine Timing Measurement Parameters element in the initial Fine Timing Measurement Request frame).

It is best to move the statements that describe ISTA behaviour (related what it shall support or how it shall select values for fields/subfields in the Fine Timing Measurement Parameters element in the initial Fine Timing Measurement Request frame) to before P106L27 (D1.4).

Resolution: REVISE. Incorporate editor instructions as shown below.

***Insert a new subclause 11.22.6.3.2 and move all the contents starting from the3rd paragraph to the end of 11.22.6.3 to 11.22.6.3.2 and modify as shown below:***

**11.22.6.3.2 EDCA-based ranging session negotiation**

The initial Fine Timing Measurement Request frame shall have:

— the Trigger field set to 1,

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

In the case of requests for 160 MHz bandwidth, the initiating STA shall indicate in the Format And Bandwidth field whether it uses a single or two separate RF LOs. In the cases when the responding STA indicates use of 160 MHz bandwidth, the responding STA shall indicate in the Format And Bandwidth field whether it uses a single or two separate RF LOs.

***Editor: delete the bullets and copy the deleted contents into a new paragraph as shown below:***

An initiating STA performing an FTM procedure with a responding STA that is an AP shall support non-ASAP operation. An initiating STA performing an FTM procedure with a responding STA that is not an AP shall support ASAP operation (#1801).

The initiating STA shall indicate, in the Format and Bandwidth field, a format and bandwidth that it supports. The initiating STA shall indicate an EDCA-based HE format in the Format And Bandwidth field sent to a responding STA if and only if the STAs are operating in the 6 GHz band, at least one of the STAs does not support TB or non-TB ranging, and the responding STA has sent an Extended Capabilities element with the Fine Timing Measurement Responder subfield set to 1; otherwise the STA shall not indicate an EDCA-based HE format in the Format And Bandwidth field. A STA that supports TB or non-TB ranging is not required to support EDCA-based HE.

For EDCA based ranging where the value of the corresponding Format and Bandwith subfield is in the range 31 through 41 (inclusive), the initiating STA shall indicate, in the Ranging Priority subfield of the Fine Timing Measurement Parameters field of the Fine Timing Measurement Parameters element in the initial Fine Timing Measurement Request frame, its ranging priority according to Table x1 in 9.4.2.167. For EDCA based ranging where the value of the corresponding Format and Bandwidth subfield is outside the range 31 through 41 (inclusive), the Ranging Priority subfield of the Fine Timing Measurement Parameters field of the Fine Timing Measurement Parameters element is reserved. (#1801)

If the request was successful

* The responding STA shall indicate, in the Format and Bandwidth field, a format and bandwidth that it supports. The responding STA should indicate the same format and bandwidth in the Format and Bandwidth field as that requested by the initiating STA, if the responding STA supports this. The responding STA shall not indicate a bandwidth wider than requested. The responding STA shall not indicate a VHT format if DMG, HT- mixed or non-HT format was requested. The responding STA shall not indicate an HT format if DMG or non-HT format was requested. The responding STA shall not indicate a DMG format if VHT, HT-mixed or non-HT format was requested. The responding STA shall indicate, in the Ranging Priority subfield of the Fine Timing Measurement Parameters field of the Fine Timing Measurement Parameters element in the initial Fine Timing Measurement frame, whether it accommodates the Ranging Priority request transmitted by the initiating STA according to Table 9-281b in 9.4.2.167.The responding STA shall indicate EDCA-based HE format only if EDCA-based HE was requested (see 26.17.2) and the STA is operating in the 6 GHz band; otherwise the STA shall not indicate EDCA-based HE format.
* A responding STA that is an AP shall support and select non-ASAP operation when so requested by an initiating STA.
* A responding STA that is not an AP shall support and select ASAP operation when so requested by an initiating STA.
* 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.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1611 | 25.00 | 9.3.1.19 | What is the rationale behind the order in which the subfields are arranged in the STA Info field? For instance, why are the bit-wide fields interspersed between the 3-bit UL N\_STS and UL Rep subfields? Why are all the reserved bits placed at the end of the field? | If there is no concrete rationale for the order in which the subfields are arranged, propose that the bit-wide subfields are placed after DL N\_STS, DL Rep, UL N\_STS and UL Rep; and the reserved bits are B30 and B31. | Reject. The STA Info field in the Ranging NDP Announcement frame is derived from the STA Info field in the HE NDP Announcement frame defined in .11ax. AID and Disambiguation subfields are common in both cases. In order to keep the pasing logic common, it is best not to move common subfields around. |

