TANZANIA COMMUNICATIONS REGULATORY AUTHORITY

RADIO FREQUENCY BAND PLAN FOR WLAN & LPWAN SERVICES

First Version

ISSUED BY TCRA – JULY, 2025

RADIO FREQUENCY BAND PLAN FOR WLAN & LPWAN SERVICES

Document No: TCRA /DICT/SMS/FBP – WLAN & LPWAN/011

Approved by	Title	Signature	Date
DR. JABIRI K. BAKARI	DIRECTOR GENERAL	 Digitally Signed By JABIRI KUWE BAKARI Wed Jul 16 23:40:31 EAT 2025	JULY, 2025

1. Release Details

Institution	Tanzania Communications Regulatory Authority (TCRA)
Document Title	Radio Frequency Band Plan for WLAN & LPWAN Services
Document Number	TCRA /DICT/SMS/FBD-WLAN & LPWAN/011
Document Version Number	1.0
Release Date	July, 2025
Classification	Public

2. Document Changes Tracking

No.	Version No.		Page No.		Date	Details
	Old	New	Old	New		
1.		Version 1.0		12		
2.						
3.						
4.						
5.						

TABLE OF CONTENTS

Acronyms and Abbreviations....1

Recommendations related to WLAN and LPWAN Services....1

PART 1: Introduction....2

PART 2: Scope and Purpose....2

PART 3: WLAN and LPWAN Services....2

3.1 Wireless Local Area Networks (WLAN)....2

3.2 Low Power Wide Area Networks....3

PART 4: Frequencies for WLAN and LPWAN Services....3

4.1 License-exempt bands....4

4.2 Licensed frequency bands....5

PART 5: Document Administration....6

5.1 Amendment....6

5.2 Compliance....6

5.3 Publication....6

Acronyms and Abbreviations

For the purpose of this document, the following abbreviation applies: -

EIRP	Effective Isotropic Radiated Power
ISM	Industrial, Scientific and Medical
ITU	International Telecommunication Union
LPWAN	Low Power Wide Area Networks
NFAP	National Frequency Allocation Plan
RLAN	Radio Local Area Network
TPC	Transmit Power Control
WLAN	Wireless Local Area Network

Recommendations related to WLAN and LPWAN Services

RECOMMENDATIONS	**TITLE**
Recommendation ITU-R M.1450	Characteristics of broadband radio local area networks (RLAN)
Recommendation ITU-R M.1651	Characteristics of radio local area network (RLAN) systems for frequency sharing.
Recommendation ITU-T Y.4480	Framework and requirements for LPWAN for IoT services
Recommendation ITU-R M.2083	IMT-2020 (5G) framework, which includes considerations for LPWAN technologies

PART 1: Introduction

The radio frequency spectrum is part of electromagnetic waves propagated in space and used as a communication medium for all wireless systems. As a valuable and finite public resource, it requires transparent, predictable, and coherent governing policies, legislations, and regulations. Therefore, its effective management is essential to accommodate the current and future emerging technologies while empowering society through communication services.

The Tanzania Communications Regulatory Authority (TCRA) Act of 2003, and the Electronic and Postal Communications Act of 2010, mandate TCRA to manage, assign, and promote the efficient use of the radio frequency spectrum resource in the United Republic of Tanzania.

Communication services supported by radio frequency spectrum include mobile broadband, radio and television broadcasting, satellite communication, fixed Wireless Fidelity (Wi-Fi), and other fixed wireless access networks such as Wireless Local Area Networks (WLAN) and Low Power Wide Area Networks (LPWAN).

PART 2: Scope and Purpose

To ensure efficient operations of the wireless services in the Wireless Local Area Networks (WLAN) and Low Power Wide Area Networks (LPWAN), the TCRA has prepared this document with the objective to highlight frequency bands available for WLAN and LPWAN applications in the country, and to provide guidelines for applicants deploying services under these frequency bands.

PART 3: WLAN and LPWAN Services

3.1 Wireless Local Area Networks (WLAN)

Wireless Local Area Network (WLAN) is a wireless access communication system that enables devices such as smartphones, laptops and tablets to connect and communicate wirelessly over short distances by using radio waves. WLANs are used in areas such as at home, school, industries/ factories, office buildings, and in public spaces to access the internet and local networks. The most widely used WLAN technology is the Wi-Fi technology which operates in some of Industrial, Scientific and Medical (ISM) bands. The bandwidth supported by Wi-Fi technology depend on the specific IEEE 802.11

standard/protocol that is being used. Table 1 below shows the evolution of IEEE 802.11 protocol and the bandwidth they can support.

Table 1: Evolution of IEEE 802.11 standard and the supported bandwidth

IEEE 802.11 Protocol	Operating Frequency Band(s) (GHz)	Bandwidth (MHz)	Max Throughput
802.11(Wi-Fi 0)	2.4	22	2 Mbps
802.11b(Wi-Fi 1)	2.4	22	11 Mbps
802.11a(Wi-Fi 2)	5	20	54 Mbps
802.11g(Wi-Fi 3)	2.4	20	54 Mbps
802.11n (Wi-Fi 4)	2.4/5	20/40	600 Mbps
802.11ac (Wi-Fi 5)	5	20/40/80/160	6.8 Gbps
802.11ad (Wi-Gig)	60	2160	8 Gbps
802.11ax (Wi-Fi 6)	2.4/5	20/40/80/160	9.6 Gbps
802.11axe (Wi-Fi 6E)	2.4/5/6	20/40/80/160	9.6 Gbps
802.11be (Wi-Fi 7)	2.4/5/6	20/40/80/160/320	46.1 Gbps

3.2 Low Power Wide Area Networks

Low Power Wide Area Network (LPWAN) is a group of low–power, wireless wide area network communication technologies designed to support low-bandwidth, long-range data transmission at low bit rates and by using minimal power. LPWAN technologies represent narrowband radio technologies with low radiation power and an extended coverage zone with a radius of up to several kilometers. It is the ideal network for Internet of Things (IoT) and machine –to-machine (M2M) applications that require devices to send small amounts of data over long distances, and with greater power efficiency than traditional mobile networks. LPWANs facilitate a wide range of services including smart metering, wearables, smart dustbins, smart street lighting, industrial appliances, environmental monitoring, and various other applications.

