IEEE P802.11
Wireless LANs

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| 11az Ranging Parameters Element Amendment Text |
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Abstract

This submission adds to the Ranging Parameters Element.

Revisions:

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Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGaz Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGaz Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGaz Editor: Editing instructions preceded by “TGaz Editor” are instructions to the TGaz editor to modify existing material in the TGaz draft. As a result of adopting the changes, the TGaz editor will execute the instructions rather than copy them to the TGaz Draft.***

**The text preceded by “Discussion” is not part of the adopted changes.**

### Discussion

Need RSTA capabilities (in beacon?):

* RSTA AoA feedback available
* RSTA ToA type supported (I2R and R2I)

9.4.2.26 Extended Capabilities element

TGaz Editor: Insert the following new row into Table 9-283 (Extended Capabilities field):

#### **Table 9-154 Extended Capabilities element**

|  |  |  |
| --- | --- | --- |
| Bits  | Information  | Notes |
| <NAN> | AoA Measurements Available | A STA sets the AoA Measurement Available field to 1 when dot11AoAMeasurementAvailable is true. Otherwise, the STA sets the AoA Measurement Available field to 0. |

9.4.2.279 Ranging Parameters

TGaz Editor: Change the following paragraph of 9.4.2.279:

The ~~Next Generation Positioning~~ Ranging Parameters element contains a set of fields and optional subelements. The Ranging Parameters element is optionally included in the initial Fine Timing Measurement Request frame, as described in 9.6.7.32 (Fine Timing Measurement Request frame format), and the initial Fine Timing Measurement frame, as described in 9.6.7.33 (Fine Timing Measurement frame format). The use of the Ranging Parameters element is described in 11.22.6 (Fine timing measurement (FTM) procedure).

The format of the Ranging Parameters element is shown in 9-610a (Ranging Parameters element 21 format).

TGaz Editor: Change Figure 9-610a as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Element ID (255) | Length | Element ID Extension | Ranging Parameters | Ranging subelements |  |
| Octets: | 1 | 1 | 1 | ~~3~~6 | Variable |  |

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| **Figure 9-610a - Ranging Parameters element format** |

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

The format of the Ranging Parameters field is shown in 9-610b (Ranging Parameters field).

TGaz Editor: Change Figure 9-610b as follows:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B1 | B2-B6 | B7 | B8 | B9 | B10 B11 | B12 | B13 | B14 | B15 |
|  | Status Indi-cation | Value | ISTA-2-RSTA LMR Req. | Secure LTF Req. | Secure LTF Support | Ranging Priority | R2I ToA Type | I2R ToA Type | R2I AOA Req. | I2R AOA Req. |
| Bits: | 2 | 5 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
|  | B16 B21 | B22 B23 | B24 B26 | B27 B29 | B30 | B31 | B32 B34 | B35 B37 |
|  | Format and Bandwidth | Reserved | Max UL Rep | Max DL Rep | Device Class | Full Bandwidth UL MU-MIMO | Max DL STS $\leq $80 MHz | Max DL STS >80 MHz |
| Bits: | 6 | 2 | 3 | 3 | 1 | 1 | 3 | 3 |
|  | B38 B39 | B40 B42 | B43 B45 | B46 B47 |  |
|  | Reserved | Max UL STS$ \leq $ 80 MHz | Max UL STS > 80 MHz | Reserved |  |
| Bits: | 2 | 3 | 3 | 2 |  |

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| **Figure 9-610b - Ranging Parameters field format** |

The Status Indication field indicates the responding STA’s response to the Fine Timing Request. The encoding of the Status Indication field is shown in Table 9-272 (Status Indication field values).

The Status Indication field and Value field are reserved in the initial Fine Timing Measurement Request frame. When the Status Indication field is set to 3 by the responding STA, the Value field contains a duration in units of seconds; otherwise the Value field is reserved.

TGaz Editor: Change/move the following paragraph of 9.4.2.279 here:

The ISTA2RSTA LMR Feedback subfield in the Ranging Parameters field is set to 1 in the Initial Fine Timing Measurement Request frame indicates that the ISTA is willing to report the ~~estimated~~ LMR to the RSTA; when included in the Initial Fine Timing Measurement frame indicates that the RSTA requires a LMR report from the ISTA at the end of each ranging exchange. Otherwise the ISTA2RSTA LMR Feedback subfield is set to 0. See 11.22.6.4.2.4 (TB Measurement Reporting Part) and 11.22.6.4.3.3 (Measurement Report).

The Secure LTF Required subfield is set to 1 to enable a secure LTF measurement exchange between an ISTA and an RSTA. Otherwise the Secure LTF Required field is set to 0.

The Secure LTF Support subfield is set to 1 in the initial Fine Timing Measurement Request frame to indicate that an ISTA supports a secure LTF measurement exchange. Otherwise the Secure LTF Support field is set to 0. The Secure LTF Support field is reserved in the initial Fine Timing Measurement frame (see 11.22.6.3 (Fine timing measurement procedure negotiation)).

TGaz Editor: Add the following paragraphs to 9.4.2.279:

For TB ranging and non-TB ranging, the Ranging Priority subfield of the Ranging Parameters field of the Ranging Parameters element in the initial Fine Timing Measurement Request frame contains the ISTA’s Ranging Priority request which indicates the time sensitivity of a ranging operation, and it is set according to Table x1 in 9.4.2.166.

For TB ranging, the Ranging Priority subfield of the Ranging Parameters field of the Ranging Parameters element in the initial Fine Timing Measurement frame contains the RSTA’s Ranging Priority response which indicates whether the RSTA accommodates the Ranging Priority request of the ISTA, and it is set according to Table x2 in 9.4.2.166.

