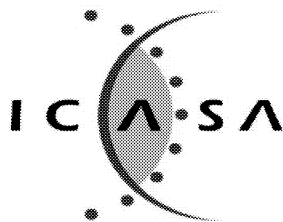


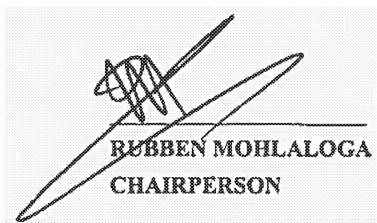
**INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA  
NOTICE 147 OF 2018**



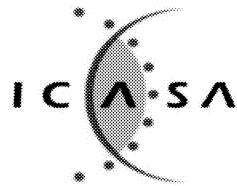
**ELECTRONIC COMMUNICATIONS ACT 2005, (ACT NO. 36 OF 2005)**

**REGULATIONS ON THE USE OF TELEVISION WHITE SPACES**

The Independent Communications Authority of South Africa ('the Authority'), in terms of section 4 read with section 32 (1) and 33 of the Electronic Communications Act (Act No. 36 of 2005), hereby prescribe the Regulations on the use of Television White Spaces.



**RUBBEN MOHLALOGA  
CHAIRPERSON**



Independent Communications Authority of South Africa Pinmill Farm, 164

Katherine Street, Sandton Private Bag X10002, Sandton, 2146

**REGULATIONS ON THE USE OF TELEVISION WHITE SPACES**

**2018**

3

## Contents

1	Definitions .....	4
2	Purpose .....	7
3	Characteristics of White Space Devices .....	7
4	White Space Device Authorisation .....	8
5	Avoidance of Harmful Interference .....	8
6	Operational Parameters .....	9
7	Permitted Channels of Operation .....	9
8	Location Specific Maximum Permitted Radiated Power Levels .....	9
9	Operation of WSD Adjacent to a Broadcast TV Channel .....	10
10	Requirements for White Space Devices to Access the Secondary Geo-Location Spectrum Database .....	10
11	Requirements for Installers of White Space Devices .....	12
12	Antenna Requirements and Limits .....	12
13	Frequency of GLSD Access .....	12
14	Continuous Operations .....	12
15	Geo-location Spectrum Database Security Mechanisms .....	13
16	Responsibilities of Geo-Location Spectrum Database Operators Reference GLSD .....	13
17	Display of Available Channels .....	14
18	Labelling Requirements .....	14
19	User Instructions Regarding Correction of Harmful Interference .....	14
20	Compliance with Radio Frequency Exposure Requirements .....	15
21	Protection of Radio Astronomy Service .....	15
22	Default Values for WSD Technical Parameters .....	15
23	WSD Operations near International Borders .....	15
24	Offences, Contraventions and Penalties .....	15
25	Short Title .....	16
26	Commencement .....	16

## 1 Definitions

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

“**Act**” means the Electronic Communications Act, 2005 (Act No. 36 of 2005), as amended;

“**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;

“**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, this height is calculated from the averaged terrain surrounding the antenna, at distances from 1.5 km to 16 km from the antenna;

“**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);

“**Channel bonding**,” means a technique to combine multiple contiguous 8 MHz TVWS channels in order to increase WSD transmission bandwidth and maximum data rate;

“**Client WSD**” means a wireless device that can be used without an exclusive broadcast license in the Radio Frequency Spectrum certified by the Authority that communicates with the WSD.

“**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 in compliance with ETSI 301 598 standard, or successor directives;

“**Dedicated antenna**” means a removable antenna that has been designed for use and supplied with 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, secondary spectrum assignment is done in such a way that they don't cause any harmful interference with 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;

“**ETSI**” is an acronym for the European Telecommunications 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”, or successor directives;

“**External geo-location source**” means any device that is Type Approved by the Authority with the capability to determine its own geo-location coordinates and location uncertainty, as well as to remotely determine geo-location coordinates and location uncertainty of one or more devices externally connected to it;

“**Fixed equipment**” means a WSD that 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 and its geo-location uncertainty;