LPWAN technologies such as LoRa and Sigfox operate in license-exempt bands, whereas technologies such as Narrowband IoT (NB-IoT) and LTE-M operate in licensed bands.

PART 4: Frequencies for WLAN and LPWAN Services

Radio frequency spectrum available for WLAN and LPWAN applications is grouped into license-exempt frequencies and licensed frequencies.

4.1 License-exempt bands

License-exempt, or unlicensed, frequency bands refer to designated radio frequency spectrum bands that may be accessed and utilized by the general public without the requirement to obtain an individual frequency license. These bands are made available on a shared-use basis, subject to compliance with a defined set of technical and operational conditions established for each specific band. Such conditions are intended to ensure coexistence with other services and to minimize harmful interference.

The utilization of license-exempt frequency bands is therefore restricted to low-power devices and is permitted strictly on a **non-interference, non-protection** basis, meaning that users must not cause interference to licensed services and cannot claim protection from interference caused by other users.

As these license-exempt frequency bands operate on a shared, non-protected basis, there is no assurance of Quality of Service (QoS) or Quality of Experience (QoE), particularly as the number of users and/or devices operating within the same frequency band increases. Consequently, service degradation may occur due to congestion and interference.

Network operators are therefore encouraged to offer tiered service options with varying levels of QoS and data rates, enabling subscribers to select services that best align with their performance requirements and usage needs. Additionally, operators may employ appropriate interference mitigation techniques such as antenna discrimination, polarization, frequency offset, and power control to enhance coexistence and minimize interference with systems deployed by other service providers operating within the same frequency bands.

The license-exempt frequency bands available for use in the United Republic of Tanzania for WLAN and LPWAN services are as indicated in Table 2.

Table 2: License-Exempt frequency bands for WLAN and LPWAN Services

Frequency Band	Frequency Range	Available capacity/Bandwidth (MHz)
169 MHz	169.4 -169.8 MHz	0.4
433 MHz	433.05 - 434.79 MHz	1.74
868 MHz	863 - 870 MHz	7
915 MHz	916 – 919 MHz	3

2.4 GHz	2400 – 2483.5 MHz	83.5
5 GHz	5150 – 5350 MHz and 5470 – 5925 MHz	655

The use of these frequency bands both for private and commercial use in the United Republic of Tanzania is subject to the minimum technical specifications for operations applicable to each of the bands as available on the TCRA website at Minimum Technical Specifications.

In addition to specifications indicated in the Minimum Technical Specifications document referred to in this document, operations in the 5 GHz band shall adhere to the following conditions as specified in the ITU Resolution 229:

i. In the frequency range 5150 – 5350 MHz, stations in the mobile service shall be limited to a maximum mean E.I.R.P of 200 mW and a maximum mean E.I.R.P. density of 10 mW/MHz in any 1 MHz band;
ii. In the frequency range 5470 - 5725 MHz, stations in the mobile service shall be restricted to a maximum transmitter power of 250 mW with a maximum mean E.I.R.P. of 1 W and a maximum mean E.I.R.P. density of 50 mW/MHz in any 1 MHz band;
iii. Systems in the mobile service shall either employ transmitter power control to provide, on average, a mitigation factor of at least 3 dB on the maximum average output power of the systems, or, if transmitter power control is not in use, then the maximum mean E.I.R.P shall be reduced by 3 dB.

4.2 Licensed frequency bands

Licensed frequency bands are segments of the radio frequency spectrum allocated for exclusive use and require the issuance of a **Spectrum User Licence** by the Tanzania Communications Regulatory Authority (TCRA) prior to utilization. These bands are commonly employed to support a variety of technologies, including Low Power Wide Area Networks (LPWAN), which benefit from the enhanced reliability and interference protection afforded by licensed spectrum.

In the United Republic of Tanzania, any entity intending to deploy Wireless Local Area Networks (WLAN) or LPWAN technologies within licensed frequency bands must obtain a Spectrum User Licence from TCRA. However, as all licensed frequency bands are

currently exclusively assigned to Mobile Network Operators (MNOs), any third party wishing to implement WLAN or LPWAN services in such bands may only do so through collaborative arrangements with the licensed MNOs.

PART 5: Document Administration

5.1 Amendment

TCRA may from time to time, review, update or modify this document to ensure its continued service and to meet the international and/or national performance requirements as necessary.

5.2 Compliance

Appropriate provisions of the TCRA Act, 2003, the Electronic and Postal Communications Act, 2010, the Electronic and Postal Communications (Radiocommunication and Frequency Spectrum) Regulations, 2018, and its Amendments and the National Frequency Allocation Plan (NFAP) shall be used for compliance of this document and effective from the date it has been published.

5.3 Publication

This document shall be published on the TCRA website https://www.tcra.go.tz for public information, compliance, and reference purposes.

Contact Us

Tanzania Communications Regulatory Authority,
Mawasiliano Towers, 20 Sam Nujoma Road,
P.O Box 474, Dar Es Salaam
+255 22 2199760 - 9 / +255 22 2412011 - 2 / +255 784558270 - 1