IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Passive Location Ranging Inheritance of TB Ranging Properties  - CIDs Resolutions | | | | |
| Date: 2019-07-17 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Erik Lindskog | Samsung |  |  | e.lindskog@samsung.com |
|  |  |  |  |  |

Abstract

This document proposes resolutions to comments related Passive Location Ranging inheritance of TB Ranging properties.

TGaz LB240 CIDs addressed: 1286, 1520, 1542, 1543, 1544, 1547, 1548, 1551, 1552, 1553, 1554, 1555, 1556, 1561, 1562, 1564, 1565, 1574, and 2286.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **P.L** | **Clause** | **Comment** | **Proposed change** | **Resolution** |
| 1286 | 124.29 | 11.22.6.4.10 | "exceptions described in Section 11.22.6.4.9 (Measurement Exchange in TB Passive Range Location Ranging mode), with subsections" - the mentioned subclause does not exist. It is probably refering to the current subclause, in which case it should just say "with exceptions described in this subclause" | as in comment, or point ot an existing subclause. | Revised. In general this text is been moved to Subclause 11.22.6.3.8 (Passive Location Ranging Measurement Negotiation) , though the explicit reference to this subclause is no longer there. |
| 1520 | 6.22 | 4.3.19.19 | Here what applies to TB Ranging Sequence also applies to the Passive Location Ranging Sequence. | Add that it applies also to the Passive Location TB Ranging Sequence. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1542 | 67.25 | 9.6.7.32 | The 'Ranging Parameters field is present in the initial Fine Timing Measurement Request frame' applies also to the Passive Location Ranging case. The description for this is mssing. | Add description of the behavior of the 'Ranging Parameters field is present in the initial Fine Timing Measurement Request frame' for the Passive Location Ranging case. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1543 | 69.06 | 9.6.7.33 | The 'Ranging Parameters field is present in the initial Fine Timing Measurement Frame' applies also to the Passive Location Ranging case. The description for this is missing. | Add description of the 'Ranging Parameters field is present in the initial Fine Timing Measurement Frame' for the Passive Location Ranging case. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1544 | 69.23 | 9.6.7.33 | The FTM Synchronization Information field is present in the initial Fine Timing Measurement frame and its retransmissions if any, and in the first Fine Timing Measurement frame within each burst and its retransmissions if any; if the responder selects Fine Timing Measurement (11.22.6.4.2 25 RSTA Centric EDCA basic legacy scheduling Measurement) for the ranging phase, and in an A-MPDU aggregated with an LMR frame if the responder selects \*Passive Location Ranging\* for the ranging phase. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1547 | 79.19 | 11.22.6.1 | The RSTA centric scheduling is supported also by Passive Location Ranging. Add the description of this. | Add the missing description for the Passive Location Ranging case as per the comment. | Accepted. |
| 1548 | 80.06 | 11.22.6.1.1 | Also in in Passive Location Ranging Measurement Exchange the RSTA poll the ISTA to indicate their need for measurement resources and allocated medium for Range measurement based on the ISTAs' responses. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1551 | 87.01 | 11.22.6.3.3 | The ISTA Availability Window element in the HEz specific subelement in the IFTMR indicates also its availability for Passive Location Ranging. Description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1552 | 87.14 | 11.22.6.3.3 | An RSTA shall reject a request also for Passive Location Ranging from an ISTA if the RSTA cannot assign the ISTA to an availability window that does not overlap with a 10 TU interval in which the ISTA is 15 unavailable (as signaled by the ISTA Availability Window element in the IFTMR). The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1553 | 87.36 | 11.22.6.3.3 | Also for Passive Location Ranging, the ISTA shall indicate, in the Ranging Priority subfield of the Ranging Parameters field of the Ranging Parameters element in the initial Fine Timing Measurement Request frame, its Ranging Priority according to Table 9-281b in 9.4.2.167. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1554 | 87.39 | 11.22.6.3.3 | Also for Passive Location Ranging, the RSTA shall indicate, in the Ranging Priority subfield of the Ranging Parameters field of the Ranging Parameters element in the initial Fine Timing Measurement frame, whether it accommodates the Ranging Priority request transmitted by the ISTA according to Table 9-281b in 9.4.2.167. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1555 | 88.06 | 11.22.6.3.3 | Also if the negotiation is successful and the selected range measurement mode is Passive Location Ranging Based, the corresponding initial Fine Timing Measurement frame from the responding 7 STA shall include a Ranging Parameters element with the parameters that defines the negotiated 8 range measurement session. The description of this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1556 | 88.16 | 11.22.6.3.3 | If the negotiation is successful and the selected range measurement mode is Passive Location Based, the corresponding initial Fine Timing Measurement frame from the responding STA shall include a Ranging Parameters element with the parameters that defines the negotiated range measurement session. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1561 | 105.25 | 11.22.6.4.5 | Also in the non-secure variant of the Passive Location Ranging measurement exchange, the NUM\_STS paramater is set to the same value as the DL N\_STS field in the STA Info field in the preceding Ranging NDP Announcement frame. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1562 | 106.04 | 11.22.6.4.5 | Also in the non-secure variant of the Passive Location Ranging measurement exchange, the LTF\_REP paramater is set to the same value as the DL N\_STS field in the STA Info field in the preceding Ranging NDP Announcement frame. The description for this is missing. | Add the missing description for the Passive Location Ranging case as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1564 | 124.15 | 11.22.6.4.10 | The Passive Location Ranging is a variant of TB ranging and is identical to TB ranging, except where explicitly mentioned that it follows a different protocol. Text specifying this is missing in general, e.g. in the location referred to here but also in other places in the draft. | Add text as per the comment in the location specified here as well as throughout the document. Also specify what aspects of TB Ranging does not apply to Passive Location Ranging. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1565 | 124.16 | 11.22.5.4.10.1 | For scheduling of the Passive Location Ranging uses the same method as the one used for TB Ranging. See Section 11.22.6.4.3.1 (General in Section Measurement Exchange in TB mode). Text specifying this is missing. | Add text as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 1574 | 86.31 | 1.22.6.3.3 | The section 'Trigger-based and non-Trigger based Ranging Measurements negotiation also applies to the Passive Location Ranging negotiation. This description is missing. | Add missing description for Passive Location Ranging as per the comment. | Revised. Adding general specification that, unless stated otherwise, what applies to TB Ranging also applies to Passive Location Ranging. |
| 2286 | 125.08 | 11.22.6.4.10.1 | "See 11.22.6.4.9.2 (Passive Location Ranging Measurement Sounding) for further details." "11.22.6.4.9.2" is a wrong reference. It should be "11.22.6.4.10.2". | Fix the section number. | Revised. Resolved in D1.2. The subclause is now indeed 11.22.6.4.9.2. |

