

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

Submission Title: [PHY proposal for existing Sub 1-GHz bands in 15.4]

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Source: [Kunal Shah] Company [Silver Spring Networks]
[] Company []

Address []

Voice: [], E-Mail:[kshah @ silverspringnet.com]

Re: []

Abstract: [PHY proposal to support Sub 1-GHz band]

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

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Background

- **Scope of the project:**

“This amendment defines changes to the IEEE Std 802.15.4-2015 PHY clauses enabling the use of the 870-876 MHz & 915-921 MHz bands in Europe, the 902-928 MHz band in Mexico, the 902-907.5 MHz & 915-928 MHz bands in Brazil, the 915-928 MHz band in Australia/ New Zealand and Asian regional frequency bands that are not in IEEE Std 802.15.4-2015. This amendment also changes the channel parameters for the 470-510 MHz band in China and the 863-870 MHz band in Europe for SUN PHYs, and aligns these channel parameters with regional requirements. The amendment includes channel access and/or timing changes to the MAC necessary for conformance to regional requirements for these bands.”

Purpose and Objective

- PHY parameters as specified in 15.4 can not be operational per regional requirements
- Specify operational PHY parameters for existing 15.4 regions

Technical Details (Chinese Band)

Table 243—SUN FSK modulation and channel parameters^a (continued)

4) 使用频率：470-510MHz,

发射功率限值：50mW(e.r.p)

2.占用带宽：不大于200kHz

Frequency band (MHz)	Parameter	Operating mode #1	Operating mode #2	Operating mode #3
470–510	Data rate (kb/s)	50	100	200
	Modulation	2-FSK	2-FSK	4-FSK
	Modulation index	1.0	1.0	0.33
	Channel spacing (kHz)	200	400	400
779–787	Data rate (kb/s)	50	100	200
	Modulation	2-FSK	2-FSK	4-FSK
	Modulation index	1.0	1.0	0.33
	Channel spacing (kHz)	200	400	400
863–870	Data rate (kb/s)	50	100	200
	Modulation	2-FSK	2-FSK	4-FSK
	Modulation index	1.0	1.0	0.33
	Channel spacing (kHz)	200	400	400



Technical Details (European Band)

Table 243—SUN FSK modulation and channel parameters^a (continued)

Frequency band (MHz)	Parameter	Operating mode #1	Operating mode #2	Operating mode #3		
470–510	Data rate (kb/s)	50	100	200		
	Modulation	2-FSK	2-FSK	4-FSK		
	Modulation index	1.0	1.0	0.33		
	Channel spacing (kHz)	200	400	400		
779–787	Data rate (kb/s)	50	100	200		
	Modulation	2-FSK	2-FSK	4-FSK		
	Modulation index	1	863-870 MHz (notes 3 and 4)	25 mW e.r.p.	≤ 0.1% duty cycle or LBT (notes 1 and 5)	≤ 100 kHz for 47 or more channels (note 2)
	Channel spacing (kHz)	2				
863–870	Data rate (kb/s)	50	100	200		
	Modulation	2-FSK	2-FSK	4-FSK		
	Modulation index	1.0	1.0	0.33		
	Channel spacing (kHz)	200	400	400		

Modulation and Channel Parameters (SUN FSK)

Frequency band (MHz)	Parameter	Operating Mode #1	Operating Mode #2	Operating Mode #3	Operating Mode #4
470-510 (China)	Data Rate (kbps)	50	100	150	200
	Modulation	2-FSK	2-FSK	2-FSK	4-FSK
	Modulation Index	1.0	0.5	0.5	0.33
	Channel spacing (kHz)	200	200	200	200
863 - 870 (Europe)	Data Rate (kbps)	50	100	150	200
	Modulation	2-FSK	2-FSK	2-FSK	4-FSK
	Modulation Index	0.5	0.5	0.5	0.33
	Channel spacing (kHz)*	100	200	200	200

* Channel spacing requirements per ERC Rec 70-03 [CEPT]

Modulation and Channel Parameters for Chinese and European band

Modulation	Support for OFDM Option 4 as per sub-clause 21 (SUN OFDM PHY)
SUN OFDM Optional Mode	Data rates supported (kb/s): 50, 100, 150, 200, 300 Channel Spacing (kHz): 200 Nominal bandwidth (kHz): 156

Modulation	Support for SUN O-QPSK
SUN O-QPSK Optional Mode	Rate Mode: 0,1,2,3 Data rates supported (kb/s): 6.25, 12.5, 25, 50 Channel Spacing (kHz): 200 Chip rate (kchip/s): 100

Modulation and Channel Parameters (Contd..)

- Summary
 - SUN FSK (Mandatory Mode)
 - 50 kbps (Mandatory data rate)
 - 100 kbps and 150 kbps (Optional data rate)
 - SUN OFDM 4 (Optional Mode)
 - 50, 100, 150, 200, and 300 kbps (Optional data rates)
 - SUN O-QPSK (Optional Mode)
 - 6.25, 12.5, 25 and 50 kbps

- All additional PHY parameters shall be as per existing SUN FSK, SUN OFDM and SUN O-QPSK

Reference

- IEEE Std. 802.15.4-2015, Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs)
- IEEE Std. 802.15.4g-2012, Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs) - Amendment 3: Physical Layer (PHY) Specifications for Low-Data-Rate, Wireless, Smart Metering Utility Networks, March 2012.
 - <https://standards.ieee.org/findstds/standard/802.15.4g-2012.html>