INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

NOTICE 318 OF 2017

PURSUANT TO SECTION 4 (1) OF THE ELECTRONIC COMMUNICATIONS ACT 2005, (ACT NO. 36 OF 2005)

HEREBY ISSUES A NOTICE REGARDING THE DRAFT REGULATIONS ON THE USE OF TELEVISION WHITE SPACES.

The Independent Communications Authority of South Africa ("the Authority'), in terms of section 4, read with sections 31(4), 34(7) (c) (iii), 34(8) and 34(16) of the Electronic Communications Act (Act No. 36 of 2005), hereby publishes the draft regulations on the use of Television White Spaces for public consultation.

Interested persons are hereby invited to submit written representations, including an electronic version of the representation in Microsoft Word, of their views on the Draft regulations on the use of Television White Spaces no later than 16H00 on 19 May 2017.

Written representations or enquiries may be directed to:

The Independent Communications Authority of South Africa

Pinmill Farm Block A

164 *Katherine Street*

South Africa

Private Bag XI0002

Sandton

2146

Attention:

Mr Manyaapelo Richard Makgotlho

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All written representations submitted to the Authority pursuant to this notice shall be made available for inspection by interested persons from 23 May 2017 at the ICASA Library or website and copies of such representations and documents will be obtainable on payment of a fee.

Where persons making representations require that their representation, or part thereof, be treated confidentially, then an application in terms of section 4D of the ICASA Act, 2000 (Act No. 13 of 2000) must be lodged with the Authority. Such an application must be submitted simultaneously with the representation on the draft regulations and plan. Respondents are requested to separate any confidential material into a clearly marked confidential annexure. If, however, the request for confidentiality is refused, the person making the request will be allowed to withdraw the representation or document in question.

NOMVUYISO BATYI
COUNCILLOR

Independent Communications Authority of South Africa

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Private Bag X10002, Sandton, 2146

DRAFT REGULATIONS ON THE USE OF TELEVISION WHITE SPACES

2017

Contents

1 Definitions

In these Regulations, unless the context otherwise indicates, a word or expression to which a meaning has been assigned in the Act has meaning so assigned:

"Act" means the Electronic Communications Act, 2015 (Act No. 36 of 2015);

"Adjacent Channel Leakage Ratio (ACLR)" means the ratio of the in-band transmit power measured in an 8 MHz TV channel, to the out-of-band emission measured in any 100 kHz segment in an adjacent TV channel**;**

"Altitude" means the vertical distance above mean sea level (AMSL) defined by WGS84[1];

"Antenna height" means the vertical distance above ground level (AGL) to the radiation centre of an antenna;

"Antenna height above average terrain (HAAT)" means the vertical distance between a point on the ground to the radiation centre of an antenna. This height takes into consideration of an averaged surrounding terrain where the antenna is located. The calculation uses a radial horizontal distance starting from 3.2 km away from the antenna up to 16 km;

"Assignment" means the authorisation given by the Authority to use a radio frequency or radio frequency channel under specified conditions;

"Authentication" means the ability to verify that a message was truly sent by the claimed sender;

"Authority" means the Independent Communications Authority of South Africa (ICASA);

"Contact verification signal" means an encoded signal broadcast by a Master or Client device for reception by Client devices to which the Master device has provided Operational Parameters. A Master device must provide the information needed by a Client device to decode the contact verification signal at the same time that it provides the Operational Parameters;

"Device emission class" means the classification declared by the manufacturer that identifies the level of ACLR for the device;

"Digital Terrestrial TV (DTT)" means the digital terrestrial broadcasting technologies and platforms for delivery of TV content in the UHF band;

"Dynamic Spectrum Assignment" means a mechanism used to assign the unused spectrum within a frequency band of interest, to secondary users, such that they don't cause any harmful interference with the primary user or licensee.

