



**GUIDELINES FOR THE UTILISATION OF THE 2.4GHz BAND
FOR WIRELESS ACCESS NETWORKS IN UGANDA**

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1. INTRODUCTION

The 2.4GHz band (2400–2483.5MHz), which comprises approximately 83.5MHz of spectrum under the time division duplex access (TDMA) mode, is globally harmonized as a license-exempted band. This band is allocated for fixed wireless access systems (FWAS) including among others the radio local area networks (RLAN), Industrial Scientific and Medical (ISM) applications as well as other low power wireless applications such as short-range devices (SRDs), Bluetooth, and several others.

The authority to develop this guide is derived from among others, Sections 5(1)(c) and 25 of the Uganda Communications Act, 2013 (the “Act 2013”), the Uganda Communications (Licensing) Regulations concerning radio communication services, and installation and operation of radio communications services equipment.

2. OBJECTIVE

The objective of this guide is to facilitate the operation of wireless access systems (WAS) in the 2.4GHz frequency band.

3. AMENDMENT

This guide shall be subjected to periodic reviews to enable inclusion of any changes as a result of evolution in the radio communications industry, changes in policy or regulatory direction as well as emerging regional and international best practices.

4. INTERPRETATION

The terms used in this document shall have the same interpretation used in the Uganda Communication Act 2013 and the respective radio regulations issued thereunder unless otherwise defined below;

“Fixed Wireless Access (FWA)” refers to a wireless access application in which the location of the end-user termination and the network access point to be connected to the end-user are fixed.

“Point to point system” radio communication refers to a communication system that establishes a connection between two endpoints only.

Point to multipoint refers to a communication system that establishes connections between a single specified point and more than one other specified point.

“Radio local area network” (RLAN), refers to a Local Area Network utilizing radio frequency (wireless) for connection of its network terminals.

“**Short Range Devices**” refers to radio devices that operate at low transmit power and hence range, thus offering a low risk of interference with other radio services.

5. APPLICABLE LEGISLATION AND REGULATIONS

The implementation of this guide is subject to the provisions of:

- i. The Uganda Communications Act 2013;
- ii. The Uganda Communications (Licensing) Regulations, 2019;
- iii. The Uganda Communications (Equipment Type Approval) Regulations 2019;
- iv. The Uganda Communications Commission Spectrum Assignment Framework 2019;
- v. Any decisions or directives issued by the Commission however so described.

6. SCOPE

This guide outlines regulatory and technical requirements to facilitate the operation of wireless radio access systems in the 2.4GHz license-exempted frequency band.

7. APPLICABILITY

This guide shall apply to all WAS/RLAN operations and/or services in the 2.4GHz band in the range 2400–2483.5MHz.

8. AUTHORISATION AND TECHNICAL REQUIREMENT

8.1. Regulatory Requirement

Table-1 Regulatory Requirement

Condition	Additional Remarks
Terms and Conditions	The terms and conditions of operation specified herein, relevant spectrum management frameworks/guidelines, and directives issued from time to time.
Technology and Service	The band is open to any technology that meets the technical requirements and standards specified under section 8.2 herein.

Geographical area/scope	The guide applies to the operation of WAS/RLAN in the 2.4GHz band in the national geographical territory of the Republic of Uganda.
Licensing	The use of the band is license-exempted.
Spectrum Fees	The use of this band is exempted from payment of spectrum fees.
Spectrum sharing	<p>The right to use this band is based on a shared/nonexclusive basis. This is conditional on cooperation and coordination with other radio frequency spectrum users in the band and adjacent bands to avoid and resolve any occurrence of interference.</p> <p>The grant of the right to use the band is based on a non-protection and non-interference basis to licensed services in adjacent bands.</p>
Type approval	Before the importation, installation, and use in Uganda, all radio communication devices/equipment must undergo a type-approval process to confirm conformity with the national and applicable international standards.
Emission exposure and safety.	<p>a) Emission limits shall comply with ICNIRP¹ EMF² exposure limits and/or any other limits as shall be guided by law from time to time;</p> <p>b) Spectrum users may be required to demonstrate compliance with EMF exposure limits from time to time.</p>
Interference mitigation	<p>Spectrum users are required to;</p> <p>a) Coordinate amongst themselves any deployments in the band;</p> <p>b) Implement measures to mitigate interference to other radio communications systems and/or the duly licensed operations in adjacent bands.</p>

