IEEE P802.11
Wireless LANs

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| First Path CE measurement CIDs |
| Date: 2019-11-04 |
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|  |  |  |  |  |

Abstract

This document proposes resolution to CIDs 1427, 2349

The text changes are based on D1.5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1427 | 49.00 | 9.4.2.279 | The R2I and I2R ToA Types are defined either based on first arrival path or average linear phase accros subcarriers. For EDMG positioning, it is beneficial to have in addition to the first arrival path timestamp, a timestamp based on the strongest path, to provide additional information for scenarios such as obstructed LOS. | Define a ToA type based on strongest arrival path / strongest tap for SC DMG/EDMG positioning e.g., For PDMG/PEDMG the I2R ToA Type subfield is set to 1 in the initial Fine Timing Measurement Request frame to indicate that the ISTA supports ToA feedback based on strongest path in the ISTA-to-RSTA LMR. | Revise as in  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2349 | 119.18 | 11.22.6.4.7.1 | It may be beneficial to measure TOF of the strongest impulse response tap when using best path AWV. | One option would be to include trigger with value 5 indicating best path AWV and TOA feedback based on strongest tap of impulse response. |  Revise as in |

The presentation 11-19-1717 presents the reason for the required change. The draft changes we propose:

1. Add a capability field to the DMG Fine Timing and Range Measurement Capability Information field for the capability to measure on first path
2. Add a bit to the EDMG header-A to request such measurement.
3. Add a protocol to describe how the bit is used in 11.22.6.4.7
4. Add a bit to the TOA error to indicate that the measurement contained in the frame are based on first path analysis

We should note that the request is made by the ISTA to RSTA. The ISTA should match the way it measures to the way it requested from the RSTA.

***TGaz Editor: Add a field to figure 9-10000 (DMG Fine Timing and Range Measurement Capability Information field format) on P59L7 as follows***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 B7 |
|  | Fine TimingMeasurementResponder | Fine TimingMeasurementInitiator | PDMG/PEDMG supporting APs in the area | First Path Tap Measurement Capability | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 4 |

***TGaz Editor: Add the following text after P59L18 as a new paragraph (9.4.2.127.10):***

A PEDMG STA sets the First Path Tap Measurement Capability subfield to 1 if it is capable of measuring the TOA on the first path tap in a channel estimate rather than the strongest path.

***TGaz Editor: Add the following lines to Table 29-48—TXVECTOR and RXVECTOR parameters in P202***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FIRST\_PATH\_MEASUREMENT\_REQ | FORMAT is EDMG, EDMG\_MODULATION is EDMG\_SC\_MODE, NUM\_USERS is 1, NUM\_STS is 1 | Enumerated typeFIRST\_PATH\_MEAS\_REQUEST,FIRST\_PATH\_MEAS\_NOT\_REQUESTIndicates whether first path analysis should be performed for TOA, Angle of arrival and Angle of Departure | Y | N |
| Otherwise  | Not present | N | N |

***TGaz Editor: Add a line and modify the last line in Table 29-60—EDMG-MCS field definition when the Number of SS field is 0 (in P203L8 29.3.3.3.2.3)***

|  |  |  |  |
| --- | --- | --- | --- |
| First Path Measurement Req | 1 | 8 | When set to 1, indicates that TOA, Angle of Arrival and Angle of Departure measurement on this PPDU shall be based on first path channel tap rather than strongest tap.  |
| Reserved | 13 | 10 |  |

***TGaz Editor: Change P91L16-26 (9.6.4.33) as follows***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B4 | B5 B6 | B7 | B8 B15 |
|  | Max TOA Error Exponent | Invalid Measurement | Measurement on First Path Tap | Reserved |
| bits: | 5 | 2 | 1 | ~~11~~8 |

**Figure 9-878—Format of the TOA Error Field**

The Invalid Measurement field contains an indication of an invalid (#**2095**) TOA field. The Invalid Measurement field is set to 1 to indicate that the TOA value is invalid, and is set to 0 to indicate that the TOA value is valid; values of 2 and 3 are reserved. (#1686)

The Measurement of First Path subfield contains an indication of the tap on which TOA, Angle of Arrival and Angle of Departure measurements in this frame have been performed. A value of 1 indicates that the measurements were performed on the first path tap, a value of 0 indicates that the measurements were performed on the strongest tap.

***TGaz Editor: Add the following subclause at P127L20 (before 11.22.6.4.2.1.6)***

**11.22.6.4.2.1.6 Measurement of First Path Tap vs Strongest Tap.**

A PEDMG ISTA requests that the RSTA uses the first path tap when measuring the TOA, Angle of Arrival or Angle of Departure on the PPDU containing the Ack frame in an EDCA based FTM exchange, by setting the FIRST\_PATH\_MEASUREMENT\_REQ TXVECTOR parameter to FIRST\_PATH\_MEAS\_REQUEST. The ISTA uses this TXVECTOR setting only if the RSTA has set the First Path Tap Measurement Capability subfield of the DMG Fine Timing and Range Measurement Capability Information field to 1. The RSTA bases the TOA, Angle of Arrival and Angle of Departure measurements on the first path tap. In the Fine Timing Measurement Frame in the measurement results are reported, the RSTA sets the Measurement on First Path Tap field of TOA Error field to 1.

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Figure 1- Time domain channel estimate example to clarify first path tap vs. strongest tap

Note: Measurement on first path tap is independent on whether the PPDU was transmitted and received using First Path AWV.

**References:**