"dBm" means a power value in decibels referenced to one milliwatt;

"Equivalent Isotropic Radiated Power (EIRP)" means the product of the power in dBm supplied to an antenna and the absolute or isotropic antenna gain in a given direction relative to an isotropic antenna over a frequency bandwidth of 8 MHz;

"EIRP Spectral density" means the EIRP in dBm over a frequency bandwidth of 100 kHz;

[1] The World Geodetic System (**WGS84**) is the reference coordinate system used by the Global Positioning System. It comprises of a reference ellipsoid, a standard coordinate system, altitude data and a geoid. Similar to the North American Datum of 1983 (NAD83), it uses the Earth's center mass as the coordinate origin.

"ETSI" means the European Technical Standards Institute;

"ETSI EN 301 598" means the ETSI Harmonized European Standard for "White Space Devices (WSDs); Wireless Access Systems operating in the 470 MHz to 790 MHz TV broadcast band; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive", final draft V1.0.9 (2014-02);

"Fixed equipment" means a WSD which has an integral antenna, a dedicated antenna or an external antenna and is intended to operate in a fixed location only;

"Geo-location capability" means the capability of a WSD to determine and report the latitude, longitude and altitude coordinates of its antenna;

"Geo-locations Spectrum Database (GLSD)" means a database system operated by an entity which has been authorised by the Authority to calculate and generate Operational Parameters and to provide GLSD services to the WSD within the frequency band 470 MHz to 694 MHz;

"Geo-location Spectrum Database GLSD Operator" means a delegated or designated entity that operates the GLSD;

"GLSD services" means the provision of Operational Parameters in response to requests from the WSDs;

"Geo-location uncertainty" means the potential positioning error in three dimensions (latitude, longitude and altitude) defined by the maximum difference in metres between the point reported by the WSDs to the GLSD and the actual position of the TVWS antenna;

"Integral antenna" means the antenna designed as a fixed part of the equipment, without the use of an external connector, which cannot be disconnected from the equipment by a user with the intent to connect another antenna. An integral antenna may be fitted internally or externally. In the case where the antenna is external, a non-detachable cable shall be used;

"License" means a radio frequency spectrum license;

"Licensee" means a person to whom a radio frequency spectrum license has been issued in terms of the Act;

"MHz" means a frequency value designated in megahertz**;**

"Network initiation" means a process by which a Master device sends control signals to one or more Client devices and allows them to begin communications;

"Nomadic equipment" means a device which has an integral antenna or a dedicated antenna and is intended to operate continuously within a limited coverage area;

"Operational Parameters (OP)" means the technical parameters generated by a Geo-location spectrum database as a response to a request made by the Master white space device.

"Out-of-band-emissions" means the unwanted emissions that fall within the 470 to 694 MHz band;

"Primary basis" means a primary service has priority over all other users of the spectrum band and is entitled to protection from harmful interference by other services;

"Primary service" means the service to which a specific band in the National Radio Frequency Plan;

"Reference Geo-Location Spectrum Database (R-GLSD)" means a GLSD that performs baseline calculations for the country-wide TVWS availability maps and Operational Parameters for WSDs, for setting regulatory limits;

"Rural" means any area that is not classified urban. Rural areas are subdivided into tribal areas and commercial farms

"Secondary user" means a secondary service allocated in using a specific band in the National Radio Frequency Band Plan that is assigned to a primary service, meaning that the secondary user shall operate without causing harmful interference to the primary service and that the secondary user shall not be entitled to protection from harmful interference by other users, including but not limited to the primary user;

"Secondary Geo-Location Spectrum Databases (S-GLSD)" means GLSDs operated by entities certified by the Authority to provide GLSD services to end users.;

"Sleep mode" means a mode in which the device is inactive but is not powered-down;

"Time validity" means the time period which Operational Parameters provided by the GLSD to a Master WSD are in force.

