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

Submission Title: Inconsistency in SUN O-QPSK preamble length

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**Abstract:** Inconsistency in SUN O-QPSK preamble length

**Purpose:** Discussion

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# **Introduction:**

 More frequency bands were added in 2020 revision causing an inconsistency in the SUN O-QPSK preamble specification

### See 802.15.4-2015:

#### 22.2.1.1 Preamble field format

The Preamble field shall contain a sequence of 56 bits, all zero, for the 780 MHz, 915 MHz, 917 MHz, and 2450 MHz frequency bands. It shall contain a sequence of 32 bits, all zero, for the 470 MHz, 868 MHz, and 920 MHz frequency bands.

Table 22-2—SHR coding and spreading parameters

Frequency band (MHz)	Chip rate (kchip/s)	BDE	Spreading mode
470-510	100	yes	(32,1) <sub>0</sub> -DSSS
779–787	1000	yes	(64,1)-DSSS
868–870	100	yes	(32,1) <sub>0</sub> -DSSS
902–928	1000	yes	(64,1)-DSSS
917–923.5	1000	yes	(64,1)-DSSS
920–928	100	yes	(32,1) <sub>0</sub> -DSSS
2400-2483.5	2000	yes	(128,1)-DSSS

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## See 802.15.4-2020:

#### 21.2.2.2 Preamble field format

The Preamble field shall contain a sequence of 56 bits, all zero, for the 780 MHz, 915 MHz-a, 915 MHz-b, 915 MHz-c, 917 MHz, and 2450 MHz frequency bands. It shall contain a sequence of 32 bits, all zero, for the 470 MHz, 866 MHz, 867 MHz, 868 MHz, 870 MHz, 915 MHz-d, 915 MHz-e, 919 MHz, 920 MHz-a, and 920 MHz-b frequency bands.

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# See 802.15.4-2020:

Table 21-2—SHR coding and spreading parameters

Band designation (MHz)	Chip rate (kchip/s)	BDE	Spreading mode
470	100	yes	(32,1) <sub>0</sub> -DSSS
780	100	yes	(32,1) <sub>0</sub> -DSSS
	1000	yes	(64,1)-DSSS
866	100	yes	(32,1) <sub>0</sub> -DSSS
867	100	yes	(32,1) <sub>0</sub> -DSSS
868	100	yes	(32,1) <sub>0</sub> -DSSS
870	100	yes	(32,1) <sub>0</sub> -DSSS

915	100	yes	$(32,1)_0$ -DSSS
	1000	yes	(64,1)-DSSS
915-a	100	yes	(32,1) <sub>0</sub> -DSSS
	1000	yes	(64,1)-DSSS
915-b	100	yes	(32,1) <sub>0</sub> -DSSS
	1000	yes	(64,1)-DSSS
915-c	100	yes	(32,1) <sub>0</sub> -DSSS
	1000	yes	(64,1)-DSSS
915-d	100	yes	(32,1) <sub>0</sub> -DSSS
915-е	100	yes	(32,1) <sub>0</sub> -DSSS
917	100	yes	(32,1) <sub>0</sub> -DSSS
	1000	yes	(64,1)-DSSS
919	100	yes	(32,1) <sub>0</sub> -DSSS
920	100	yes	(32,1) <sub>0</sub> -DSSS
920-a	100	yes	(32,1) <sub>0</sub> -DSSS
920-b	100	yes	(32,1) <sub>0</sub> -DSSS
2450	2000	yes	(128,1)-DSSS

# **Suggested resolution:**

- Found no record on 22.2.1.1 amendment
- In 2020 revision, the preamble length is dependent on frequency band. This was probably not intended. Should be coupled to the PHY.
- PHY is not used yet by Wi-SUN. Not too late to correct this.
- Change text in clause 21.2.2.2 to:
- "The Preamble field shall contain a sequence of 56 bits, all zero for chip rates of 1000 kchip/s and 2000 kchip/s and 32 bits of all zero for chip rate of 100 kchip/s."

### **Clause 19.2.5:**

Wrong description of parity calculation:

The Parity Check field provides error detection for the mode switch PPDU. Its value is calculated using the first 11 bits from the PHR,(b0, b1, ... b10), using the following equation:

Parity Check =  $b0 \oplus b1 \oplus b2 \oplus b3 \oplus b4 \oplus b5 \oplus b6 \oplus b7 \oplus b8 \oplus b9 \oplus b10$ 

- For double error detection, the parity bit should be calculated including the checksum field.
- Suggested resolution:

"The Parity Check field provides error detection for the mode switch PPDU. Its value is calculated using the

first 15 bits from the PHR,(b0, b1,... b10), using the following equation:"

Parity Check = b0 2 b1 2 b2 2 b3 2 b4 2 b5 2 b6 2 b7 2 b8 2 b9 2 b10 2 b11 2 b12 2 b13 2 b14