

**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]

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# 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:

$$\text{Integrated BW} = 1.5 \times R$$

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

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

- *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)	<b>100</b>	200	<b>200</b>	200	<b>400</b>

## Transmit spectral mask issue

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

$$\text{Integrated BW} = 1.5 \times 150 = 225$$

$$M1 = 337.5$$

$$M2 = 675$$

- 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:

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

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

$$\text{Integrated BW} = 5/8 \times S$$

*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 paragraph 4 as follows:*

When operating mode# 1 with 100 kHz spacing, operating mode #3 with 200 kHz spacing and operating mode #5 with 400 kHz channel spacing is used as specified in Table 20-6, the integrated bandwidth and offset frequencies M1 and M2 are defined as follows:

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

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

$$\text{Integrated BW} = 5/8 \times S$$

*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.*