**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | Signalling data modes and SYNC length | |
| Date Submitted | 15 March 2023 | |
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| Re: | Contribution to TG4ab for IEEE 802.15.4ab | |
| Abstract | Core message content to allow agreement between devices of the data rates, codes and PSR lengths that they support and want to use. | |
| Purpose | Proposed message content (i.e., to include in an IE) to facilitate negotiation of supported/required data rates, codes and PSR lengths. | |
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**Introduction**

This is a distillation of the text from the rev 01 of this document to:

1. Capture the core text, without examples of use (please refer to rev 01 for example usage)
2. Merge the Receiver SFD selector field into the Receiver Data Mode Specifier for completeness.
3. Adding a table to cover this SFD selector field values.
4. Restate the final paragraph to cover the transmitter behaviour as per group discussions and including the SFD.

**Signalling data modes and SYNC length - Transmitter**

This is a mechanism for a device to indicate the data rates it wishes to use for its transmissions and whether it intends to use LPDC with these or not. To do this the following field is defined (for inclusion in a suitable IE).

This consists of a 2-bit Transmitter Rate/Code Specifier (TRCS) for each TG4ab data rate, as shown:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Transmitter Data Modes Specifier (TDMS) field | | | | |
| Bits 0–1 | 2–3 | 4–5 | 6–7 | 8–9 |
| TRCS\_1p95 | TRCS\_7p8 | TRCS\_31p2 | TRCS\_62p4 | TRCS\_124p8 |

Figure 1 – TDMS field to signal the transmitter’s desired use of data rates and LDPC coding.

Each 2-bit Transmitter Rate/Code Specifier (TRCS) is formatted as shown below:

|  |  |
| --- | --- |
| Bits 0 | 1 |
| Data Rate Request Field | LDPC Coding Support Field |

Figure 2 – Encoding of Transmitter Rate/Code specifier (TRCS) subfields

**Signalling data modes, SYNC length and SFD - Receiver**

A device can use this mechanism in response to the TDMS to signal its receiver preferences:

This defines a Receiver Data Mode Specifier (RDMS) field (for inclusion in a suitable IE) to indicate the data rates and coding that the receiver device supports along with its SYNC length and SFD requirements. This is formatted as illustrated in Figure 3 below.

This consists of a 5-bit Receiver Rate/Code/Sync specifier (RRCS) for each TG4ab data rate, and a Receiver SFD Specifier field (RSFDS) as shown:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Receiver Data Mode Specifier (RDMS) field | | | | | |
| Bits 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–26 |
| RRCS\_1p95 | RRCS\_7p8 | RRCS\_31p2 | RRCS\_62p4 | RRCS\_124p8 | RSFDS |

Figure 3 – RDMS field to signal supported data rates, coding, and sync length requirements

Each 5-bit Receiver Rate/Code/Sync specifier (RRCS), is then formatted as shown in Figure 4 below:

|  |  |
| --- | --- |
| Bits 0–3 | 4 |
| SYNC Support Field | LDPC Coding Support Field |

Figure 4 – encoding of Receiver Rate/Code/Sync specifier (RRCS) subfields

The single bit LDPC Coding Support field (bit 4 of each RRCS) indicates when set to one that LDPC is supported/allowed and, indicates when set to zero that LDPC is not supported/allowed for the associated data rate.

The coding of the 4-bit SYNC Support field is shown in Table 1 below.

Table 1— Sync Support Field values

|  |  |
| --- | --- |
| SYNC Support field value | Meaning |
| 0 | Data rate not supported or not to be used |
| 1 | PSR = 16 |
| 2 | PSR = 24 |
| 3 | PSR = 32 |
| 4 | PSR = 48 |
| 5 | PSR = 64 |
| 6 | PSR = 96 |
| 7 | PSR = 128 |
| 8 | PSR = 192 |
| 9 | PSR = 256 |
| 10 to 15 | Reserved |

The final field of the RDMS is a 2-bit Receiver SFD Specifier (RSFDS) field to signal the receiver SFD preference. This is a single value common for all supported data rates, encoded as per Table 2 below:

Table 2—RSFDS field values

|  |  |  |
| --- | --- | --- |
| RSFDS field value | SFD # selected  (as per Table 15-7c in IEEE 802.15.4z) | SFD Length |
| 0 | 1 | 4 |
| 1 | 2 | 8 |
| 2 | 3 | 16 |
| 3 | 4 | 32 |

**Resultant operation associated with this negotiation:**

Since the receiver may indicate different SYNC PSR values for different data rates, the specified operation with respect to this is as follows:

Subsequent to a TDMS/RDMS exchange, the transmitter shall only use those payload data rates and coding methods that the receiver has indicated it can support, and the transmitter shall use the SFD requested by the receiver, and a SYNC length that is no shorter than that requested by the receiver for the selected payload data rate and no longer than the largest SYNC indicated in the Receiver Data Mode Specifier (RDMS) for any data rate, except in the case where the transmitter cannot support sending an optional SYNC length in which case it shall use the next higher mandatory SYNC length.

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