IEEE P802.11
Wireless LANs

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| LB253 Phase shift TOA feedback CR |
| Date: 2021-07-14 |
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Abstract

We are here proposing a resolution to LB253 CID 5231 that enables an ISTA that measures and reports PSTOA to be able to measure its RTT without having to perform additional measurements. The ISTA would in this case rely on the RSTA to report both its TOA and PSTOA. For this purpose we are adding an optional element in the LMR frame that carriers a PSTOA and a PSTOA error field.

In addition we are here enabling an RSTA to report PSTOA and still be able to measure RTT without itself having to perform additional measurements. The RSTA would in this case rely on the ISTA to report both its TOA and PSTOA.

The TGaz LB253 CID addressed in this document is CID 5231.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **P.L** | **Clause** | **Comment** | **Proposed change** | **Proposed resolution** |
| 5231 | 130.13 | 11.21.6.3.3 | It is not specified how phase shift feedback reporting works if the ISTA is reporting phase shift TOAs in non-TB and TB ranging. How will the ISTA get the required information from the RSTA in order to compute the RTT? | Add specification and description for the case when the ISTA is reporting phase shift TOAs in non-TB and TB ranging and how the ISTA will get the required information from the RSTA in order to compute the RTT. | Revised. TGaz editor, make the changes as shown in document https://mentor.ieee.org/802.11/dcn/20/11-21-1108-01-00az-lb253-phase-shift-toa-feedback-cr.docx. |

***TGaz Editor: Insert the subclause below after Subclause 9.4.2.307 (LOS Likelihood element) as follows:***

**9.4.2.308 Phase Shift TOA And Error Timestamp element**

The Phase Shift TOA And Error Timestamp element is used to signal phase shift TOA timestamps and their errors in the Location Measurement Report frame. The format of the Phase Shift TOA And Error Timestamp element is shown in Figure 9-788ed6 (Phase Shift TOA And Error Timestamp element).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element Id | Element Length | Element ID Extension | PSTOA | PSTOAError |
| Octets: | 1 | 1 | 1 | 6 | 1 |

**Figure 9-788ed6—** **Phase Shift TOA And Error Timestamp element Action field format (#5231)**

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

The PSTOA field contains a phase shift TOA timestamp. See appendix AD.1 Phase Shift Feedback Calculation for how to calculate a phase shift TOA timestamp.

The PSTOA Error field contains an error field for the phase shift TOA timestamp reported in the PSTOA field, formatted and defined the same way as a TOA Error field described in Figure 9-909ac (Format of the TOA Error field).

***TGaz Editor: Change the text in Subclause 9.6.7.49 (Location Measurement Report frame format) as follows:***

**9.4.6.49 Location Measurement Report frame format**

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The TOA field contains a timestamp calculated based on the first arrival path of the channel impulse response (#**5231**) that represents the time, with respect to a time base, at which the start of the preamble of the corresponding NDP (#**2274**) arrived at the receive antenna connector. The corresponding NDP in an R2I LMR frame is an I2R NDP, while in an I2R LMR frame it is a R2I NDP. In both cases the corresponding NDP refers to a measurement exchange that included an Ranging NDP Announcement frame which carried the matching dialog token that is also included in this LMR. (#**1967**)

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|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category | Public Action | Dialog Token | TOD | TOA | TOD Error | TOA Error |
| Octets: | 1 | 1 | 1 | 6 | 6 | 1 | 1 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | CFO Parameter | R2I NDP Tx Power | I2R NDP Target RSSI |  Secure LTF Parameters (optional) | AOA Feedback (optional) | Phase Shift TOA And Error Timestamp(optional) |
| Octets: | 2 | 1 | 1 | 13 | 9 | 6 |

**Figure 9-909aa—Location Measurement Report frame (#1856) Action field format (#TC1208r1, #3883)** (#**5231**)

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B4 | B5 | B6 | B7 |
|  | Max TOA Error Exponent | Reserved | Invalid Measurement | Reserved |
| Bits: | 5 | 1 | 1 | 1 |

**Figure 9-909ac—Format of the TOA Error field** (#**5231**)

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<Scroll to P102L30>

The AOA Feedback field is optionally present. If present, it contains a Direction Measurement Results element; see 9.4.2.300 (Direction Measurement Results element).

If phase shift feedback is negotiated, the Phase Shift TOA And Error Timestamp field contains a Phase Shift TOA And Error Timestamp element that containts the phase shift TOA timestamp and error for the corresponding NDP. The phase shift TOA timestamp is always associated with NDP transmitted in the current measurement exchange. (#**5231**)

***TGaz Editor: Change the text in Subclause 11.21.6.3.3 (Negotiation for TB and Non-TB Ranging measurement exchange) as follows:***

**11.21.6.3.3 Negotiation for TB and Non-TB Ranging measurement exchange**

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An ISTA and an RSTA may negotiate a phase shift feedback mode of the Non-TB Ranging and TB Ranging measurement exchange (11.21.6.4.3), for either the R2I LMR and/or I2R LMR.

If phase shift feedback is negotiated for the R2I LMR, then the RSTA shall report its phase shift TOA timestamp in the Phase Shift TOA And Error element in the R2I LMR frame, and the shall report the TOA timestamp as an invalid measurement. (#**5231**)

If phase shift feedback is negotiated for the R2I LMR, and I2R LMR is negotiated, then the ISTA shall, in addition to reporting its TOA timestamp and error, also report its phase shift TOA timestamp and error in the Phase Shift TOA And Error element in the R2I LMR frame. (#**5231**)

If phase shift feedback is negotiated for the I2R LMR, then the ISTA shall report its phase shift TOA timestamp in the Phase Shift TOA And Error element in the I2R LMR frame, and shall report the TOA timestamp as an invalid measurement. (#**5231**)

If phase shift feedback is negotiated for the I2R LMR, then the RSTA shall, in addition to reporting its TOA timestamp and error, also report its phase shift TOA timestamp in the PSTOA field and its error in the Phase Shift TOA And Error element in the I2R LMR frame. (#**5231**)

The phase shift TOA timestamps shall always be referring to timestamps corresponding to the NDPs transmitted in the current measurement exchange, i.e. shall not be using delayed reporting. (#**5231**)

The TOA timestamp may, as negotiated, be using immediate or delayed reporting. (#**5231**)

***TGaz Editor: Change the text in Subclause 11.21.6.4.3.4 (Reporting phase of TB Ranging measurement) as follows:***

**11.21.6.4.3.4 Reporting phase of TB Ranging measurement**

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In TB ranging measurement reporting, any phase shift timestamps that are reported shall be reported immediately, i.e. not delayed. Any TOA timestamps that are reported shall be reported immediate or delayed as negotiated. (#**5231**)

***TGaz Editor: Change the text in Subclause 11.21.6.4.4.3 (Non-TB Ranging Measurement Reporting phase) as follows:***

**11.21.6.4.4.3 Non-TB Ranging Measurement Reporting phase**

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In Non-TB Ranging measurement reporting phase, any phase shift timestamps that are reported shall be reported immediately, i.e. not delayed. Any TOA timestamps that are reported shall be reported immediate or delayed as negotiated. (#**5231**)

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**References:**

**[1] Draft P802.11az\_D3.1**