***TGaz Editor: Change the text in subclause 9.3.1.22.910 (Ranging Trigger variant) as follows:***

***TGaz Editor: Change the Table 9-25k (Ranging Trigger Subtype field encoding) as follows:***

|  |  |
| --- | --- |
| **Ranging Trigger Subtype field value** | **Ranging Trigger frame variant** |
| 0 | Poll |
| 1 | Sounding |
| 2 | Secure Sounding |
| 3 | Report |
| 4 | Passive Location Sounding |
| 5-15 | Reserved |

***TGaz Editor: Throughout D1.2, change:***

‘Passive Location subvariant’ to ‘Passive Location Sounding subvariant’

***TGaz Editor: Change the text in Section 11.22.6.1 as follows:***

**11.22.6.1 Overview**

***Change the following paragraphs of Clause 11.22.6.1 as shown below:***

***…***

RSTA centric scheduling is supported by legacy FTM, TB, Passive Location Ranging, PDMG and PEDMG ranging. ISTA centric scheduling is supported by non-TB ranging.**(#1547)**

For EDMG STAs that have set to one the First Path Beamforming Training Supported field in the Beamforming Capability subelement, an FTM session shall be preceded by a first path beamforming training as described in 10.43.10.6 First Path Beamforming Training.

**…**

***TGaz Editor: Change the text in 11.22.6.1.3 (RSTA centric for passive ranging operation overview) D1.2 P85L15 as follows:***

***11.22.6.1.3 Passive Location Ranging overview***

(#1520, #1542, #1543, #1544, #1548, #1551, #1552, #1553, #1554, #1555, #1556, #1561, #1562, #1564, #1565, and #1574)

Passive Location Ranging is a variant of the TB ranging mode referred to in Subclause 11.22.6 (Fine timing measurement (FTM) procedure). In all aspects, except where explicitly stated differently, the Passive Location Ranging mode, its protocols, procedures, componenets, and defenitions follow the rules for TB ranging.