“**Geo-locations Spectrum Database (GLSD)**” means a database system operated by an entity that 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 Operator or GLSD Operator**” means a delegated or designated entity that operates the GLSD;

“**Geo-location uncertainty**” means the potential positioning error in latitude and longitude defined by the maximum difference (in metres) between the point reported by the WSDs to the secondary GLSD and the actual position of the WSD antenna;

“**GLSD services**” means the provision of Operational Parameters in response to requests from the WSDs;

“**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;

“**Licence**” means a radio frequency spectrum licence;

“**Licensee**” means a person to whom a radio frequency spectrum licence has been issued to, in terms of the Act;

“**Master WSD**” means a wireless device that can be used without an exclusive broadcast license in the radio frequency spectrum certified by the Authority operating that communicates with the Reference Geo-Location database.<sup>3</sup>;

“**MHz**” means a frequency value designated in megahertz;

“**National Radio Frequency Plan**” means a plan that allocates the Radio Frequency Spectrum to Radio Services in the Frequency Bands between 8.3 kHz and 3000 GHz, contemplated in section 34 of the Act.

“**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 WSD that has an integral antenna or a dedicated antenna intended to operate continuously from a fixed location and can rapidly be relocated to another location 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 WSD as set forth in Regulation 6;

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

“**Protocol to Access White Space (PAWS) Databases**” means an open standard defined by the Internet Engineering Task force (IETF) to be used by WSDs to access the secondary GLSDs in the Request for Comments (RFC) 7545;

**“Primary basis”** means a primary service has priority over all other users of spectrum band of interest in the National Radio Frequency Plan 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 is licensed;

**“Radio Frequency Spectrum Planning”** means the plan developed in accordance with regulation 3 of the Radio Frequency Spectrum Regulations, Government Gazette 38641 (Notice 279 of 2015)

**“Reference Geo-Location Spectrum Database”** means a GLSD that performs baseline calculations for the countrywide TVWS availability maps and generates Operational Parameters for WSDs, for setting regulatory limits;

**“Rural”** means any area that is not classified urban. Rural areas may comprise one or more of the following: tribal areas, commercial farms and informal settlements;

**“Secondary user”** means a secondary radiocommunications service allocated for use in a specific band in the National Radio Frequency Band Plan that is assigned to a primary radiocommunications service with a condition that the secondary user shall operate without causing harmful interference to the primary radiocommunications 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”** means GLSDs operated by certified GLSD operators designated 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;

**“Spectral density”** means power versus frequency and, when integrated across a given bandwidth, the function represents the mean power in such bandwidth;

**“Time validity”** means the time period which Operational Parameters provided by the secondary 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 unused frequencies within the radio frequency band 470 MHz to 694 MHz, excluding the Radio Astronomy sub-band 606 MHz to 614 MHz;

**“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 MHz to 694 MHz;

**“Urban”** means a continuously built-up area with characteristics such as type of economic activity and land use. Cities, towns, townships, suburbs, etc. are typical urban areas. An urban area is one which was proclaimed as such (i.e. in an urban municipality under the old demarcation) or classified as such during census demarcation by the Geography department of Stats SA, based on their observation of the aerial photographs or on other information.

**“White Space Device (WSD)”** means a wireless device that can be used without an exclusive broadcast license in the Radio Frequency Spectrum certified by the Authority;

“**World Geodetic System 1984 (WGS84)**” means a geodetic system approved by the Chief Directorate’s office: National Geo-spatial Information as an official ellipsoid aligned with South Africa’s Hartebeesthoek94 (Hart-94) datum<sup>1</sup>.

## 2 Purpose

- (1) The purpose of these regulations is to:
  - (a) Support the uptake of affordable broadband services and access by the underserved.
  - (b) Establish the regulatory framework through which the Authority may authorise the use of Dynamic spectrum assignment for 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, excluding Radio Astronomy sub-band 606 MHz to 614 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, excluding Radio Astronomy sub-band 606 MHz to 614 MHz.
  - (f) Prescribe conditions for the possession of WSDs.
  - (g) Establish the mechanisms for ensuring the protection of primary users in the band 470 MHz to 694 MHz from harmful interference.

