**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title |  | |
| Date Submitted | 5th August 2024 | |
| Source | Carl Murray (Qorvo), | carl.murray at qorvo.com |
| Re: | CIDs 1113, 1114, 1115, 1116, 1334, 1770 | |
| Abstract |  | |
| Purpose | To propose resolution for “P802.15.4ab™/D01 Draft Standard for Low-Rate Wireless Networks”. | |
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## CID 1113:

This document provides changes to

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| **Name** | **Index#** | **Pg** | **Sub-Clause** | **Ln** | **Comment** | **Proposed Change** | **Disposition** |
| Billy Verso | 1113 | 55 | 10.38.2 | 26 | Somewhere in this overview, we should state that NB and UWB PHYs are not transmitting or receiving at exactly the same time which I assume is the case. This would help designers better understand the requirements. (The only case for TX and RX at exactly the same time is monostatic sensing, which separate to MMS). | Add a paragraph to make a statement along the lines of: For MMS ranging, the UWB radio does not transmit and receive at the same time, nor does the O-QPSK radio, and UWB and O-QPSK radios do not operate at the same time. Or stating this differently, In NBA UWB MMS ranging, NB transmission, NB reception, UWB transmission, and UWB reception are mutually exclusive operations that do not overlap with each other in time. | Revised |

**Add the following new paragraph on page 56 after line 21 –**

In NBA UWB MMS operation, for any single device, NB transmission, NB reception, UWB transmission, and UWB reception are mutually exclusive operations that do not overlap with each other in time. The interframe spacings between these operations are defined in XXX. (when comment ID 1195 is resolved)

## CID 1114

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| **Name** | **Index#** | **Pg** | **Sub-Clause** | **Ln** | **Comment** | **Proposed Change** | **Disposition** |
| Billy Verso | 1114 | 56 | 10.38.2 | 1 | I think some of the parameters talked about here are potentially in the realms of the next higher layer protocol and perhaps not configured directly into the MAC. Maybe for this introductory statement a rewording could help make this more generic. | Change "is configured for UWB MMS ranging by specifying" to "is reused for UWB MMS ranging including the specification of" | Accepted |

**Overview of changed text in context**

The ranging block structure ~~is configured for UWB MMS ranging by specifying~~ is reused for UWB MMS ranging including the specification of the ranging slot duration, the ranging round duration, and the ranging block duration in RSTU. For UWB MMS ranging, the ranging slot, ranging round, and ranging block durations shall be integer multiples of 300 RSTUs.

## CID 1115

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| **Name** | **Index#** | **Pg** | **Sub-Clause** | **Ln** | **Comment** | **Proposed Change** | **Disposition** |
| Billy Verso | 1115 | 56 | 10.38.2 | 5 | This phrase "carrier coherence" is not clear to me in meaning or how transmission offset might influence it.. I have no problem with the specifying that offset shall be zero, but I think we should note why. | Add a definition of this term and a NOTE giving some explanation of this requirement. | Revised |

**Change the text on page 56 beginning on line 4 as indicated**

The round hopping, specified in 10.32.3.3 may be optionally applied to UWB MMS ranging. ~~To ease carrier coherence between UWB MMS phases,~~ To simplify scheduling when round hopping is used~~,~~ the transmission offset shall be zero.

## CID 1116

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| **Name** | **Index#** | **Pg** | **Sub-Clause** | **Ln** | **Comment** | **Proposed Change** | **Disposition** |
| Billy Verso | 1116 | 56 | 10.38.2 | 15 | A ranging round is typically the time from the start of ranging exchange between two devices to the start of their next exchange. In figure 25, "Ranging Round" should be changed to "UWB MMS ranging exchange" to match the text, although later in the text this may be called a "ranging sub-round", but I think that term is never actually defined. This would be a good place to define it, if we want to use it to cover what is in Figure 25. | Define "MMS ranging sub-round" here, and add the definition to clause 3.1. Review all usages of sub-round to ensure that they are consistent (use "MMS ranging sub-round") everywhere. Change figure 25 "Ranging Round" to "MMS Ranging Sub-round". | Revised |

**From 10.38.2 pg 56**

A screenshot of a computer

Description automatically generated

**From 15.4me-D04 section 10.32.2 page 482, line 13**

A ranging block is a time period for ranging. Each ranging block consists of a whole number of ranging

rounds, where a ranging round is a period of sufficient duration to complete one entire range-measurement

cycle involving the set of ERDEVs participating in the ranging exchange.