In particular, along to the general statement in the paragraph above, the text in the following subclauses, and their subclauses, apply also to Passive Location Ranging:

* Subclause 11.22.6.1.1 RSTA schedule operation overview
* Subclause 11.22.6.3.3 (“Trigger-based and non-Trigger-based Ranging Measurement Negotiation”)
* Subclause 11.22.6.4.3 (“Measurement Exchanges in TB Mode”)
* Subclause 11.22.6.5 (Fine Timing Measurement parameter modification)
* Subclause 11.22.6.5.1 (Availability Window parameter modification)
* Subclause 11.22.6.6 (Fine timing measurement termination)

Below are a list of example exceptions for Passive Location Ranging where it does not follow the rules for TB Ranging:

* The rules and procedures specific for the secure version of TB Ranging does not apply to Passive Location Ranging.
  + For example, the following subclauses dealing with secure features of TB ranging do not apply to Passive Location Ranging:
    - 11.22.6.3.4 (“Secure LTF measurement setup”)
* The RSTA uses the ‘Passive Location Ranging’ Ranging Trigger Subtype for its sounding trigger frames.
* The ISTAs use HE Ranging NDP PPDUs for its I2R NDPs.
* The ISTAs does not use the Location Measurement Report for reporting of its measurements but instead uses the ISTA Passive Location Measurement Report frame for this purpose, with its associated different measurements.
* The RSTA send the Primus and Secundus broadcast frames as specified.
* The number of spatial streams (NSTS) for passive location ranging is limited to max 4.

The Passive Location Ranging mode consists of ranging exchanges between an RSTA and a set of ISTAs. These ranging exchanges and associated measurement reporting are set up such that an arbitrary STA can listen in to them and use the ranging exchanges and reported ranging measurements to estimate its differential distance to pairs or sets consisting of the RSTA and/or one or more ISTAs. The listening STA, a ‘passive’ STA or PSTA, is not itself an active transmitting participant in the ranging exchange. That is, the PSTA can passively estimate its differential distances to the RTA and the ISTAs pairs. It can then use these differential distances together with knowledge of the RSTA and ISTA locations to estimates its own location.

The RSTA centric Scheduling for Passive Location Ranging operation operates as the RSTA

centric Scheduling for TB Ranging operation refered to in subclause 11.22.6.1.1 (RSTA scheduled operation overview).

The Passive Location Ranging is scheduled by the RSTA in an availability window used for passive location. In order to announce the scheduling and parameters of the availability window for passive location ranging the RSTA includes an RSTA Availability Element (see Subclause 9.4.2.278 (RSTA Availbility Window element)) in its beacon frame (see Subclause 9.3.3.3 (Beacon frame format)). Here the RSTA Availability Window element contains a single Availability Window Information field with the Passive Location Ranging Availability Window bit is set to 1.

The purpose of the announcement of the availability window for the passive location ranging is to enable PSTAs to listen to the Passive Location Ranging exchanges that are occurring there.

***TGaz Editor: Change the text in subclause* 11.22.6.3.3 (“Trigger-based and non-Trigger-based Ranging Measurement Negotiation”) *@D1.2 P91L4 as follows:***

An RSTA shall reject a request, unless the request is for Passive Location Ranging, if it has set the Protection of Range Negotiation and Measurement Management Frames Required field of the Extended Capabilities element to 1, and the ISTA has not successfully set up a security context to protect IFTMR, IFTM and LMR frames exchanged between the RSTA and the ISTA. Note that the security context can either be established as a result of a successful association between the RSTA and ISTA; or as a result of the ISTA 12 successfully completing PASN as described in 12.13 Pre-Association Security Negotiation.

***TGaz Editor: Insert a section 11.22.6.3.8 (“Passive Location Ranging Measurement Negotiation”) as follows:***

**11.22.6.3.8 Passive Location Ranging Measurement Negotiation**

The Passive Location Ranging measurement negotiation follows the rules and procedures of the TB Ranging measurement negotiation detailed in Section 11.22.6.3.3 (Trigger-based and non-Trigger-based Ranging Measurement Negotiation), unless explicitly stated otherwise. (#1520, #1542, #1543, #1544, #1548, #1551, #1552, #1553, #1554, #1555, #1556, #1561, #1562, #1564, #1565, and #1574)

An RSTA in which dot11PassiveLocationRangingRespoinderActivated is true shall set the Passive Location Ranging Responder Measurement Support field in the Extended Capabilities element to 1.