## 3 Characteristics of White Space Devices

- (1) A WSD wireless apparatus must be:
  - (h) capable to transmit or receive in the frequency band 470 MHz to 694 MHz, excluding Radio Astronomy sub-band 606 MHz to 614 MHz ;
  - (i) Fixed or Nomadic device; and
  - (j) Master or Client device.
- (1) 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; or
    - (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; or
    - (ii) a dedicated antenna.
- (2) Categories of White Space Devices:
  - (a) A Master WSD must be:
    - (i) a Fixed WSD with an internal geo-location capability and Internet access to request and receive Operational Parameters from a secondary GLSD; or

<sup>1</sup> International Terrestrial Reference Frame - [http://itrf.ensg.ign.fr/trans\\_para.php](http://itrf.ensg.ign.fr/trans_para.php)

- (ii) a Nomadic WSD with an internal geo-location capability and Internet access to request and receive Operational Parameters from a secondary GLSD; and
  - (k) able to transmit and receive only within the frequency band 470 MHz to 694 MHz under specific Operational Parameter limitations, excluding Radio Astronomy sub-band 606 MHz to 614 MHz .
- (b) A Client WSD must be:
- (i) a Fixed WSD with an internal geo-location capability that does not have direct access to a secondary GLSD to request and receive Operational Parameters; or
  - (ii) a Fixed WSD without an internal geo-location capability that does not have direct access to a secondary GLSD to request and receive Operational Parameters; or
  - (iii) a Nomadic WSD with an internal geo-location capability that does not have direct access to a secondary GLSD to request and receive Operational Parameters; or
  - (i) a Nomadic WSD without an internal geo-location capability that does not have direct access to a secondary GLSD to request and receive Operational Parameters; and
  - (ii) able to obtain operational parameters from an associated Master WSD for use by one Client WSD within a TV white space network served by that Master WSD; or
  - (iii) able to obtain operational parameters from an associated Master WSD for use by all Client WSDs within a TV white space network served by that Master WSD; and
  - (l) able to transmit and receive only when under the direction of a Master WSD, and only within the frequency band 470 MHz to 694 MHz under specific Operational Parameter limitations, excluding Radio Astronomy sub-band 606 MHz to 614 MHz

#### 4 White Space Device Authorisation.

- (1) Any person who possesses a WSD must ensure that the device is type-approved prior to operating it.
- (2) When submitting the WSD for type-approval, the applicant must ensure that the application is accompanied by a certificate from an accredited laboratory confirming that the device conforms to the applicable standards in relation to WSD.
- (3) The WSD must have validation capability for Type Approval certification identity with the Authority through the secondary GLSD operator prior to network rollout.
- (4) A Master WSD must have the capability to automatically communicate with the secondary GLSD during the WSD initialisation and registration with the secondary GLSD operator.
- (5) The secondary GLSD must provide sufficient security to the user to ensure privacy and protection of the user's personal information.

#### 5 Avoidance of Harmful Interference

- (1) The GLSD must provide Operational Parameters to ensure low probability of harmful interference to primary services caused by transmissions of WSD in compliance with:
  - (a) the ITU GE06 agreement<sup>2</sup>;
  - (b) the Astronomy Geographic Advantage (AGA) Act 21 of 2007<sup>3</sup> ;
  - (c) the National Radio Frequency Plan; and
  - (d) the Terrestrial Broadcasting Frequency Plan.
- (2) Geo-location coordinates and geo-location uncertainty of Master WSD antenna must be determined automatically:
  - (a) using WSD internal geo-location capability prior to its initialisation with the secondary GLSD at a given location; and
  - (b) each time the device is activated from a power-off condition; or
  - (c) been relocated 100 m or more.

