

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

Submission Title: [Sub-GHz License-Exempt Bands Suitable for ULP Consideration]

Date Submitted: [August 21st, 2012]

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Re: [key specifications of license exempt sub-GHz bands suitable for ULP applications]

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- Sub-GHz bands Suitable for ULP

Frequency (MHz)	Region	Max TX Power (dBm)	Channel / BW Spacing (kHz)	Notes
433.05 – 434.79	EU	+10	-	10% duty cycle
470 – 510	PRC	+17	200	-
779 – 787	PRC	+10	-	-
863 – 870	EU	+14	100	0.1% duty cycle or LBT + AFA
863 – 870	EU	+14	> 300	+6.2 - -4.5 dBm / 100 kHz PSD
868.0 – 868.6	EU	+14	600	1% duty cycle or LBT + AFA
868.7 – 869.2	EU	+14	500	0.1% duty cycle or LBT + AFA
869.7 – 870.0	EU	+14	300	1% duty cycle or LBT + AFA
869.7 – 870.0	EU	+7	300	-

- Sub-GHz bands Suitable for ULP

Frequency (MHz)	Region	Max TX Power (dBm)	Channel / BW Spacing (kHz)	Notes
902 – 928	Americas	+30	< 500	FHSS
902 - 928	Americas	+30	> 500	8 dBm / 3 kHz PSD
915 – 928	Aus / NZ	+5	-	-
915 – 928	Aus	+30	-	FHSS / DSSS
917 – 923.5	Korea	+10	N*200	-
920.5 – 923.5	Japan	+24	N*200	-
920.5 – 929.7	Japan	+13	N*200	-
921.5 – 928	NZ	+30	-	FHSS / DSSS

- Existing 802.15.4 Sub-GHz Band Usage

Band (MHz)	802.15 Standard	PHY Modes(S)
433.05 – 434.79	15.4f / 15.4k	FSK
470 – 510	15.4g / 15.4k	FSK / DSSS / OFDM
779 – 787	15.4g / 15.4k	FSK / DSSS / OFDM
863 – 870	15.4g / 15.4k	FSK / OFDM
868 – 870	15.4 / 15.4g	DSSS
902 - 928	15.4 / 15.4g / 15.4k	FSK / DSSS / OFDM

- **Summary**
 - The document provides a non-exhaustive summary of sub-GHz license-exempt frequency bands suitable for consideration on a regional basis.
 - This document also lists those frequency bands that are currently used in existing or planned 802.15.4 standards
- **Conclusion**
 - The listed sub-GHz bands are all suitable for the proposed ULP standard

- **References:**

- ETSI EN 300 220-1 - EU
- CFR 47 Part 15.247 – USA
- RS-210 - Canada
- Technical requirements of low-power radio devices – PRC
- ARIB T-108 - Japan
- Radio Communications (Low Interference Potential Devices) Class Licence 2000 (July 2011) – Australia
- AS/NZS 4268:2003 – Australia / New Zealand
- Radiocommunications Regulations (General User Radio Licence for Short Range Devices) Notice 2011 – New Zealand
- IEEE Standard 802.15.4 - 2011
- IEEE Standard 802.15.4f - 2012
- IEEE Standard 802.15.4g - 2012
- P802.15.4k/D1, August 2012