"Transmitter power" means the power produced by a WSD, measured at the output of the transmitter to which the antenna is normally connected;

"Transmitter Power Control (TPC)" means technical mechanism used by within some networking devices in order to prevent unwanted interference between wireless networks;

"TV" means broadcast Television services;

"TV White Spaces (TVWS)" means the locally unused frequencies within the 470 MHz - 694 MHz UHF band;

"TV transmitter dataset" means a dataset containing technical parameters of terrestrial TV installations such as geographical locations, transmitting powers and antenna heights. This dataset is under the sole custodianship of the Authority;

"Ultra-High Frequency (UHF) TV band" means the frequency band from 470 to 694 MHz (TV channel 21 – 48);

"Urban" means an area typified by wide streets and where building heights are generally less than three stories making diffraction over roof-top likely

"White Space Device (WSD)" shall be construed in accordance with Regulation 3.
"Word Geodetic System 1984 (WGS84)" means a geodetic system used by the Department of Rural Development and Land Reform as an official ellipsoid for the South Africa's Hartebeesthoek94 (Hart-94) datum.

2 Purpose

(1) The purpose of these regulations is to:
(a) To support the uptake of affordable broadband services and access;
(b) Establish the regulatory framework through which the Authority may authorise the use of Dynamic spectrum assignment for Television White Spaces (TVWS);
(c) Establish the conditions under which the TVWS must operate in accordance with the National Radio Frequency Plan;
(d) Establish standard terms and conditions applicable to the operation of WSDs in the frequency band 470 MHz to 694 MHz;
(e) Establish standard terms and conditions applicable to the operation of Geo-location spectrum databases (GLSDs) in the frequency band 470 MHz to 694 MHz;
(f) Prescribe conditions for the possession of White Space Devices (WSDs).
(g) Establish the mechanisms for ensuring the protection of primary users in the band from harmful interference;

3 Characteristics of White Space Devices

(1) A White Space Device (WSD) wireless apparatus must be:

(a) capable to transmit or receive in the frequency band 470 MHz to 694 MHz;
(b) Fixed device;
(c) Nomadic device;
(d) Master device; and
(e) Client device.

(2) Types of WSD:

(a) A fixed WSD must be a device intended to operate in a fixed location only, and must have either:

(i) an integral antenna;
(ii) a dedicated antenna; and
(iii) an external antenna.

(b) A nomadic WSD must be a device intended to operate within a limited coverage area that has either:

(i) an integral antenna;
(ii) a dedicated antenna;
(iii) an external antenna.

(3) Categories of White Space Devices:

(a) Master WSD must be:

(i) Fixed WSD with an internal geo-location capability and Internet access to request and receive Operational Parameters from a GLSD.
(ii) Nomadic WSD with an internal geo-location capability and Internet access to request and receive Operational Parameters from a GLSD.
(iii) Able to transmit and receive within the frequency band 470 MHz - 694 MHz under specific Operational Parameter limitations.

(b) Client WSD must be:

(i) Fixed WSD with an internal geo-location capability and does not have direct access to a GLSD to request and receive Operational Parameters.
(ii) Nomadic WSD with an internal geo-location capability and does not have direct access to a GLSD to request and receive Operational Parameters.
(iii) able to obtain operational parameters from a Master WSD for use by one Client WSD within a TV white space network served by that Master WSD.
(iv) able to obtain operational parameters from a Master WSD for use by all Client WSDs within a TV white space network served by that Master WSD.
(v) able to transmit and receive within the frequency band 470 MHz – 694 MHz under specific Operational Parameter limitations.

4 White Space Device Authorisation.

(1) Any person granted authorisation by the Authority to operate WSD, must provide the Authority with a mandatory certification information from an accredited laboratory during network roll-out.
(2) A WSD must have the capability to automatically communicate with the GLSD during the WSD initialisation and registration with the GLSD operator.
(3) The GLSD must provide sufficient security to the user to ensure privacy and protection.

5 Avoidance of Harmful Interference

(1) The GLSD must provide Operational Parameters to protect primary services from possible harmful interference generated by transmissions of WSD.
(2) The GLSD must generate technical parameters in response to request by Master WSD.

6 Operational Parameters

(1) Operational Parameters must include:

(a) The lower and upper boundaries of each TV channel within the 470 MHz to 694 MHz frequency range within which a WSD may transmit and receive;
(b) The maximum permitted EIRP spectral density for each TV broadcast channel within which a WSD may transmit;
(c) The maximum permitted EIRP for each TV channel within which a WSD may transmit;

(d) The time period during which the Operational Parameters are valid;
(e) The geographic area within which the Master White Space Device Operational Parameters are valid; and
(f) The duration (in seconds) within which a Master WSD must regularly check with a GLSD that the Operational Parameters received are still valid.

