Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [PHY proposal on Transmit Spectral Mask]
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Abstract: [PHY proposal on Transmit Spectral Mask]

Purpose: [To be considered in the PHY amendment as part of 802.15.4v]

Background

- Maximum allowed channel spacing in some regions is limited to 200 kHz
- Having higher data rates supported in those regions can be challenging
- 802.15.4 SUN FSK transmit spectral mask might result in overlapping channels

802.15.4 SUN FSK Transmit Spectral Mask

- Transmit spectral mask as defined in clause 20.6.6 of 802.15.4-2015:

  Integrated BW = 1.5 x R

  $M1 = 1.5 \times R \times (1 + h)$

  $M2 = 3 \times R \times (1 + h)$

- *The transmit spectral content at M1 and M2 shall be less than –25 dB and –35 dB, respectively.*

SUN FSK PHY – Additional Operating Modes (15.4v)

Modulation	Parameter	Operating Mode #1	Operating Mode #2	Operating Mode #3	Operating Mode #4	Operating Mode #5
SUN FSK PHY	Data Rate (kb/s)	50	100	150	200	300
	Modulation Index	0.5	0.5	0.5	0.5	0.5
	Channel spacing (kHz)	**100**	200	**200**	400	**400**

Transmit spectral mask issue

- Per existing 802.15.4-2015, the transmit spectral mask for 150 kbps would be:

  Integrated BW = 1.5 x 150 = 225

  M1 = 337.5

  M2 = 675

- For 200 kHz channel spacing, M1 would fall after the center of the adjacent channel

Proposal

The offset frequencies M1 and M2 for transmit spectral mask for operating mode# 1 with 100 kHz spacing, operating mode #3 with 200 kHz spacing and operating mode #5 with 400 kHz shall be:

$$M1 = 9/16 \times S \times (1 + h)$$

$$M2 = 9/8 \times S \times (1 + h)$$

Integrated BW = 5/8 x S

Where S is the channel spacing, expressed in units of hertz

The transmit spectral content at M1 and M2 shall be less than –20 dB and –35 dB, respectively.

Changes to the draft Standard

20.6.6 Transmit spectral mask

Insert new paragraph after the first paragraph as follows:

When Operating mode #1 with 100 kHz channel spacing or Operating mode #3 with 200 kHz channel spacing or Operating mode #5 with 400 kHz channel spacing is used as specified in Table 20-6 and Table 20-7, offset frequencies M_1 and M_2 and the integrated bandwidth (with respect to the M_1 and M_2 offset frequencies) are defined as follows:

The integration bandwidth shall be equal to 5/8 x S, where S is the channel spacing, expressed in units of hertz.

$M_1 = 9/16 \times S \times (1 + h)$
$M_2 = 9/8 \times S \times (1 + h)$

where h is the modulation index for 2-level modulation.

The transmit spectral content at M_1 and M_2 for the Operating modes specified above shall be less than -20 dB and -35 dB, respectively.

Otherwise for all other Operating modes specified in Table 20-6 and Table 20-7, the offset frequencies M_1 and M_2 and the integrated bandwidth shall be defined as follows: