**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 Comments Resolution on Sensing and AC IE** | |
| Date Submitted | May 2024 | |
| Sources | Pooria Pakrooh (Qualcomm) |  |
| Re: |  | |
| Abstract | Resolution to comments: 859, 860, 861, 862 | |
| Purpose | To propose comments resolution for “P802.15.4ab™/D (pre-ballot) C Draft 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 2: Changes relative to Rev0 and Rev1:

1. Rev0 addressed CIDs 94, 97, 104, 156, 224, 410, 411, 432, 433, 553, 656, 663, 844, 846, 847, 859, 860, 861, 862, 881.
2. Rev1 has been approved by the group. It contains CIDs 94, 97, 104, 156, 224, 410, 411, 432, 433, 553, 656, 663, 844, 846, 847.
3. In Rev2, CIDs 859, 860, 861 and 862 are further discussed, building on the discussion in Rev0.

***Comment Index #859 and #860 in 15-24-0010-16-04ab-cc-consolidated-comments***

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| **CID** | **Commenter** | **Sub-Clause** | **Page** | **Line** | **Comment** | **Proposed Change** |
| 859 | Carl Murray | 10.39.7.1 | 115 | 2 | Allow for a configuration of 32 - better than leaving reserved. |  |
| 860 | Carl Murray | 10.39.7.1 | 115 | 6 | Allow for a configurations up to 32 - better than leaving reserved. |  |

**Discussion:**

According to the latest PHY consensus for MMS ranging, maximum number of fragments is 16 for RSF and 8 for RIF. The 4ab group members have agreed on these numbers long time ago after extensive discussions.

Note that every doubling of fragments does not necessarily provide 3dB of extra link margin. When increasing the number of fragments, there are two main factors which limit the link budget increase:

1. Packet detection/acquisition is done via NB-OQPSK (for NBA-MMS), or UWB packet (UWB-driven MMS). The link margin for acquisition must be greater than/ equal to the ranging link margin. Otherwise, packet detection is the bottleneck, and increasing the number of fragments does not help. Please refer to DCN 22-0074, and DCN 21-0394, for link budget analysis, and analysis of number of fragments for NBA-MMS in presence of fading.
2. The CFO error leads to larger time/phase drift across larger number of fragments. Even in the presence of tracking loops, the impact of time/phase drift needs to be studied to evaluate the optimal max number of fragments.

If this comment is only addressing a special case of weak NLOS path in presence of strong LOS, there needs to be studies to show what should be the optimal max number of segments based on the performance of acquisition via NB/UWB and the combining number of RSF segments, taking into account time/phase drift.

An alternative to enable 32+ fragments without making PHY changes at this stage is to make proper scheduling in the MAC protocol to send consecutive packets, each with 16 fragments, and utilize proper signal processing to do the combining across fragments. Further PHY config changes required more discussions and agreement among the 4ab group in its proper timeline for PHY discussions.

**Resolution: Rejected**

***Comment Index #861 and #862 in 15-24-0010-16-04ab-cc-consolidated-comments***

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| 861 | Carl Murray | 10.39.7.1 | 116 | 2 | Allow for a configurations of 8 and 16 - better than leaving reserved configurations and allows for the new ETSI +10dB. |  |
| 862 | Carl Murray | 10.39.7.1 | 115 | 6 | Allow for a configurations of 8 and 16 - better than leaving reserved configurations and allows for the new ETSI +10dB. |  |

**Discussion:**

The minimum values for MSR and RIF/STS segment length have been set to 32, as reflected in DCN 100-23/r1. Similarly, minimum 15.4z STS segment length is 32. Decreasing these values to 8 and 16 requires higher Tx peak power, different from the range of consideration in 4z, and 4ab (as of today). Additionally, higher ETSI limits will make this peak power increase requirement more severe. Therefore, the group has not agreed on these values in previous 4ab discussions.

**Resolution: Rejected**