Discussion: The position of subfields in the STA Info field of the HE NDP Announcement frame that apply to .11az are not changed in .11az. Only those subfields in the STA Info filed of the HE NDP Announcement frame that do not apply to .11az are repurposed for use in .11az-specific NDP Announcement frames. As a result the position of bits that are reserved is scattered around in the STA Info subfield.

Resolution: REVISE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1612 | 27.00 | 9.3.1.23.9 | Should these lines be part of the Poll sub-variant? | move this paragraph to Cl. 9.3.1.23.9.1. | Reject. The ISTAs may not always be on channel at the start of the Availability Window and may miss the Ranging Trigger frame of subvariant Poll. Sending the More TF subfield in the Sounding and Reporting subvariants will help address this situation. |

Discussion: The More TF subfield of the Common Info field of the Ranging Trigger frame of subvariant Poll set to 1 or 0, to indicate that more Ranging Trigger frame(s) of subvariant Poll will be transmitted in the current Availability Window will help ISTAs to save power – if they were not polled in the current Ranging Trigger frame of subvariant Poll, they can go into Power Save and become available for the next poll (and not listen to Ranging Trigger of subvariant Sound/Secure Sound and Ranging Trigger of subvariant Report corresponding to the current Ranging Trigger of subvariant Poll). While this is true, the ISTAs may not always be on channel at the start of the Availability Window and may miss the Ranging Trigger frame of Poll subvariant. Sending the More TF subfield in the Sounding and Reporting subvariants will help these ‘late to the Availability Window’ ISTA catchup.

Resolution: Reject

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1664 | 54.00 | 9.4.2.280 | Is it expected that an implementation of Secure LTF Parameters element parser uses context to parse the element? If the current frame is RSTA-to-ISTA LMR or initial FTM, then parse LTF Sequence Generation Info and LTF Generation SAC fields but ignore these fields in ISTA-to-RSTA LMR? And ignore Range Measurement SAC field in initial FTM? | It would improve ease-of-understanding if L12-27 are reworded to reflect in which context (which frame(s)) each of the fields in the Secure LTF Parameters element is reserved (or otherwise). Use RSTA-to-ISTA LMR instead of "Location Measurement Report frame transmitted from an RSTA to an ISTA". Move the fact that the Range Measurement SAC is the same as that in the STA Info field in the Ranging NDP Announcement to Clause 11 (probably 11.22.6.4.6). | REVISE.  Incorporate editor instructions from 11-19-1559 associated with CID 1664. |
| 2355 | 54.12 | 9.4.2.280 | Can not find 9-610d for the definition of "LTF Sequence Generation Information field format". | Add a figure to define it. | Revise. The field is now named Secure LTF Counter. It is a 6-octet wide field and does not require a figure to describe the format. Editor to incorporate editorial instructions in 11-19-1559 corresponding to CID 1664 and 2355. |
| 2513 | 54.12 | 9.4.2.280 | "The specific LTF Sequence Generation Information field format is 9-610d (LTF Sequence Generation Information field format)." There is no "LTF Sequence Generation Information field" defined in the draft. | Either define it, or delete the usage of LTF Sequence Generation Information field. | Revise. Editor to incorporate editorial instructions in 11-19-1559 corresponding to CID 1664, 2355 and 2513. |

Discussion: The Secure LTF Parameters element has a LTF Sequence Generation Information, LTF Generation SAC and Range Measurement SAC (this is shown as Measurement Result SAC in Fig 9-1012) but is referred to as Range Measurement SAC in the corresponding text in Cl. 9.4.2.280. This inconsistency should be fixed by modifying the Figure (with the correct field name). Why is the LTF Sequence parameter listed twice in Table 27-1 (TXVECTOR and RXVECTOR parameters)? The second one should be LTF Sequence Counter? Also, the LTF Sequence Generation Information field is renamed to “Secure LTF Counter” (See Clause 11.22.6.3.4) and is not reflected in this clause (9.4.2.280).

