



**TECHNICAL REQUIREMENTS FOR
THE USE OF THE 863-870MHZ
(868MHZ) BAND FOR INDUSTRIAL,
SCIENTIFIC AND MEDICAL (ISM) IN
UGANDA**

October 2019

ACRONYMS

ISM:	Industrial Science and Medical
SRD:	Short Range Devices
IoT:	Internet of Things
UCC:	Uganda Communications Commission
NB-IoT:	Narrow Band IoT
AFA:	Adaptive Frequency Agility
CSS:	Chirp Spread Spectrum
DSSS:	Direct Sequence Spread Spectrum
ETSI:	European Telecommunications Standards Institute
EU:	European Union
FHSS:	Frequency-hopping spread spectrum
IEEE:	Institute of Electrical and Electronics Engineers
IoT:	Internet of Things
ISM:	Industrial, Science and Medical
ITU-R:	International Telecommunications Union-Radio
LBT:	Listen Before
LoRa:	Long Range
LTE:	Long Term Evolution
ms:	Milli Second
mW:	milli Watts
NB-IoT:	Narrow Band-IoT
TX:	Transmission
W:	Watts

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1.0 INTRODUCTION

Under region 1 in the International Telecommunications Union ITU-R international table of allocation and the Uganda National Table of Frequency Allocations, the 862-890 MHz band is allocated to Broadcasting, Land Fixed and Mobile except aeronautical mobile Radiolocation services. The range 863-870MHz lies within this range.

The 863-870MHz band has been identified as suitable for a variety of technologies, applications and services, inclusive of Short Range Device (SRD).

The industry has embraced the use of this band as Industrial, Scientific and Medical (ISM), fostering deployment of IoT based technologies and services used in smart systems, such as smart cities, smart street lighting as well as other Information and Communication Technology (ICT) based solutions.

2.0 AMENDMENT OF THE TERMS AND CONDITIONS

This document shall be subjected to periodic reviews to enable inclusion of any new developments resulting from evolution of the sector, changes in policies and regulations as well as established good practices.

3.0 OBJECTIVE

The objective of this document is to facilitate the development of ICT systems in and guide the use of the 868MHz band in Uganda.

4.0 INTERPRETATION

Communication services: means services performed consisting of the dissemination or interchange of audio, visual or data content using postal, radio or telecommunications media, data communication, and includes broadcasting.

Duty Cycle: the cycle of operation of a device or systems which operates intermittently rather than continuously.

License exempt: means that the radio devices and services operating in this band shall do so on a strict "no-interference, no-protection" basis in relation to all other radio systems. This means that licence-exempt radio devices are neither permitted to cause interference, nor can they claim protection from any that they may receive.

5.0 APPLICABLE LEGISLATION AND REGULATION

Section 5(1)(c) and (l) of the Uganda Communications Act 2013 bestows upon the Uganda Communications Commission (UCC) responsibility;

- a) to allocate, license, standardize and manage the use of the radio frequency spectrum resources in a manner that ensures widest variety of programming and optimal utilization of spectrum resources.*
- b) to promote research into the development and use of new communications techniques and technologies, including those which promote accessibility of persons with disability and other members of society to communications services*

Section 25 (1) of the Act further states that, UCC is exclusively responsible for—

- a). Planning, monitoring, managing and allocating the use of the radio spectrum;*
- b). establishing technical requirements and standards in respect to radio communications apparatus and interference-causing apparatus or any class of that apparatus;*

6.0 SCOPE

The document includes the principles, procedures and the terms and conditions for the use of the 868MHz band as an ISM band.

7.0 APPLICABILITY AND EXCEPTIONS

The provisions contained herein shall apply only to ISM operations in this band.

8.0 OPERATIONAL TERMS AND CONDITIONS

8.1 Band channelisation

No channelisation schemes shall be prescribed for this band in order to accommodate the variety of services, applications and technologies possible in the band. However, all emissions associated with operations in this band shall be confined within the spectrum block 863-870MHz.

8.2 Operational parameters

The following parameters shall apply to operations in this band to ensure co-existence and compatibility of in-band and adjacent band operations.