7 Permitted Channels of Operation

(1) A WSD may operate in the frequency band 470 to 694 MHz, subject to the interference protection requirements set forth in Regulations 5;

(2) A WSD may operate on available frequencies determined in accordance with the interference avoidance mechanisms in Regulation 5;

(3) A WSD may not operate on a co-channel basis with broadcast television stations in the same area guided by the GLSD; and

(4) Client WSDs may only operate on available frequencies determined by a Master WSD.

8 Location Specific Maximum Permitted Radiated Power Levels

(1) The maximum EIRP shall be in accordance with Table 1.
(2) The GLSD may instruct the Master WSD to operate at lower power level in order to meet the co-channel and adjacent channel suppression limitations.

Table 1: Location specific maximum permitted EIRP and EIRP spectral density

Location	Maximum EIRP per 8 MHz channel	EIRP Spectral Density per 100 kHz
Urban	36 dBm	17 dBm
Rural	41.2 dBm	22.2 dBm

9 Operation of WSD Immediately Adjacent to a Broadcast TV Channel

(1) A WSD operating immediately adjacent to the occupied Television channels must have the out-of-band-emissions based on the Adjacent channel leakage ratios (ACLRs) established for the WSD emission classes prescribed in Table 2.

Table 2 ACLRs per classes of WSDs on the first adjacent TV channel.

Device Emission Class	ACLR
Class 1	74 dB
Class 2	74 dB
Class 3	64 dB
Class 4	54 dB
Class 5	43 dB

(2) The out-of-band power (EIRP) spectral density shall be measured in the first 100 kHz beyond the channel edge.
(3) The out-of-band power (EIRP) spectral density shall be greater than the measured in-band transmit power spectral density over 8 MHz minus the ACLR (-84 dBm).

10 Requirements for White Space Devices to Access the Geo-Location Spectrum Database

(1) The communication between the GLSD and the Master WSD must comply with the latest version of Protocol to Access White Space Databases (PAWS), Internet Engineering Task Force (IETF), RFC 7545.
(2) The Master WSD must initiate communication with the GLSD.
(3) The GLSD must acknowledge the initial request from the Master WSD.
(4) The Master WSD in registering with GLSD must provide:

(a) information specifying that it is a Master device;
(b) the Master device's unique identifier;
(c) the type approval identification designated by the Authority
(d) information of the Master device owner;
(e) information of the device operator;
(f) information specifying that the Master device is Fixed;
(g) information specifying that the Master device is Nomadic;
(h) the geographic location of its antenna expressed in latitude and longitude coordinates;
(i) the geo-location uncertainty of its antenna not exceeding 50 metres.
(j) Storage capacity in the device for geo-location uncertainty; and
(k) the confidence interval of 95% report to the GLSD.

(5) The GLSD must validate the accuracy and authenticity of the information;
(6) The GLSD must decide on the registration of the Master WSD;
(7) The Master WSD in requesting for the Operational Parameters from the GLSD, must provide:

(a) information specifying that it is a Master device;
(b) the Master device's unique identifier;
(c) the type approval identification designated by the Authority
(d) information specifying that the Master device is Fixed;
(e) information specifying that the Master device is Nomadic;
(f) the geographic location of its antenna expressed in latitude and longitude coordinates;
(g) the geo-location uncertainty of its antenna not exceeding 50 metres.
(h) Storage capacity in the device for geo-location uncertainty; and
(i) the confidence interval of 95% report to the GLSD.

(8) The GLSD upon receipt of the request from the Master WSD may provide Operational Parameters;
(9) Upon receipt of the Operational Parameters the Master WSD must:

(a) communicate periodically its usage of TVWS channel to that GLSD;

(b) communicate periodically with the GLSD to confirm the validity of the Operational Parameters.