When an RSTA has set the Passive Location Ranging Responder Measurement Support field to 1 in the Extended Capabilities element it transmits, an ISTA with dot11PassiveLocationRangingActivated equal to true may set the Passive Location Ranging field in the TB Specific Parameters field in an initial Fine Timing Measurement Request frame to 1 to request a Passive Location Ranging measurement session between the ISTA and the RSTA.

To grant an ISTA Passive Location Ranging, the RSTA shall respond with the Passive Location Ranging subfield in the Ranging Parameters field to set 1 in the corresponding IFTMR.

When an ISTA sets the Passive Location Ranging field in the TB Specific Parameters field in an initial Fine Timing Measurement Request frame to 1, the ISTA shall set the Secure LTF Required subfield in the Ranging Parameters field in an initial Fine Timing Measurement Request frame to 0.

***TGaz Editor: Change the text in subclause 11.22.6.4.1 (FTM Measurement exchange overview) in D1.2 P97L7) as follows:***

**11.22.6.4.1 FTM Measurement exchange overview**

FTM measurement has four basic scheduling mechanisms:

— RSTA centric EDCA based Ranging scheduling mode (including PDMG and PEDMG) described in Subclauses 11.22.6.4.7 and 11.22.6.4.8

— RSTA centric TB Ranging scheduling mode described in Subclause 11.22.6.4.3

— Measurement exchange in Non-TB Ranging scheduling mode described in Subclause 11.22.6.4.4

— Passive Location Ranging scheduling mode described in Subclause 11.22.6.4.19, which is a variant of the TB Ranging scheduling mode.

***TGaz Editor: Change the text in subclause 11.22.6.4.9.1 (General) in D1.2 P132L15 as follows:***

**11.22.6.4.9.1 General**

As stated in subclause 11.22.6.1.3 (“Passive Location Ranging overview”), the Passive Location Ranging mode is a variant of the TB ranging mode. In all aspects, except where explicitly stated differently, the Passive Location Ranging mode, its protocols, procedures, componenets, and defenitions follow the rules for TB ranging mode. (#1520, #1542, #1543, #1544, #1548, #1551, #1552, #1553, #1554, #1555, #1556, #1561, #1562, #1564, #1565, and #1574)

In particular the measurement exchanges for Passive Location Ranging follows the rules and procedures described in subclause 11.22.6.4.3 (Measurement Exchange in TB Ranging Mode), with subclauses, unless explicitly stated otherwise.

Some of the exceptions for the Passive Location Ranging measurement session are:

- The RSTA sends the Passive Location Ranging Sounding Sub-variant Ranging Trigger Frame instead of the Sounding Sub-variant Ranging Trigger frame. Upon receiving of the Passive Location Ranging Sounding Sub-variant Ranging Trigger Frame, the ISTA responds with an HE Ranging NDP instead of an HE TB Ranging NDP. See 11.22.6.4.9.3 (Passive Location Ranging Measurement Sounding) for further details.

- The RSTA broadcasts two RSTA Broadcast Passive Location Measurement Report frames containing measurement data and related information. See 11.22.6.4.9.4 (Passive Location Ranging Measurement Reporting) for further details.

The Passive Location Ranging exchanges occur in an availability window used for passive location.

***TGaz Editor: Insert a section 11.22.6.4.9.2 (“Polling Phase of Passive Location Ranging”) as follows:***

**11.22.6.4.9.2 Polling Phase of Passive Location Ranging**

The polling phase of Passive Location Ranging follows the same rules and procedures for the polling phase of TB ranging described in subclause 11.22.6.4.3.2 (“Polling Phase of TB Ranging”). (#1520, #1542, #1543, #1544, #1548, #1551, #1552, #1553, #1554, #1555, #1556, #1561, #1562, #1564, #1565, and #1574)

***TGaz Editor: Change the text in subclause 11.22.6.4.9.2 (“Passive Location Ranging Measurement Sounding”) as follows:***

**11.22.6.4.9.3 Passive Location Ranging Measurement Sounding Phase**

The Passive Location Ranging measurement sounding follows the same rules and procedures for the measurement sounding for TB Ranging described in subclause 11.22.6.4.3.3 (“TB Ranging Measurement Sounding Phase”), unless explicitly stated otherwise. (#1520, #1542, #1543, #1544, #1548, #1551, #1552, #1553, #1554, #1555, #1556, #1561, #1562, #1564, #1565, and #1574)

The second phase of the Passive Location Ranging measurement sequence, after the Passive Location Ranging polling phase, is called the Passive Location Ranging measurement sounding phase. The Passive Location Ranging measurement sounding phase is composed by one or more Passive Location Sounding subvariant Ranging Trigger frame and HE Ranging NDP exchanges, a Ranging NDPA frame, and an HE Ranging NDP transmissions.