In reading through Cl. 11.22.6.3.4 (Secure LTF measurement setup) P112L37-40 states, “When an RSTA has set the Secure LTF Support field to 1 in the Extended Capabilities, an ISTA with dot11SecureLTFImplemented equal to true may set the Secure LTF Support subfield in the Ranging Parameters field in an initial Fine Timing Measurement Request frame to 1 to activate a secure LTF measurement exchange mode between the ISTA and the RSTA.” which is incorrect. This should be restated as “When an RSTA has set the Secure LTF Support field to 1 in the Extended Capabilities, an ISTA with dot11SecureLTFImplemented equal to true may set the Secure LTF Req subfield in the Ranging Parameters field in an initial Fine Timing Measurement Request frame to 1 to request a secure LTF measurement exchange mode between the ISTA and the RSTA” since the RSTA is the one that has the final say in activating Secure LTF measurement exchange (by setting the Secure LTF Req subfield in the initial Fine Timing Measurement frame). In addition Secure LTF measurement exchange can happen if and only if a PASN context is setup between the ISTA and RSTA before the negotiation exchange. This is not clearly called out.

Resolution: Revise.

***TGaz Editor: Replace “LTF Sequence Generation Information” with “Secure LTF Counter” and “Measurement Results SAC” with “Range Measurement SAC” in Figure 9-1012 (Secure LTF Parameters element format). Also label the “Measurement Result LTF Offset” field in the figure as “Optional”.***

***TGaz Editor: Modify the following paragraphs in Cl. 9.4.2.280 as shown below:***

The Secure LTF Counter **(#2289)** field is used to determine the randomized LTF sequence of an I2R NDP and R2I NDP in one of the following secure LTF measurement exchange sequences:

* An I2R NDP and a R2I NDP immediately following a Ranging NDP Announcement frame, in a Non-TB ranging measurement exchange.
* A sequence of an I2R NDP, a Ranging NDP Announcement frame, a R2I NDP immediately following a Ranging Trigger frame of subvariant Sounding, in a TB ranging measurement exchange.

The Secure LTF Counter **(#2289)** field contains a value used in the computation of secure LTF generation information as described in 11.22.6.4.6.3 (Secure LTF generation information). This field is present in the RSTA2ISTA #1664) Location Measurement Report frame and is reserved otherwise.  
  
The LTF Generation SAC field is used to authenticate that the randomized LTF sequence is generated from a reliable Secure LTF Counter **(#2289).** The LTF Generation SAC field is a nonzero value associated with Secure LTF Counter **(#2289)** carried in the same Secure LTF Parameters element (see 11.22.6.3.4 (Secure LTF measurement setup)). This field is used in the RSTA2ISTA (#1664) Location Measurement Report frame and is reserved otherwise.

The Range Measurement SAC field is used to verify that range measurement results of the Location Measurement Report frame are calculated using the same LTF sequence between ISTA and RSTA. The Range Measurement SAC field is the same value as in the LTF Generation SAC subfield in the STA Info SAC field in the Ranging NDP Announcement frame that solicited the I2R NDP and the R2I NDP (see 11.22.6.4.6 (Secure Non-TB and TB Ranging Measurement Exchange Protocol)). This field is reserved in the initial Fine Timing Measurement frame.  
  