(10) The GLSD must instruct the Master WSD to end its operation when Operational Parameters are no longer valid.
(11) When Operational Parameters are no longer valid:

(a) Master WSD must communicate an instruction to all Client devices associated to that Master device to stop transmission; and
(b) Master WSD must stop transmission.

(12) The Master WSD must perform network initialisation with the Client WSD using the TVWS channels obtained from the GLSD.
(13) The Client WSD must communicate through the Master WSD the following information to the GLSD for registration purposes:

(a) information specifying that it is a client device;
(b) the associated Master WSD;
(c) the client device's unique identifier;
(d) the type approval identification designated by the Authority
(e) information specifying that the client device is Fixed;
(f) information specifying that the client device is Nomadic;
(g) the geographic location of its antenna expressed in latitude and longitude coordinates;
(h) the geo-location uncertainty of its antenna not exceeding 50 metres.
(i) Storage capacity in the device for geo-location uncertainty; and
(j) the confidence interval of 95% report to the GLSD.

(14) The Master WSD must provide Operational Parameters to the associated client WSD.
(15) Master WSD must communicate an instruction to all Client WSDs associated to that Master WSD to stop transmission, when Operational Parameters are no longer valid;
(16) When Operational Parameters are no longer valid the Client WSD must stop transmission.

11 Requirements for Installers of White Space Devices

(1) Fixed WSDs shall be installed by an installer of wireless equipment in possession of a radio dealer certificate issued by the Authority.
(2) Fixed WSDs shall be installed by an installer of wireless equipment certified by an accredited institution.
(3) The installer must not reconfigure or tamper with any technical operational features settings of the WSD.
(4) The installer must ensure that characteristics of the WSD remain constant.
(5) The installer must ensure that the WSD complies with type approval certificate.

12 Antenna Requirements and Limits

(1) Fixed WSD must at first power-on, and at any time after it has been relocated:

(a) store its geo-location;
(b) Store the antenna height;
(c) The maximum permitted transmit antenna height of Fixed WSD must be 30 m above ground level (AGL);
(d) The maximum permitted transmit antenna height must not be located where the height above average terrain (HAAT), as calculated by the GLSD, is greater than 250 m; and The Authority may approve deviations from this restriction on a case-by-case basis, in approving an alternative means of interference mitigation in the GLSD.

(2) The default antenna height of a Nomadic WSD must be recorded by the GLSD as 1.5 m above ground level, unless the WSD notifies the GLSD otherwise.
(3) The Nomadic WSD must have 7 dB of power to compensate for in-building penetration loss when operating indoors.

13 Frequency of GLSD Access

(1) A Master WSD must access the GLSD once every twelve (12) hours to verify that the Operational Parameters continue to remain available.
(2) Each Master WSD must adjust its use of TVWS channels provided the Operational Parameters are still valid.

14 Continuous Operations

(1) The Master WSD may continue to operate up to 48 hours after the last GLSD access where after it must cease its operation.
(2) The Master WSD must re-establish contact with the GLSD and verifies its Operational Parameters.
(3) The client WSD must cease operation immediately if it does not receive a contact verification signal from the associated Master WSD;
(4) The client WSD must re-establish a contact with the associated master WSD within 900 seconds of last contact.
(5) The Client WSD device must then receive the Operational Parameters from the associated Master WSD.

15 Geo-location Spectrum Database Security Mechanisms

(1) Communications security must be instituted to ensure that GLSDs are protected from unauthorised data input.
(2) authentication procedures must be instituted to ensure that GLSDs are protected from unauthorised alteration of stored data.
(3) Communications between the GLSD and WSDs must be secured to prevent unauthorized parties from accessing information during transmission.
(4) GLSD must incorporate sufficient security measures to prevent the unauthorised WSDs from accessing GLSDs.

