



**UGANDA
COMMUNICATIONS
COMMISSION**

STANDARD FOR TV WHITE SPACES ACCESS AND USE IN UGANDA

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1. INTRODUCTION

The continuous development and increase in use of wireless applications and services has resulted in a significant increase in demand for radio spectrum. Uganda Communications Commission (the Commission), as the regulator of the Communications sector in Uganda, is tasked with ensuring optimal utilization of the available spectrum resources.

White Spaces technology presents an opportunity to accommodate multiple wireless services through spectrum sharing arrangements in a given band. The Commission, therefore, presents the standard and associated regulatory arrangements for the use of Television White Spaces (TVWS) in Uganda.

2. AMENDMENT

This standard shall be valid until it is withdrawn by the Commission and shall be reviewed regularly to enable alignment with the constantly changing telecommunications industry and/or any changes in the national policy, legal and/or regulatory regimes.

3. OBJECTIVE

The objective of this standard is to present principles and practice associated with the access and use of TVWS in the frequency range 470-694MHz in Uganda.

4. INTERPRETATION

“Authorisation” refers to the grant by Uganda Communications Commission of a right to use the specified radio frequency pursuant to sections 5(1)(c), 21, and 24 of the Uganda Communications Act.

“Communications 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;

“Equivalent Isotropically Radiated Power (EIRP)” is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna.

“Fixed WSD” is a WSD that transmits and/receives signals at a specific fixed location.

“Geolocation Database (GLDB)” is a database system approved by Uganda Communications Commission for provision of TVWS technical and operational parameters to WSDs.

“Geolocation Database Administrator” this is a legal person authorised by Uganda Communications Commission to manage one or more *GLDBs* in Uganda.

“Master WSD” is a WSD that is able to communicate with a *GLDB* and with other WSDs.

“Operator” means a person licensed to provide a communication or broadcasting service.

“Portable WSD” a WSD that transmits at non-specified or changing location.

“Private network” is a communication network established by a person for the sole use of its members with no monetary gain to the person for provision of access or use of the network by its members.

“Client WSD” is a WSD that is only able to communicate with other WSDs under the control of a master WSD.

“Television White Space (TVWS)” are the unused frequencies in the range of 470-694MHz in respect to time and/or geographical locations.

“TVWS Service Provider” refers to an Operator using TVWS technology.

“Ultra-High Frequency (UHF) TV band” means the frequency band from 470 MHz to 694 MHz

“Uganda Communications Commission (the Commission also known UCC)” refers to the regulator of the Communications Sector established by the Uganda Communications Act of 2013.

“Uganda Communications Act (the Act)” means that Uganda Communications Act of 2013, the law that governs communications sector in Uganda.

“WSD” is a fixed or mobile radio device that transmits and receives signals using white space spectrum, based on operational information received from a geo location white space database.

5. APPLICABLE LEGISLATION AND REGULATION

The implementation of this standard is subject to the provisions of Sections 5 & 25 of the Uganda Communications Act 2013, including;

5(1)(c) 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.

25(1)(b) Notwithstanding any other law, the Commission is exclusively responsible for establishing technical requirements and standards in respect of:

- i) radio communications apparatus;
- ii) interference-causing apparatus or any class of that apparatus;

Section 21 of the Act on “Licence for radio communications”, a person shall not, without a licence issued by the Commission—

- (a) establish or use any radio station or provide radio communication services;
- (b) sell, let, hire or otherwise dispose of any radio communications apparatus;
- (c) manufacture, possess, install, connect or operate any radio communications apparatus or interference-causing apparatus.

Section 7(1) of the Communications (telecommunications and radio Communications equipment type approval) regulations 2005, all telecommunication or radio communications equipment, apparatus or device that may be connected to a telecommunication network or radio communications network shall, before installation, connection or operation and use in the provision of telecommunication and radio communications services in Uganda, be approved by the Commission.

6. SCOPE

This document outlines the technical requirements, operational and regulatory requirements for operation of WSDs and TVWS technology in Uganda.

7. APPLICABILITY

This standard shall apply only to operations in the UHF TV broadcasting band of 470-694MHz in Uganda.

8. AUTHORISATION AND OPERATION OF WHITE SPACES SYSTEMS AND SERVICES IN UGANDA

8.1 REGULATORY REQUIREMENTS

8.1.1 General

- a) The use of TVWS systems and services shall be on a secondary basis in the band and shall therefore not disrupt or cause interference to nor claim protection from any radio communication systems and services allocated on primary basis in the band.
- b) Only TVWS devices that comply with the requirements specified herein and associated standards shall be allowed for use in Uganda

- c) Every TVWS service provider shall ensure that all devices connected to its network are duly type approved by the Commission and relevant authorisation(s) obtained for any fixed WSDs deployed.
- d) All TVWS service providers and geolocation database administrators shall ensure the protection of user information and privacy, in observance of the relevant national laws and regulations.
- e) The channels available for use for TVWS and the associated operating parameters shall be limited to those obtained from a duly authorized geolocation database.
- f) The use of TVWS for provision of Communications services in Uganda shall be subject to possession of an operating licence issued by the Commission pursuant to section 21 and/or 22 of the Act. Such licence must be current, valid, and authorizing the provision of the Communications services for which the TVWS may lawfully be used.
- g) Any WSD that is authorized for use by the Commission as a fixed WSD shall be operated at the geographical location specified in the authorisation.