The Measurement Results LTF Offset field is used to verify that the measurement results of the Location Measurement Report frame in TB Ranging are calculated using the same LTF Offset for the HE I2R and R2I NDP frames between ISTA and RSTA. The Measurent Result LTF Offset field has the same value as the Offset subfield in the corresponding STA Info field of Ranging NDP Announcement frame preceding the R2I NDP frame, which is used for estimating the measurement results in the Location Measurement Report frame. The Measurement Result LTF Offset field is structured as shown in Figure 9-1012a. This field is not present in the initial Fine Timing Measurement Frame and in the Location Measurement Report Frame in non-TB Ranging measurement exchange. **(#1580, #2283, #1163)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1807 | 36.01 | 9.4.2.26 | Incorrect reference in Table 9-153 | Passive Location Ranging Initiator Measurement Support field description has the wrong reference. Measurement Exchange in Passive Location Ranging mode is loacted in sub-clause 11.22.6.4.10. | REVISE. The clause numbers (and in some cases names as well) are changed as a result of submission 11-19-1483. Incorporate editor instructions in 11-19-1559 corresponding to CIDs 1807 and 1808. |
| 1808 | 36.01 | 9.4.2.26 | Incorrect reference in Table 9-153 | Passive Location Ranging Responder Measurement Support field description has the wrong reference. Measurement Exchange in Passive Location Ranging is in sub-clause 11.22.6.4.10. | REVISE. The clause numbers (and in some cases names as well) are changed as a result of submission 11-19-1483. Incorporate editor instructions in 11-19-1559 corresponding to CIDs 1807 and 1808. |

Discussion: 11-19-1483r2 rearranged Clause 11 to group EDCA based, Trigger Based and non-Trigger Based ranging operations together. Also some clause/sub-clause titles were modified for consistency. Fix table 9-153 to match the contents of 11-19-1483r2.

Resolution: Revise

***TGaz Editor: Modify the following entries in Table 9-153 as shown below:***

|  |  |  |
| --- | --- | --- |
| Bits | Information | Notes |
| <ANA> | Passive Location Ranging Responder Measurement Support | A STA sets the Passive Location Ranging Responder Measurement Support field to 1 when dot11PassiveLocationRangingResponderActivated is true. Otherwise, the STA sets the Passive Location Ranging Responder Measurement Support field to 0. See 11.22.6.4.8 (Measurement Exchange in Passive TB Ranging). |
| <ANA> | Passive Location Ranging Initiator Measurement Support | A STA sets the Passive Location Ranging Initiator Measurement Support field to 1 when dot11PassiveLocationRangingInitiatorActivated is true. Otherwise, the STA sets the Passive Location Ranging Initiator Measurement Support field to 0. See 11.22.6.4.8 (Measurement Exchange in Passive TB Ranging). |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1856 | 79.35 | 9.6.7.48 | What is the format of the Location Measurement Report frame, it seems only the Location Measurement Report Action field and the ToD Error field are provided. | Provide the format of the Location Measurement Report frame. | Revise. Editor to incorporate changes corresponding to CID 1856 in 11-19-1559 |

Discussion: The caption of the Location Measurement Report frame is incorrect. It has to be changed from “**Figure 9-981a—Location Measurement Report Action field format**” to “**Figure 9-981a—Location Measurement Report frame format**”.

Resolution: Revise

***TGaz Editor: Change the caption of Figure 9-981a from “Location Measurement Report Action field format” to “Location Measurement Report frame format”; and reference(s) to Location Measurement Report frame format as shown below:***

**9.6.7.48 Location Measurement Report frame format**

The Location Measurement Report frame is an Action No Ack frame of category Ranging. The Location Measurement Report frame is used to support the non-TB, and TB ranging mechanisms of the FTM procedure described in 11.22.6 (Fine timing measurement (FTM) procedure). The format of the Location Measurement Report Action field is shown in Figure 9-981a (Location Measurement Report frame (#1856) format.)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1862 | 36.01 | 9.4.2.26 | Sub-clause 11.22.6.4a (Secure LTF Measurement Exchange Protocol) is referred several times in this draft, but such sub-clause does not exist. | Please add this sub-clause. | Accept. Editor instructions in 11-19-1483. |

Discussion: Renamed the clause to 11.22.6.4.6 Secure non-TB and TB Ranging Measurement Protocol but some references to Secure LTF Measurement Exchange Protocol remain in D1.4. Submission 11-19-1483 refined this further to “non-TB and TB measurement exchange for secure LTF” and fixed all references accordingly.

