**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **Proposed Resolution Draft 1.0 comments CID – 1251, 138, 1377, 1319, 273, 274, 1258** | |
| Date Submitted | January 2025 | |
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| Re: |  | |
| Abstract |  | |
| Purpose | To propose resolution for comments related to Sensing CIDs – 1251, 138, 1377, 1319, 273, 274, 1258 for “P802.15.4ab™ Draft 1.0 Standard for Low-Rate Wireless Networks” . | |
| Notice | This document does not represent the agreed views of the IEEE 802.15 Working Group or IEEE 802.15.4ab Task Group. It represents only the views of the participants listed in the “Sources” field above.It is offered as a basis for discussion and is not binding on the contributing individuals. The material in this document is subject to change in form and content after further study. The contributors reserve the right to add, amend or withdraw material contained herein. | |

Rev 0: Initial version.

***Comment Indices in 15-24-0371-34-04ab-consolidated-comments-draft-1-0 related to sensing:***

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| **Name** | **Index #** | **Category** | **Page** | **Sub-clause** | **Line #** | **Comment** | **Proposed Change** | **Must Be Satisfied?** | **Disposition Status (Accepted, Rejected, Revised)** | **Disposition Detail** |
| Billy Verso | **1251** | **Technical** | **148** | 10.39.6.1 | 10 | Should the term "speed" be used rather than velocity, just to avoid people thinking it is a vector with a direction? | Change velocity to speed. |  | TBD | TBD |
| Rojan Chitrakar | **138** | **Technical** | **159** | 10.39.6.6 | **3** | When EOL field is zero, how is the target list continued in a subsequent frame, is the target list the only content of the next report, or are the preceding control fields also present? Details are missing. Also which target list, full or short? | Add detail of the procedure used to continue the target list in the next report when the EOL field is zero. Details are missing. Also specify if the target list is full or short? |  | TBD | TBD |
| Pooria Pakrooh | **1377** | **Technical** | **159** | 10.39.6.6 | **20** | Unclear what the definition of "Rotation" and "Elevation" fields are | Clarify the defenition and range of values |  | TBD | TBD |
| Pablo Corbalán Pelegrín | **1319** | **Technical** | **160** | 10.39.6.6 | **17** | Shouldn't the Elevation angle range from -90º to 90º instead of -180º to 180º? If we do make this change, the resolution for Azimuth and Elevation angles will be different. | Change "-pi to +pi radians" to "-pi/2 to +pi/2 radians". |  | Accepted | **Changed as per proposed change** |
| Li-Hsiang Sun | **273** | **Technical** | **161** | 10.39.6.6 | **1** | what is the reference for Delay field? i.e. what 0 means? What is the unit? | Please clarify |  | Accepted | Units for Delay is Seconds. Added to text. |
| Li-Hsiang Sun | **274** | **Technical** | **161** | 10.39.6.6 | **3** | what is the unit of the velocity? | Please clarify |  | Accepted | Updated text. Units for Velocity would be seconds/seconds and hence dimensionless. |
| Billy Verso | **1258** | **Technical** | **161** | 10.39.6.6 | **3** | "Velocity field reports the velocity of the target (4 bits, signed integer, zero padded to an octet)"…. Units are missing. Also maybe could uses whole octet as a singed integer, and/or sign extend it rather than zero padding, for easier use. | Specify units. Make full octet signed value. (and change name to "Speed" instead of velocity as it is not a velocity vector. |  | TBD | TBD |

**Discussion for 273, 274:**

Why do we have a Range-Doppler representation as Delay and Velocity with units as in D01?

It is important to understand that 802.15.4ab should be able to serve both mono-static and multi-static sensing.

Much of the literature is on mono-static sensing, and in that case the conversion from delay to range is straightforward (i.e., multiply by speed of light and divide by two). This approach typically does not work for multi-static sensing. In multi-static sensing, the transmitter and receiver are typically not co-located, and the target may be away from the direct line between the two nodes. Therefore, the distance to the line of sight (and/or the angles to the line of sight) needs to be taken into account when calculating range from delay. The accuracy of this kind of conversion may depend on the accuracy with which the radio nodes can localize each other.

In 15.4ab, we are taking the approach that the delay-to-range conversion may not be possible locally, and therefore we transmit the delay information as-is, with the unit [seconds]. The velocity is also on the basis of delay, so instead of [meters]/[seconds], this is expressed in [seconds]/[seconds], meaning this value is dimensionless.

**For Comment 1319:**

**Text changes:** Highlighted in Yellow

**10.39.6.6**

**Change at Page 160, line 17**

The Elevation field value gives the elevation-of-arrival of the target. This is a 7-bit signed value linearly representing an angle from –π/2 to +π/2 radians. Optionally, one Elevation field is sent for each target in the full target list.

**For comment 273, 274:**

**Text changes**：Highlighted in Yellow

**10.39.6.6**

**Change at Page 161, Line 1:**

The Delay field gives the delay of a target in the units of Seconds, with line of sight transmission between transmitter and receiver as reference. This is an 8-bit unsigned integer. A delay value is sent for each

target in both full and sparse target lists.

**Change at Page 161, Line 3:**

The Velocity field reports the velocity of the target (4 bits, signed integer, zero padded to an octet). A

velocity value is sent for each target identified. The velocity is on the basis of delay, so, this is expressed in [seconds]/[seconds], meaning this value is dimensionless.