8.1.2 Administration of Geolocation Database

The geolocation database (GLDB) maybe established, operated and maintained by any of the following persons:

- i) An eligible person under the Laws of Uganda;
- ii) An Operator already licensed under the Act;
- iii) A consortium of Operators under the Act. Where the consortium is in the form of Trust, the Operator that are named as the trustees of the particular Trust at the time of applying for authorisation by the Commission shall be recognised as the directors of the administrator. A new authorisation shall be required when all the named licensees have ceased to be trustee;
- iv) A statutory institution established under the laws of Uganda whether this is an academic or government agency.

a) Authorization to administer a Geolocation Database

- i) An application shall be submitted to the Commission to establish and administer a geolocation database.
- ii) Upon meeting the criteria for authorisation and where the GLDB is for use other than in a private network, the Commission shall subject such application to public notice.
- iii) The applicant's planned telecommunication or radio communication equipment shall then be subjected to type approval review.
- iv) Upon successful completion of the above and payment of the associated fees, an authorisation shall be issued by the Commission.

8.1.3 Applicable fees

All TVWS service providers and database administrators shall pay any applicable fees as shall prescribed by the Commission.

8.2 TECHNICAL REQUIREMENTS

8.2.1 Permissible Frequencies and Channel Arrangement

- a) TVWS operations in Uganda shall only be allowed in the UHF TV broadcasting frequency band of 470-694MHz.
- b) The maximum permissible channel bandwidth is 8MHz. Higher bandwidth may be achieved by aggregation.

8.2.2 TVWS Access Mode

- a) The permitted mode of access for TVWS in Uganda shall be the use of a geolocation database.
- b) Access to TVWS channels shall be on non-exclusivity and non-discriminatory basis.

8.2.3 Characteristics of WSDs

- a) A WSD client must have:
 - i) The relevant capabilities associated with the technical requirements specified herein to ensure that no harmful interference is caused to any duly licensed or authorised Communication services or operations.
 - ii) the ability to transmit and receive within the frequency range 470 MHz to 694 MHz
- b) In addition to 8.2.3(a), a WSD used as a master WSD shall possess inbuilt geo-location capability.

8.2.4 Radio Frequency (RF) and emission requirements

- a) All WSDs devices and operations shall comply with the parameters in table-1 below to ensure coexistence with other communications services in the band 470-694MHz and in other bands.

Table 1: TVWS Operational Parameters

| <i>Transmission Power (EIRP) over a channel</i> | Fixed WSD | Portable WSD |
|---|---|---|
| | 4 W (36 dBm) | 100 mW (20 dBm) |
| <i>Transmitter Unwanted Emission (EIRP)</i> | <i>Out-of-band Emissions from the WSD shall not exceed;</i> | <i>Spurious Emissions from a WSD operating in 470-694 MHz shall not exceed;</i> |
| | -56.8dBm/100KHz | -54 dBm |
| <i>Maximum Antennae Height Above Ground Level</i> | 50m | |

- b) The operations of WSDs shall also comply to the following requirements;
- i) Electromagnetic Compatibility (“EMC”) emissions input and output power ports as specified in ETSI EN 301 489-1 and IEC CISPR 32; and;
 - ii) Electrical safety defined in the IEC 60950-1 and IEC 62368-1.
 - iii) The International Commission on Non-Ionizing Radiation Protection (“ICNIRP”) guidelines for limiting exposure to time-varying electromagnetic field (“EMF”) in the frequency range of up to 300 GHz.

8.2.5 Additional requirements

All TVWS installations and operations in Uganda shall additionally be guided by the following industry standards PROVIDED ALWAYS that whenever there shall be any conflict between a requirement specified by UCC herein and the industry standards listed below or between the industry standards, the UCC requirements shall prevail over what is contained in the industry standards.

- a) International Telecommunications Union recommendations: ITU-R SM.2405-0 and ITU-R M2330.0
- b) Institute of Electrical and Electronics Engineers (IEEE) Standardization; IEEE 802.11af, IEEE 802.22, IEEE and 802.19.1, IEEE 802.15.4m and IEEE 1900.7.
- c) European Standard; ETSI EN 301 598.
- d) Internet Engineering Task Force (IETF) Standardization, Protocol to access of TV white spaces (PAWs Protocol).
- e) European Computer Manufacturers Association (ECMA 392).