Resolution: Accept. (no changes needed as editor instructions in 11-19-1483 addresses this issue).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1909 | 12.04 | 6.3.56.1 | If figures 6-17b and 6-17c are introducing new exchanges initiated by MLME-FINETIMINGMSMT.request, then the existing figure 6-17 needds to be re-titiled to make the distincition clear. Otherwise, it also applies, due to lack of exclusion, and we have ambiguity. | Add text before the existing Figure 6-17, to explain to the reader how these three figures apply to different situations. Change the title of the existing Figure 6-17 to make it clear it is exclusive of Figures 6-17b and 6-17c scenarios. | Revise. Incorporate editor instruction corresponding to CID 1909 in 11-19-1559. |

Discussion: Figure 6-17 applies only to the Fine Timing Measurement protocol described in IEEE802.11-2016. In P802.11az this protocol is renamed to EDCA based ranging measurement exchange.

Resolution: Revise.

***Editor: Rename the caption to Figure 6-17 from “Fine timing measurement primitives and timestamps capture” to “Fine timing measurement primitives and timestamps capture for EDCA based ranging measurement exchange”, and change all corresponding references to match the rename of the caption.***

**6.3.56 Fine timing measurement (FTM)**

**6.3.56.1 General**

***Editor: change the first paragraph of Cl. 6.3.56.1, NOTE 1 and NOTE 2 in Cl. 6.3.56.1 as shown below:***

The following set of primitives supports exchange of FTM information from one SME to another. The informative diagram in Figure 6-17 (Fine timing measurement primitives and timestamps capture for EDCA based ranging measurement exchange) depicts various points in time that are of interest to the FTM procedure.

NOTE 1—In Figure 6-17 (Fine timing measurement primitives and timestamps capture for EDCA based ranging measurement exchange), t1 and t3 correspond to the point in time at which the start of the preamble for the transmitted frame appears at the transmit antenna connector. An implementation may capture a timestamp during the transmit processing earlier or later than the point at which it actually occurs and offset the value to compensate for the time difference.

NOTE 2—In Figure 6-17 (Fine timing measurement primitives and timestamps capture for EDCA based measurement exchange), t2 and t4 correspond to the point in time at which the start of the preamble for the incoming frame arrives at the receive antenna connector. Because time is needed to detect the frame and synchronize with its logical structure, an implementation determines when the start of the preamble for the incoming frame arrived at the receive antenna connector by capturing a timestamp some time after it occurred and compensating for the delay by subtracting an offset from the captured value.

***Editor: Change all references to Figure 6-17 in the specification to reflect the change in the caption to Figure 6-17 (in Cl. 6.3.56.2.2, 6.3.56.3.2, 6.3.56.4.2 and 11.22.6.4).***

***TGaz Editor: Change the caption to Figure 6-17b from “non-TB Sounding Exchange for Ranging” to “Fine timing measurement primitives and timestamps capture for non-TB ranging measurement exchange”; and changes all references to Figure 6-17b to reflect the change to the caption.***