16 Responsibilities of Geo-Location Spectrum Database Operators

Reference GLSD

(1) The Authority, directly or through a designated delegated entity, will develop and operate a reference GLSD and will:

(a) maintain a reference GLSD that contains information about incumbent licensees to be protected;
(b) implement propagation algorithms and interference parameters issued by Authority to calculate country-wide map of baseline Operating Parameters for WSDs.
(c) The maps are to be utilised as regulatory limits when verifying accuracy of secondary GLSDs;
(d) update the algorithms or parameter values as necessary for good spectrum coordination;
(e) establish a technical procedure for approving entities wishing to operate secondary GLSDs; and
(f) from time to time use the reference GLSD for verification and monitoring purposes on the accuracy of results given by secondary GLSD operators

Secondary GLSD

(2) The Authority may designate entities to operate secondary GLSDs after undergoing a technical examination.
(3) Each secondary GLSD operator designated by the Authority must:
(a) maintain a database that contains information about incumbent licensees to be protected;
(b) establish a process in the secondary GLSD for synchronising and acquiring necessary technical information from the reference GLSD at least once a week to include newly licensed facilities or any changes to licensed facilities;
(c) establish a process for registration of Master WSDs;
(d) implement propagation algorithms and interference parameters prescribed by the Authority to calculate and provide accurate Operational Parameter to Master WSDs;
(e) establish protocols and procedures to ensure that all communications and interactions between the GLSD and Master WSDs are accurate and secured
(f) that unauthorized parties cannot access or alter the database or the Operational Parameters;
(g) respond in a timely manner to verify, correct and/or remove, as appropriate, data in the event that the Authority or a party brings a claim of inaccuracies in the GLSD to its attention.
(h) have functionality such that upon request from the Authority it can indicate that no TVWS channels are available when queried by WSDs;
(i) not discriminate between WSDs in providing the minimum information levels; and
(j) may provide additional information to certain classes of devices.

Service fees

(4) A secondary GLSD operator may charge a fee to the TVWS network operators for;

(a) registration of WSDs; and
(b) the provision Operational Parameters to Master WSDs.

17 Display of Available Channels

(1) A Master WSD must incorporate the capability to display a list of TVWS channels given to it by the GLSD including the channels selected for use;
(2) The Master WSD must fulfil this requirement by a built-in display.

18 Labelling Requirements

A WSD must bear the following statement in conspicuous location on the device:

> *"This device complies with applicable regulations promulgated by the Authority. Operation is subject to the following conditions: (1) this device may not cause harmful interference. (2) This device must accept any interference received.*

19 User Instructions Regarding Correction of Harmful Interference

The text of the user manual for a WSD, in whatever form it is provided (printed, electronic or on-line) shall include the following statement placed in a prominent location within the manual:

This equipment has been tested and found to comply with the technical rules and regulations for WSDs, consistent with all applicable regulations issued by the Authority.

These rules have been formulated to furnish reasonable protection against harmful interference. This equipment generates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to protected primary services. If this equipment does cause harmful interference to radio or television reception, the user shall correct the interference by one or more of the following measures:
(1) Reorient or relocate the receiving antenna of the WSD and/or broadcast receiver.
(2) Increase the separation between the equipment and the receiver.
(3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
(4) Consult the manufacturer, dealer or an experienced radio / TV technician for help.
(5) If the interference cannot be resolved, operation of this device shall be discontinued.

20 Compliance with Radio Frequency Exposure Requirements

A fixed WSD must be accompanied by instructions on measures to ensure that persons maintain a distance of at least 7.5m from the device during operation, as well as any necessary hardware that may be needed to implement that protection. These instructions shall be displayed in all formats of the user manual.

21 WSD Operations near International Borders

WSDs must operate in a manner that will not cause harmful interference to broadcasting and other services in neighbouring countries[2].

22 Offences, Contraventions and Penalties

Operations in the TVWS without authorisation and in contraventions of these regulations is a criminal offense and subject, on conviction, to:

(a) A fine not less than R100,000, but not exceeding R1,000,000; and/or
(b) Imprisonment of not less than a month, but not exceeding six months.

23 Short Title and Commencement

These regulations are called "Regulations on the use of Television White Spaces" and shall come into force upon publication in the government gazette.

End///

[2]. http://www.crasa.org/crasa-publications-details/id/105/memorandum-of-understanding-on-cross-border-coordination-on-radio-communication-services-sadc./