Table 1: Proposed band operational parameter

Application	Frequency (MHz)	Max ERP	DUTY CYCLE	BAND WIDTH	ADDITIONAL REQUIREMENTS
Non-Specific (Narrow/wideband modulation)	863-870	25 mW	≤ 0.1% duty cycle or Listen Before Talk (LBT), duty cycle may be increased to 1% in 865-868 MHz	≤50/≤ 100kHz	ETSI EN 300 220-2 v3.2.1 (2018-04) Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonized Standard for access to radio spectrum for nonspecific radio equipment.
Non-Specific (FHSS) ¹	863-870	25 mW	≤ 0.1% duty cycle or listen before talk (LBT), duty cycle may be increased to 1% in 865-868 MHz	≤ 100kHz	
Non-Specific (DSSS ² and other wideband modulations)	863-870	25 mW (Power density is limited to -4,5 dBm/100 kHz)	≤ 0.1% duty cycle or LBT with adaptive frequency agility (AFA), duty cycle may be increased to 1% for wideband modulation other than DSSS (bandwidths 200 kHz to 3 MHz) in 865-868 MHz provided ERP is ≤10 mW	No requirement	

¹ FHSS: Frequency-hopping spread spectrum

² DSSS: Direct Sequence Spread Spectrum

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RFID	865-868	2 W		≤ 200kHz	ETSI EN 302 208-1 (2015-02) Electromagnetic compatibility and Radio Spectrum Matters (ERM); Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W; Part 1: Technical requirements and methods of measurement.
Non-Specific	Non-Specific	868-868.6 MHz - 25 mW 868.7-869.2 MHz - 25 mW 869.4-869.65 MHz - 500 mW 869.7-870 MHz - 25 mW	868-868.6 MHz, 869.7-870 MHz ≤ 1% duty cycle or LBT with AFA 868.7-869.2 MHz ≤ 0.1% duty cycle or LBT with AFA 869.4-869.65 MHz ≤ 10% duty cycle or LBT with AFA 869.7-870 MHz operating below 5 mW, no requirement	869.4-869.65MHz ≤ 25kHz No requirement for other bands	ETSI EN 300 220-2
<p>NB:</p> <ol style="list-style-type: none"> The specific duty cycles imposed on the different sub-bands MUST be respected by both gateways and end user or connecting devices. 					

2. Further reference should be made to the
 - i. Guidelines for use of short range devices in Uganda, October 2015.
 - ii. IEEE Standard (IEEE 802.15.4g) for Local and metropolitan area networks Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs).

8.3 Licensing Approach

The use of this band shall be License-exempt subject to:

- i.* Not causing interference to the other operations and operations in adjacent bands and not seeking protection from interference.
- ii.* Conformity to all the provisions of this document including the operational requirements highlighted in table 1 above and in the “Guidelines for the use of short range devices in Uganda, October 2017”.
- iii.* Any gateways or base stations deployed shall have to be registered with UCC.
- iv.* All equipment to be operated in the band shall be subject to type approval by UCC in accordance with the type approval regulations and associated guidelines.
- v.* The possession of an operating licence issued by the Commission pursuant to section 21 and/or 22 of the Uganda Communications Act of 2013 where this band is to be used for provision of Communications Services. Such licence must be current, valid and authorising the provision of these services.

8.4 Stakeholders responsibilities

8.4.1 The regulator

UCC shall be responsible for;

- i.* Reviewing and updating the band’s operation status and requirements.
- ii.* Enforcing adherence to the band’s operational requirements.

8.4.2 Operators of the band on ISM basis

- i.* Ensure that all operations in the band conform to the highlighted provisions of this document, and any other applicable legal and regulatory requirements.
- ii.* Cooperate with other users of this band, adjacent bands and UCC in mitigation, investigation and resolution of any occurrence of interference.

9.0 ENFORCEMENT

In accordance with the Uganda Communications Act 2013, the Communication (Radio) regulations, 2005 and the Uganda Communications Commission Spectrum management guidelines of June 2017, the UCC shall impose fines to entities that unlawfully installs, connect and operates that are in contradiction with the specified requirements. Further, the UCC may in accordance with the Act, confiscate such apparatus possessed, installed, connected or operated unlawfully.