For non-TB ranging, the Ranging Priority subfield of the Ranging Parameters field of the Ranging Parameters element in the initial Fine Timing Measurement frame is reserved.

The R2I ToA Type subfield is set to 1 in the initial Fine Timing Measurement Request frame to set the ToA feedback type in the RSTA-to-ISTA LMR to phase shift which corresponds to the average linear phase across the subcarriers. Otherwise, the R2I ToA Type is set to 0 and the RSTA-to-ISTA LMR ToA feedback type will be first path reporting.

The I2R ToA Type subfield is set to 1 in the initial Fine Timing Measurement Request frame to indicate that the ISTA supports phase shift type ToA feedback in the ISTA-to-RSTA LMR. The I2R ToA type subfield is set to 1 in the initial Fine Timing Measurement frame to set the ToA feedback type in the ISTA-to-RSTA LMR to phase shift, corresponding to the average linear phase across the subcarriers. Otherwise, the I2R ToA Type is set to 0 and the ISTA-to-RSTA LMR ToA feedback type will be first path reporting.

The R2I AoA Requested subfield is set to 1 in the initial Fine Timing Measurement Request frame by the ISTA when it requests the RSTA to include AoA measurements in the RSTA-to-ISTA LMR in the AoA feedback field.

The I2R AoA Requested subfield is set to 1 in the initial Fine Timing Measurement Request frame to indicate that the ISTA supports AoA measurement feedback in the ISTA-to-RSTA LMR. The I2R AoA Requested subfield is set to 1 in the initial Fine Timing Measurement frame by the RSTA to request the ISTA to include AoA measurements in the ISTA-to-RSTA LMR in the AoA feedback field.

TGaz Editor: Move the following paragraph of 9.4.2.279 here:

The Format and Bandwidth subfield indicates the requested or allocated PPDU format and bandwidth used to transmit the uplink and downlink NDP frames exchanged as part of the non-TB ranging or TB Ranging protocol (See 11.22.6.4.2 (Measurement exchange in TB mode) and 24 11.22.6.4.3 (Measurement exchange in Non-TB mode)). The encoding of this subfield is <TBD> given in Table 9-272 Format and Bandwidth field.

TGaz Editor: Replace the following paragraph of 9.4.2.279:

~~The Number of Antennas subfield is 8 Bits wide where Bits 0 thru 3 indicate the number of transmit antennas and Bits 4 thru 7 indicate the number of receive antennas.~~

The Max UL Rep subfield indicates the maximum number of LTF repetitions that the FTM session uses in the preamble of UL NDP frames.

The Max UL Rep subfield indicates the maximum number of LTF repetitions that the FTM session uses in the preamble of DL NDP frames.

The Device Class and Full Bandwidth UL 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.

The Max DL STS ≤ 80 MHz subfield indicates for bandwidths less than or equal to 80 MHz the maximum number of space-time streams to be used in DL NDP frames in the session.

The Max DL STS > 80 MHz subfield indicates for bandwidths greater than 80 MHz the maximum number of space-time streams to be used in DL NDP frames in the session.

The Max UL STS ≤ 80 MHz subfield indicates for bandwidths less than or equal to 80 MHz the maximum number of space-time streams to be used in UL NDP frames in the session.

The Max UL STS > 80 MHz subfield indicates for bandwidths greater than 80 MHz the maximum number of space-time streams to be used in UL NDP frames in the session.

TGaz Editor: Change Figure 9-610d as follows:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B7 | B8 B15 |  |  |  |  |  |  |  |
|  | Subelement ID (1) | Length | Availability Window | Ranging ID | Res-ponse | Trigger Frame Padding Duration | Passive Location Ranging | MaxToA-Available Exp | BSS Color |
| Bits: | 8 | 8 | TBD | 16 | 1 | 2 | 1 | 4 | 8 |

Figure 9-610d TB Specific Parameters subelement format

TGaz Editor: Change the following paragraph of 9.4.2.279:

The Trigger Frame MAC Padding Duration field in ~~HE~~ TB Specific Parameters subelement in the NDP Parameter Set element is defined in 9.4.2.237.2 HE MAC Capabilities Information field.

## Annex C

## (normative)

* 1. **C. 3 MIB detail**

*Insert the following entry at the end the following object as shown below:*

Dot11WirelessMgmtOptionsEntry ::=

SEQUENCE {

…

dot11RMCivicConfigured TruthValue,

dot11SecureLTFImplemented TruthValue

dot11PassiveLocationRangingResponderActivated TruthValue

dot11PassiveLocationRangingInitiatorActivated TruthValue

dot11AoAMeasurementAvailable TruthValue

}

dot11PassiveLocationRangingResponderActivated OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates that a support for Passive Location Ranging acting as a responder is implemented (see Section 11.22.6.4.9 Measurement Exchange in Passive Location Ranging mode) is implemented. The capability is disabled otherwise."

DEFVAL { false }

::= { dot11WirelessMgmtOptionsEntry <appropriate number>}

dot11PassiveLocationRangingInitiatorActivated OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates that a support for Passive Location Ranging acting as an initiator is implemented (see Section 11.22.6.4.9 Measurement Exchange in Passive Location Ranging mode) is implemented. The capability is disabled otherwise."

DEFVAL { false }

::= { dot11WirelessMgmtOptionsEntry <appropriate number>}

dot11AoAMeasurementAvailable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates that the STA supports Angle-of-Arrival (AoA) measurements and feedback of these measurements is available via the LMR frame. When false, there is no such feedback available in the LMR frame."

DEFVAL { false }

::= { dot11WirelessMgmtOptionsEntry <appropriate number>}