8.2.6 Requirements for communication between a GLDB and a Master WSD

- a) A Master WSD must register with a GLDB:
 - i) When first installed or rebooted and;
 - ii) When its location or coordinates has changed.

- b) Prior to any transmission, a Master WSD shall establish contact with an authorised GLDB and request parameters necessary to operate in the respective location(s). Such communication shall include the provision of the following information;
 - i) Its unique identifier;
 - ii) Its geographical coordinates.
 - iii) Its height above the ground level (m).
 - iv) Its channel bandwidth (MHz) requirement.
 - v) Emission class in accordance with ETSI EN 301 598 or any other applicable standards specified herein.
 - vi) Its operating mode – master or client
 - vii) Its unique identifier - as serialised by the Manufacturer of the device

- c) A Master WSD must also query the serving GLDB for operational parameters when:
 - i) Activated from a power-off state.
 - ii) When the channel validity period expires.

- d) A GLDB shall:
 - i. upon request, provide a Master WSD all the information necessary to facilitate interference free communication.
 - ii. only provide operational parameters to Master WSDs that are duly registered.
 - iii. have security mechanisms to ensure secure communication between itself and the Master WSDs including the prevention of manual modification of parameters at any stage during communication.

- e) The operational parameters provided by the GLDB shall be in accordance with the limits specified in the table-1 under 8.2.4.

- f) Upon confirmation of information in 8.2.6(b), the GLDB shall respond providing;
 - i) Available channels and bandwidth,
 - ii) Associated signal quality,
 - iii) Maximum permissible transmission power,

- iv)* Channel validity.
- g)* Upon receipt of the operational parameters, the Master WSD shall regularly:
 - i)* update the GLDB on it's on the usage of TVWS channels and its client WSDs.
 - ii)* poll the GLDB to confirm the validity of the operational parameters in use.
- h)* Master WSDs shall be required to immediately cease operation in any of the following situations;
 - i)* The serving GLDB indicates the channel is no longer available or valid.
 - ii)* The GLDB itself becomes unavailable.
- i)* When a master WSD does not have a direct connection to GLDB, it shall operate as client WSD and depend on another master WSD to obtain the respective operational information/parameters from the GLDB.

8.2.7 Requirements for communication between master WSD and the Client WSD

- a)* In requesting for operational parameters, the Client WSD shall communicate the following information to the GLDB through the Master WSD:
 - i)* Its operating mode – master or client;
 - ii)* the unique identifier of the serving Master WSD;
 - iii)* Its unique identifier as serialised by the Manufacturer of the device;
 - iv)* Its type – fixed or portable
 - v)* Its emission class based on ETSI EN 301 598 or any other applicable standards specified herein.
 - vi)* its antenna height (m)
- b)* The Master WSD shall only communicate with and to the client WSDs operational parameters that have been determined by the serving GLDB.
- c)* A master WSD shall instruct all its associated Client WSDs to stop transmission upon receipt of information from the serving GLDB indicating that the operational parameters are no longer valid.
- d)* the Client WSD must stop transmission immediately upon receipt from the master WSD of such instruction described in 8.2.7(d).

9. STAKEHOLDER RESPONSIBILITY

9.1 The Uganda Communications Commission

- a) periodically review and update the standard as deemed necessary.
- b) Consider applications for authorization for the TVWS service providers and the *GLDB* database administrators.
- c) Consider applications for type approve of WSDs
- d) monitor and enforcement of compliance against the provision of this document.

9.2 TVWS Service Provider

- a) obtain relevant licence(s) and authorization(s) prior to operations using TVWS.
- b) Ensure that all WSDs in its operations and to which it provides services are duly type approved by the Commission.
- c) ensure that all their operations adhere to the provisions of this document and the relevant laws of Uganda.

9.3 Geolocation Database Administrator

- i) the *GLDB* administrator(s) shall be responsible for the establishment and management of the database.
- ii) ensure full functionality, accessibility, availability and provision of, accurate operational parameters to requesting WSDs in a non-discriminatory manner, in accordance with the requirements specified herein.
- iii) establishing processes and submission of necessary information with the UCC.
- iv) ensure collection, storage and use of customer (WSD) information complies with the database security requirements as well as relevant national laws on data protection and privacy.
- v) facilitate interference free operations of the WSDs in all locations.
- vi) Cooperate and coordinate with other *GLDB* administrators to ensure consistency and interference free operations.

10. INFORMATION MANAGEMENT

The register of authorized *GLDB* administrators and TVWS service providers shall be published by the Commission.

11. ENFORCEMENT

The Commission shall take enforcement in accordance with the Uganda Communications Act of 2013, the Telecommunications (Radio) Regulations 2005 and the Uganda Communications Commission Spectrum Management Guidelines of 2017 in case of any breach to the requirements for access and use of TVWS outlined in this standard.