The issue is that TG4ab currently defines a ‘Ranging Round’ for MMS as per figure 25 but this in reality is a ‘Ranging Sub-round’. This is implicitly assumed elsewhere in the text eg figure 40. It is noted that a ‘Ranging Round’ can be composed of a single ‘Ranging Sub-round’.

A blueprint of a diagram

Description automatically generated

**Resolution**

* Make the following change on page 56 lines 8 and 9.
  + As illustrated in Figure 25, a ranging sub-round which incorporates a UWB MMS ranging exchange, consists of a control phase, a ranging phase, and a report phase.
* In figure 25 on page 56 change ‘Ranging Round’ to ‘MMS Ranging Sub-round.
* Search for ‘ranging round’ and replace by ‘ranging sub-round’ where appropriate.

## CID 1334

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| **Name** | **Index#** | **Pg** | **Sub-Clause** | **Ln** | **Comment** | **Proposed Change** | **Disposition** |
| B. Rolfe | 1334 | 56 | 10.38.2 | 14 | Marginally incorrect use of "may" suggesting something outside of this standard (if only just). | alternatively, another OOB mechanism will be used. | Revised |

**Change the text on page 56 beginning on line 12 as indicated**

In UWB driven UWB MMS, the HRP UWB PHY is employed for the control phase, the ranging phase and the report phase. UWB driven MMS may use the O-QPSK PHY described in clause 13 for initialization and setup, or ~~it may use~~ an OOB mechanism can be used for this.

## CID 1170

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| **Name** | **Index#** | **Pg** | **Sub-Clause** | **Ln** | **Comment** | **Proposed Change** | **Disposition** |
| Billy Verso | 1170 | 68 | 10.38.5 | 23 | Lines 23 through to Line 6 of the next page, are trying to explain the PHY packet in words, this should be clear from clause 16 and should not be repeated here. | Delete as much as possible from this clause, since it is already specified in clause 16 (which is where this PHY level stuff it should be specified). Clause 16 should reference/use the PIB phyUwbMmsRsfNumberFrags and phyUwbMmsRifNumberFrags configurations, so they don’t need to be mentioned here again. All it that is needed to say is that, responder fragments are offset by 600 RSTU, as shown in the figure. | Revised |

**Change the text in 16.2.11 on page 192, starting on line 15 as indicated**

Where X and Y are *phyUwbMmsRsfNumberFrags* and *phyUwbMmsRifNumberFrags* respectively ~~the number of RSF and RIF fragments respectively in the MMS UWB packet~~, the following are the combinations that should be supported by the HRP-ARDEV in the case of NBA UWB MMS operations:

⎯ RSF only MMS packets, i.e., where Y=0 and X ∈ {1, 2, 4, 8, 16}.

⎯ RIF only MMS packets, i.e., where X=0 and Y ∈ {1, 2, 4, 8}.

⎯ Mixed RSF/RIF packets, i.e., where X ∈ {1, 2, 4, 8}, Y ∈ {1, 2, 4, 8}.

**Change the text in 10.38.5 on page 68, starting on line 22 as indicated -**

The UWB MMS ranging phase follows the control phase.

~~In the ranging phase, the initiator shall transmit~~ *~~phyUwbMmsRsfNumberFrags~~* ~~RSF fragments starting its first fragment at the start of the ranging phase, with each subsequent RSF fragment starting 1200 RSTU from the start of the previous one.~~

In the ranging phase, the initiator shall transmit a HRP UWB PHY MMS packet as described in 16.2.11.

~~The initiator may start transmitting a first RIF fragment at the start of the ranging phase if no RSF fragments are present, or two milliseconds (2400 RSTU) after the start of its last RSF fragment transmission otherwise. The initiator may continue to send~~ *~~phyUwbMmsRifNumberFrags~~* ~~RIF fragments at regular intervals of 1200 RSTU.~~

~~The responder may start transmitting a first RSF fragment at 600 RSTU into the ranging phase. The responder may send~~ *~~phyUwbMmsRsfNumberFrags~~* ~~RSF fragments at regular intervals of 1200 RSTU.~~

The responder may start transmitting a HRP UWB PHY MMS packet as described in 16.2.11 at 600 RSTU into the ranging phase.

~~The responder may start transmitting a first RIF fragment at 600 RSTU into the ranging phase if no RSF fragments were transmitted, or two milliseconds (2400 RSTU) after the start of its last RSF fragment transmission otherwise. The responder may continue to send~~ *~~phyUwbMmsRifNumberFrags~~* ~~RIF fragments at regular intervals of 1200 RSTU.~~