¹ ICNIRP: *International Commission on Non-Ionizing Radiation Protection (ICNIRP)* is an international commission specialized in non-ionizing radiation protection

² EMF: *Electro Magnetic Field*

8.2. Technical Requirements

8.2.1 WLANs and RLANs

- a) The 2.4 GHz band may be used for indoor Wireless Local Area Networks (WLANs) established for:
 - i. Private and public use;
 - ii. Indoor including household and commercial buildings (lobbies, hotels, corporate offices, etc., inside-automobiles (trains, cars, etc.)
- b) Use cases in a) above shall be in accordance with the regulatory requirements specified in Section 8.1 herein;
- c) Outdoor WLANs and RLANs shall not claim protection and shall not cause interference to other radio services in the same or adjacent band. In case of any reported and confirmed harmful interference, the WLAN and RLAN user shall be required to make necessary adjustments in resolving the interference and/or immediately cease the interference causing operations;
- d) The use of 2400-2483.5 MHz (2.4 GHz) band by short-range devices (SRD) and low power devices shall be subject to the provisions of the guidelines for use of short-range devices (SRDs) and ultra-wideband (UWB) devices in Uganda. The SRDs guidelines are available on the Commission's website.

8.2.2 Applicable technical specifications and standards

Table-2 below highlights the applicable technical specifications and standards.

Table.2: Technical Specifications For The Operation of the 2.4GHz Band for FWAS/RLAN in Uganda.

Technical parameter	Equipment type	Value	Reference Standards
RF Power Output	FSS and non-FHSS equipment	≤ 20 dBm	<ul style="list-style-type: none">• ETSI EN 300 328 V2.2.2 (2019 - 07)• EN 300 422• EN 300 652
Power Spectral Density	No-adaptive FHSS and non-FSS equipment	≤ 20 dBm (Manufacturer declared value).	
	Non-FHSS equipment	10 dBm per MHz.	

Duty Cycle	FHSS (Frequency Hopping) equipment (adaptive or non-adaptive)	Not applicable for output power (e.i.r.p) < 10 dBm,	<ul style="list-style-type: none"> EN 300 454
	Non-adaptive FHSS (Frequency Hopping) equipment	Max. Tx-sequence time ≤ 5 ms. Min. Tx-gap time ≤ 5 ms For e.i.r.p ≥ 10 dBm, (Max. value declared by the Manufacturer)	
	Non- FHSS equipment (adaptive or non-adaptive)	Not applicable for e.i.r.p < 10dBm,	
	Non-FHSS equipment	Max. Tx-sequence time ≤ 10 ms. Min. Tx-gap time ≤ 3.5 ms Applicable for e.i.r.p ≥ 10 dBm, (≤ Max. value declared by the Manufacturer)	
Hopping Frequency Separation	FHSS (Frequency Hopping) equipment (adaptive or non-adaptive)	limit is ≥ 100KHz for e.i.r.p < 10 dBm,	
	Non-adaptive FHSS (Frequency Hopping) equipment	≥ Occupied bandwidth with a Min. separation of 100KHz	
	Adaptive FHSS (Frequency Hopping) equipment	≥ 100KHz	
Occupied Channel Bandwidth (OCBW)	FHSS (Frequency Hopping) equipment	Occupied bandwidth shall be within the Frequency band	

	(adaptive or non-adaptive)	range 2400 MHz to 2483.5 MHz	
	Non-adaptive FHSS (Frequency Hopping) equipment	≤5 MHz for system with e.i.r.p <10dBm.	

9. STAKEHOLDER RESPONSIBILITY

9.1. The Commission

The Commission shall regularly review and update the provisions of this guide to ensure continued relevance and effectiveness;

9.2. Stakeholders (Importers, Vendors, and Operators)

- i).* To adhere and operate under the provision of this guide;
- ii).* Acquaint themselves with the relevant communication laws in Uganda including but not limited to Uganda Communications Act 2013 and all regulations issued thereunder, data protection and privacy laws, and the Computer misuse Act 2011.