In Passive Location Ranging, the Trigger frame that the RSTA send is of variant Ranging and subvariant Passive Location Sounding. The Trigger frame here only allocates uplink resources to a single STA.

An ISTA addressed by the RID in the Passive Location Sounding Subvariant Ranging Trigger frame shall transmit an HE Ranging NDP a SIFS time after the reception of the Passive Location Sounding subvariant Ranging Trigger frame.

An RSTA transmitting a Passive Location Sounding Subvariant Ranging Trigger frame 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 Passive Location Subvariant Ranging Trigger frame.

An RSTA transmitting a Ranging NDP Announcement frame and an HE Ranging NDP after receiving an HE Ranging NDP as a response to a Passive Location Sounding Subvariant Ranging 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 Passive Location Sounding Subvariant Ranging Trigger frame.

An ISTA transmitting an HE Ranging NDP as a response of to a Passive Location Sounding Subvariant Ranging 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 Passive Location Sounding Subvariant Ranging Trigger frame.

Similar to in TB Ranging, an ISTA participating in a Passive Location Ranging exchange shall measure the ToD of its own HE Ranging NDP and the ToA of when it receives the RSTA’s HE Ranging NDP. In addition, optionally the ISTA also measures and reports the TOAs of when it receives the HE Ranging NDPs transmitted by the other ISTAs participating in the Passive Location Ranging exchange. By reporting the TOA timestamps for when it received the other ISTAs NDP transmissions, the quality of the location estimate for a PSTA listening in to the Passive Location exchanges can be improved.

The max number of NSTS used in the Passive Location Ranging exchanges is limited to 4.

***TGaz Editor: Change the text in subclause 11.22.6.4.9.3 (“Passive Location Ranging Measurement Reporting”) as follows:***

**11.22.6.4.9.4 Passive Location Ranging Measurement Reporting Phase**

The Passive Location Ranging measurement reporting follows the same rules and procedures for the measurement reporting for TB Ranging described in subclause 11.22.6.4.3.4 (“TB Ranging Measurement Sounding Phase”), unless explicitly stated otherwise.

The last phase of the Passive Location Ranging measurement sequence is the Passive Location Ranging measurement reporting phase and is transmitted SIFS time after the Passive location ranging measurement sounding phase.

In the Passive Location Ranging measurement reporting phase, the RSTA shall send a Location Measurement Report frame and the LMR Subvariant Ranging Trigger to one or more ISTAs that sent an HE Ranging NDP in the preceding passive location ranging measurement sounding phase. An ISTA addressed by the LMR Subvariant Ranging Trigger frame shall transmit an ISTA Passive Location Measurement Report frame SIFS time after the LMR Subvariant Ranging Trigger frame transmission.

The ISTA Passive Location Measurement Report frame is defined in subclause 9.6.7.49 (ISTA Passive Location Measurement Report frame format). The ISTA Passive Location Measurement Report frame contains an ISTA Passive Location Measurement Report element, see Subclause 9.4.2.286, containing the TOD time stamp for the I2R NDP that the ISTA transmitted, the TOA time stamp of the R2I NDP that the ISTA received from the RSTA, the CFO of the ISTA with respect to the RSTA, and optionally the TOAs for I2R NDPs received from other ISTAs participating in the Passive Location Ranging Polling-Sounding-Reporting triplet identified by a Dialog Token included in the report.

The RSTA shall send two RSTA Broadcast Passive Location Measurement Report frames a SIFS time after receiving the ISTA Passive Location Measurement Report frames from the ISTAs.

The Primus RSTA Broadcast Passive Location Measurement Report frame containing the following is transmitted first:

—— Current Passive Location LCI Table Number

— Passive Location LCI Table Countdown

— RSTA Passive Location LMR

— Passive Location LCI Table (optionally present)

See subclause 9.6.7.39 Primus RSTA Broadcast Passive Location Measurement Report frame format.

The Secundus RSTA Broadcast Passive Location Measurement Report frame containing the following is subsequently transmitted with after a SIFS time.

— ISTA Passive Location Measurement Reports

See subclause 9.6.7.40 Secundus RSTA Broadcast Passive Location Measurement Report frame format.

**References:**

**[1] Draft P802.11az\_D1.2**

**[2] Draft P802.11ay\_D3.0**

**[3] Draft P802.11REVmd\_D2.1**