

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

Submission Title: [Proposed changes to P802.15.4-REVd/D01 draft]

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Abstract: [Proposed changes to P802.15.4-REVd/D01 draft]

Purpose: [Updates to 802.15.4-Revision draft]

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Background

- Comments received as part of the 802.15.4v Std. development process
- Group agreed to address these items as part of the 802.15.4 revision process
 - Captured in minutes doc#15-17-0184-01
- Few additional updates to the revision draft

15.4 Band Designation/ Freq. Band

- For each Frequency Band (region), Band Designation is defined
- Each PHY clause uses either Frequency Bands or Band Designation or both
- No consistency across all PHYs

Example Frequency Band Designations

Table 10-1—Frequency band designations

Band designation	Frequency band (MHz)
169 MHz	169.400–169.475
433 MHz	433.05–434.79
450 MHz	450–470
470 MHz	470–510
780 MHz	779–787
863 MHz	863–870
866 MHz	865–867
867 MHz	866–869
870 MHz	870–876

15.4 PHYs Usage on Band Designation

Table 10-2—LECIM DSSS PHY operating frequency ranges

Band designation	Bandwidth (kHz)	Modulation	Chip rate (kchips/s)
470 MHz	100	BPSK	100
		O-QPSK	200
780 MHz	1000	BPSK	1000
		O-QPSK	2000
863 MHz	100	BPSK	100
		O-QPSK	200

Table 10-4—RCC PHY frequency bands and data rates

Band designation	Frequency range (MHz)	Modulation and bit rate
161 MHz	160.170–161.580	LMR GMSK: 9.6/19.2 kb/s LMR 4-FS 9.6/19.2/38.4 kb/s LMR QPSK: 16/32 kb/s LMR $\pi/4$ DQPSK: 16/32/36 kb/s
216 MHz	216–217	
217 MHz	217–220	
220 MHz	220–222	

15.4 PHYs Usage on Band Designation

Table 10-14—Channel numbering for SUN PHYs

Frequency band (MHz)	Modulation	ChanSpacing (MHz)	TotalNumChan	ChanCenterFreq ₀ (MHz)
169.400–169.475	SUN FSK operating modes #1, #2, and #3	0.0125	6	169.40625
450–470	SUN FSK operating modes #1 and #2	0.0125	1599	450.00625
470–510	SUN FSK operating modes #1, #2, and #3	0.2	199	470.2
	SUN OFDM Option 4	0.2	199	470.2
	SUN O-QPSK	0.2	199	470.2

15.4 PHYs Usage on Band Designation

- **Proposal:**
 - Use one term for all PHYs throughout the standard
 - **Band Designation (naming for the band)**
 - Frequency bands (Range for frequency band of operation)

Duplicate entries for 920 MHz

Table 7-22—Frequency band identifier values

Frequency band identifier	Band designation
0	169 MHz
1	450 MHz
2	470 MHz
3	780 MHz
4	863 MHz
5	896 MHz
6	901 MHz
7	915 MHz
8	917 MHz
9	920 MHz
10	928 MHz
11	920 MHz

- Frequency band identifier 11 defined earlier for 950 MHz
- During the revision it was replaced with 920 MHz
- However 920 MHz was already specified
- Mark Frequency band identifier 11 as “Reserved”
- Fix typo “21 - 919 MHz” to “21 919 MHz”
- Table headings are not consistent with IEEE editorial guideline throughout the spec

Frequency Bands Definition

- Some of the PHYs has a separate table defined for frequency bands, including for LECIM, TVWS, and RCC PHYs
- Table 10-1 defines the band definition for all other PHYs
- All PHYs band definition should be defined in one Table 10-1
- Some of the band designation missed from 802.15.4-2015 version to P802.15.4-REVd/D01 draft (868 MHz and 896 MHz)

PHY Modulation and Channel Parameters

- Each PHY has defined operating mode and respective PHY parameters
- Many regional frequency bands have similar PHY parameters
- Duplicate of the operating modes could potentially lead to technical errors

PHY Modulation and Channel Parameters

896–901	Data rate (kb/s)	10	20	40
	Modulation	2-FSK	2-FSK	2-FSK
	Modulation index	0.5	0.5	0.5
	Channel spacing (kHz)	12.5	12.5	12.5
901–902	Data rate (kb/s)	10	20	40
	Modulation	2-FSK	2-FSK	2-FSK
	Modulation index	0.5	0.5	0.5
	Channel spacing (kHz)	12.5	12.5	12.5
902–928	Data rate (kb/s)	50	150	200
	Modulation	2-FSK	2-FSK	2-FSK
	Modulation index	1.0	0.5	0.5
	Channel spacing (kHz)	200	400	400
917–923.5	Data rate (kb/s)	50	150	200
	Modulation	2-FSK	2-FSK	2-FSK
	Modulation index	1.0	0.5	0.5
	Channel spacing (kHz)	200	400	400

Proposal for PHY parameters

- Consolidate PHY modes in one table
 - Define operating modes 1,2,3...
 - PHY parameters for each mode
 - Channel spacing
 - Number of available channels
 - Provide a reference to the table for each PHY

Summary

- Updates required to the revision draft before the letter ballot
 - Align table headings that are not consistent with IEEE editorial guidelines
- Updates requires to the draft after the letter ballot
 - Consolidate PHY modes
 - Usage on band designation
 - Duplicates on 920 MHz and updates to band identifier values