***TGaz Editor: Change the caption to Figure 6-17c from “TB Sounding Exchange for Ranging” to “Fine timing measurement primitives and timestamps capture for TB ranging measurement exchange and changes all references to Figure 6-17c to reflect the change to the caption”.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1910 | 13.11 | 6.3.56.1 | We need the same precision about exactly where in the HE TB Ranging NDP (and/or HE Ranging NDP) appearing at the antenna connector is the point in time where t1 and t3 are snapped. This should be done the same way it is done for the FTM frame/Ack in Figure 6-17 and existing text. In the next paragraph, t2 and t4 are discussed explicitly, so why aren't they shown in the figures? | State at exactly what point in the transmission of the appropriate frames are t1 and t3 snapped, similarly to the existing text for the FTM/Ack. OR, modify the existing text to make it clear that t1 and t3 are similarly at the start of the preamble for the new Figures. Add t1 and t3 (and the Antenna vertical market) to Figures 6-17b and 6-17c. Delete the statement that these are not shown in the figures. Similarly add t2 and t4 to the figures, and delete the statement that they aren't shown. | Reject. The figures 6-17a, 6-17b abd 6-17c only depict the exchange of management frames corresponding to the invocation/generation of the MLME primitives. With TB and non-TB ranging the timestamp capture occurs when control frames (NDP) are exchanged. Hence they are not shown. However the capture timestamps corresponding to the exchange of NDP frames is described in Cl. 11.22.6.4.3.3 and Cl. 11.22.6.4.2.2 for TB and non-TB ranging measurement exchanges respectively. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2267 | 48.04 | 9.4.2.280 | Definition of Full Bandwidth UL-MUMIMO needs to be added | Definition of Full Bandwidth UL-MUMIMO in Fig 9-1006 needs to be added | Accept. Addressed in D1.4. The subfield is now named Full Bandwidth I2R MU-MIMO. |

***Resolution: Accept. No text changes needed as the required changes are already incorporated in D1.4. The subfield is now named Full Bandwidth I2R MU-MIMO and the corresponding description in D1.4 reads as follows:***

The Device Class and Full Bandwidth I2R MU-MIMO subfields are defined in Table 9-322b, Subfields of the HE PHY Capabilities Information field. For associated STAs they should match the value exchanged during association.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2308 | 41.01 |  | "Single User Range Measurement". Both non-TB ranging and legacy FTM are for single user range measurement. Even TB ranging can be used when there is only one iSTA. So, the name of this bit is not sufficiently descriptive. Replace the name of bit with "TB Ranging measurement" | Replace "Single User Ranging Measurement" with "non-TB Ranging measurement". | Accept. This has been addressed in D1.4. Single User Ranging Measurement is now non-TB ranging measurement exchange. (see 11-19-1483) |
| 2309 | 41.01 |  | "Multi user range measurement." Replace it with "TB ranging measurement". | Replace "Multi User Ranging Measurement" with "TB Ranging measurement". | Accept. This has been addressed in D1.4. Single User Ranging Measurement is now non-TB ranging measurement exchange. (see 11-19-1483) |

Discussion: The terms Single User Ranging Measurement and Multi User Ranging Measurement are replaced by non-TB ranging measurement exchange and TB ranging measurement exchange (D1.4 and subsequently 11-19-1483). The corresponding entries in Table 9-153 where these terms were used are deleted since these are synonymous to the other entries in Table 9-153 non-TB Ranging Responder and TB Ranging Responder respectively.

Resolution: Accept. No text changes needed, as the required changes are already incorporated in D1.4.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2426 | 36.01 | 9.4.2.26 | The Notes for TB Ranging Responder should be "A STA sets the TB Range Responder field ...". | As in comment. | Accept. Incorporated in D1.4. |

Resolution: Accept. No text changes needed as the proposed change is already incorporated in D1.4.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2453 | 79.06 | 11.22.6.1 | "(e.g., an AP providing measurements to STAs at a mall or a store)". This is in the baseline, but seems to be unnecessary. Delete it. | As in comment. | Reject. The refered text has been through several WG ballots without objection. It is in the overview section and provides a feel for the type of service expected of an infrastructure device in a typical deployment. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2457 | 81.02 | 11.22.6.1.2 | Change to "... RSTA may not see start of measurement phase as ISTA is occupied with activities on other channel." to "... an RSTA may not see start of measurement phase at the beginning of the availability window as an ISTA may be active on another channel." | As in comment. | Revise. In addition to the change recommended by the commenter there are other improvements to the text. Editor to incorporate the editorial instructions under CID #2457 in 11-19-1599. |

Discussion: ISTA centric scheduling FTM operation which submission 11-19-1483 depricated is not completed addressed in 11-19-183. Other changes to improve the readability of the overview in addition to the one proposed by the commenter.

