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Wireless Personal Area Networks

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Re:	Contribution to TG4ab for IEEE 802.15.4ab
Abstract	Core message content for indication of the data rates, codes and PSR lengths that a device wants to receive.
Purpose	Proposed message content (e.g., to include in an IE) to allow a device to indicate the data rates, codes and PSR lengths supported by its receiver or that it wants to receive.
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Signalling data modes and SYNC length

The following specifies a field that can be included (in a suitable IE) to specify the data rates, data coding and PSR length requirements. This would be sent by a device to indicate what it supports and wants to receive. Let's call this the data mode specifier (DMS), with format illustrated in Figure 1 below.

This consists of a Rate/Code/Sync specifier (RCS), of 4 bits, for each TG4ab data rate, as shown:

Data Mode Specifier (DMS) field				
Bits 0–3	4–7	8–11	12–15	16–19
RCS_1p95	RCS_7p8	RS_31p2	RS_62p4	RS_124p8

Figure 1 – DMS field to signal supported data rates, coding, and sync length requirements

Each 4-bit Rate/Code/Sync specifier (RCS) is then formatted as shown in Figure 2 below:

Bits 0–2	3
SYNC Support Field	Coding Support Field

Figure 2 – encoding of Rate/Code/Sync specifier (RCS)

The single bit Coding Support field (bit 3 of each RCS) indicates when set to one that LDPC is supported/allowed and, indicates when set to zero that LDPC should not be used.

A coding of the 3-bit SYNC Support field is shown in Figure 3 below. (Illustrative of principle)

SYNC Support field value b2, b1, b0	Meaning
0 0 0	Data rate not supported or not to be used
0 0 1	PSR = 16
0 1 0	PSR = 24
0 1 1	PSR = 32
1 0 0	PSR = 48
1 0 1	PSR = 64
1 1 0	PSR = 96
1 1 1	PSR = 128

Figure 3 –Sync Support Field values (RCS)

NOTE: The assumption here on SFD length is that this is also pre-negotiated (separately) and fixed (common to all data-rates in the Data Mode Specifier (DMS) set)

Example use cases are given below for the modes under discussion at TG4ab.

Looking at the 3 modes under discussion at TG4ab,

MODE (A) PSDU data rate constrained to be >=7.8 Mb/s, with either LDPC or BCC allowed to be used.

This may be signalled as follows:

RCS_1p95 b3 to b0	RCS_7p8 b3 to b0	RCS_31p2 b3 to b0	RCS_62p4 b3 to b0	RCS_124p8 b3 to b0
0 0 0 0	1 0 1 1	1 0 1 1	1 0 1 1	1 0 1 1

The above decodes to indicate that all rates except 1.95 Mb/s are supported/allowed, with SYNC length of 32 repetitions used for all, and LDPC coding can be used/supported.

MODE (B) PSDU data rates >= 1.95 Mb/s + BCC; For >1.95 Mb/s, either LDPC or BCC can be used. For 1.95 Mb/s, only BCC is used

This may be signalled as follows:

RCS_1p95 b3 to b0	RCS_7p8 b3 to b0	RCS_31p2 b3 to b0	RCS_62p4 b3 to b0	RCS_124p8 b3 to b0
0 1 0 1	1 1 0 1	1 1 0 1	1 1 0 1	1 1 0 1

The above decodes to indicate that all rates are supported but that LDPC is allowed only for rates of 7.8 Mb/s and above; and that SYNC is length of 64 repetitions is used for all.

MODE (C) PSDU data rate >= 1.95 Mb/s + LDPC (either BCC and LDPC can be used)

This may be signalled as follows:

RCS_1p95 b3 to b0	RCS_7p8 b3 to b0	RCS_31p2 b3 to b0	RCS_62p4 b3 to b0	RCS_124p8 b3 to b0
1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1

The above decodes to indicate that all rates supported with LDPC, with SYNC length of 128 repetitions used for all.

OTHER:

As an additional example to illustrate the flexibility of this approach, a receiver might signal its capability as follows:

RCS_1p95 b3 to b0	RCS_7p8 b3 to b0	RCS_31p2 b3 to b0	RCS_62p4 b3 to b0	RCS_124p8 b3 to b0
1 1 1 1	1 1 0 1	1 1 0 1	1 1 0 1	0 0 0 0

The above decodes to indicate that the receiver wants PSR 128 for 1.95 Mb/s rate, does not support 124.8 Mb/s, and supports 7.8 Mb/s, 31.2 Mb/s and 62.4 Mb/s with PSR of 64.