***TGaz Editor: Change the first paragraph of Cl. 11.22.6.1.2 as shown below:***

**11.22.6.1.2 non-TB ranging overview**

In Non-TB ranging measurement exchange 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 use contention based access to initiate a new measurement exchange. Because of conflict arising due to other activities, ISTA may not start measurement at start of availability window while the RSTA waits for the start of measurement phase. Dotted region in Figure 11-35a indicates that of the non-TB measurement exchange phase may not start at the beginning of the time window since the ISTA may have been active on another channel.

***TGaz Editor: Change the caption to Figure 11-35a from “ISTA Scheduled Concurrent FTM Sessions” to “non-TB ranging concurrent FTM sessions”***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2461 | 81.13 | 11.22.6.1.2 | Change "The RSTA remain ready within the complete availability window instance for the ISTA to initiate a measurement instance." to "The RSTA shall be ready from the start of the availability window for the ISTA to initiate a measurement instance." | As in comment. | Revise. Editor to incorporate editorial instructions corresponding to CID 2461 in 11-19-1599. |

Discussion: In addition to the changes proposed in the comment, additional text clean up is necessary to improve the clarity.

Resolution: Revise

***TGaz Editor: Change the second paragraph of Cl. 11.22.6.1.2 as shown below:***

The initiating STA in Figure 11-35a (non-TB ranging concurrent FTM sessions), establishes sessions with RSTA 1 and RSTA 2 on different channels. Scheduling of each availability window instance is determined by the timing of the previous measurement instance with the corresponding RSTA. The constraints for an ISTA to initiate the non-TB ranging measurement exchange with each RSTA may be different. The RSTAs shall remain available within the entire availability window instance for the ISTA to initiate the non-TB ranging measurement exchange.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2462 | 82.11 | 11.22.6.1.3 | How to set a field according to a MIB attribute is already described in 9.4. Duplicate description is not required. Delete such part. | As in comment. | Reject. Although how to set a field/subfield based on the setting of a MIB variable is in Clause 9, it is normative only in Clause 11. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2486 | 14.22 | 4.3.19.19 | I believe the tern used in 11ax is HE TB PPDU. The name convention should follow the same format | change "TB" to "HE TB" | Revise. Editor to incorporate editor instructions corresponding to CID 2486 in 11-19-1559. |
| 2487 | 14.22 | 4.3.19.19 | "TB ranging sequence" is not used anywhere else in the spec. It is not very clear what it is. Please provide reference or add desriptions, unless the "whether" part is a description, which is not clear in its current form. | as in comment. | Revise. TB ranging sequence is now referred to as TB ranging measurement exchange (Cl. 11.22.6.4.3). Editor to incorporate editor instructions corresponding to CID 2487 in 11-19-1559. |
| 2488 | 14.22 | 4.3.19.19 | Not sure what it is means "whether they request range", is that word supposed to be "in which"? Also "they" is a grammer mistake. | change "whether they request range measurement and then schedule times for concurrent range measurements to several HE STAs." into "in which it requests range measurement and then schedules times for concurrent range measurements to several HE STAs." | Revise. Editor to incorporate editor instructions corresponding to CID 2488 in 11-19-1559. |

***TGaz Editor: Change the second paragraph of Cl. 4.3.19.19 as shown below:***

**4.3.19.19 Fine timing measurement**

***Insert the new paragraph at the end of the clause:***

Fine timing measurement allows a STA to accurately measure the round trip time (RTT) between it and another STA. With the regular transfer of Fine Timing Measurement frames it is possible for the recipient STA to track changes in its relative location with other STAs in the environment.

DMG and EDMG devices can also estimate the direction of the transmission and reception of frames, allowing for a single link positioning. Using the TB ranging measurement exchange, An HE STA may poll other HE STAs and based on the corresponding response, execute concurrent range measurements with a subset of the HE STAs that responded to the poll.