<sup>2</sup> <https://www.itu.int/pub/R-ACT-RRC.14-2006>

<sup>3</sup> <http://www.polity.org.za/article/astronomy-geographic-advantage-act-no-21-of-2007-2008-07-17>



- (3) If the Master WSD is located where its internal geo-location capability does not function, it may obtain its geo-location coordinates from a Type Approved external geo-location source that must be located within 100 m and securely connected to the Master WSD.
- (4) Only Master WSD is permitted to communicate directly with the secondary GLSD for purposes of:
  - (a) Initialisation;
  - (b) registration;
  - (c) in requesting for Operational Parameters for itself; and
  - (d) on behalf of Client WSDs associated to it.
- (5) Operations of WSDs are permitted only on channels and at power levels that are determined by the secondary GLSD as being available for each WSD.
- (6) If the database indicates that the channel is no longer available at the current operating level:
  - (a) operation on a channel must cease immediately; or
  - (b) power must be reduced to a permissible level.

## 6 Operational Parameters

- (1) Operational Parameters must include:
  - (a) The lower and upper boundaries of each TV channel within the frequency band 470 MHz to 694 MHz within which a WSD may transmit and receive; excluding Radio Astronomy sub-band 606 MHz to 614MHz ;
  - (b) The maximum permitted EIRP spectral density for each TV 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 if less than that provided in Sub-regulation 13(1);
  - (e) The geographic area within which the Operational Parameters are valid; and
  - (f) The duration (in seconds) within which a Master WSD must regularly check with a secondary GLSD that the Operational Parameters received are still valid.

## 7 Permitted Channels of Operation

- (1) A WSD may operate in the frequency band 470 MHz to 694 MHz, excluding Radio Astronomy sub-band 606 MHz to 614MHz , subject to the interference protection requirements provided by the secondary GLSD;
- (2) A WSD may operate on available frequencies determined in accordance with the interference avoidance mechanisms set forth 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 secondary GLSD; and
- (4) Client WSDs may only operate on available frequencies communicated by a Master WSD as determined by the secondary GLSD.

## 8 Location Specific Maximum Permitted Radiated Power Levels

- (1) The maximum allowed to transmit EIRP of WSD must not exceed the values shown in Table 1.
- (2) The secondary GLSD may instruct the Master WSD to adjust to lower EIRPs than those shown in Table 1 in order not to exceed the incumbent's protection thresholds.
- (3) An additional 7dB of power must be added to the maximum EIRP level per 8 MHz channel for WSDs operating indoors to compensate for in-building penetration losses.

Table 1 Maximum permitted location specific WSD EIRP and EIRP spectral density

Location	Type of WSD	EIRP per 8 MHz channel (dBm)	EIRP per 100 kHz channel (dBm)

Rural	Fixed	41.2	22.2
Urban	Fixed	36	17
Rural	Nomadic	20	1
Urban	Nomadic	20	1

### 9 Operation of WSD Adjacent to a Broadcast TV Channel

- (1) A WSD operating adjacent to the occupied TV channels must have the out-of-band-emissions based on the adjacent channel leakage ratios (ACLRs) limits established for the WSD emission classes prescribed in Table 2 in compliance with the latest version of ETSI EN 301 598 standard, or successor directives<sup>4</sup>.

**Table 2 ACLR limits per classes of WSDs on the nth adjacent TV channel**

WSD out-of-band power falls within the nth adjacent TV channel (per 8 MHz channels)	ACLR (dB)				
	Class 1	Class 2	Class 3	Class 4	Class 5
n = ± 1	74	74	64	54	43
n = ± 2	79	74	74	64	53
n ≥ + 3 or n ≤ - 3	84	74	84	74	64

- (2) The WSD out-of-band power (EIRP) spectral density shall be measured in the first 100 kHz beyond the channel edge.
- (3) The WSD out-of-band power (EIRP) spectral density shall be less than or equal to the measured in-band transmit power spectral density over 8 MHz minus the ACLR (-84 dBm).
- (4) If a WSD use channel bonding technique to transmit on multiple contiguous TVWS channels as guided by the secondary GLSD; the ACLR limits in Table 2:
- do not apply within the bonded adjacent contiguous channels; but
  - do apply within the 8 MHz TV channel immediately adjacent below and above the edges of the bonded channels.

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

- (1) The communication between the secondary GLSD and the Master WSD must comply with the latest version of Protocol to Access White Space Databases (PAWS) as given in the Internet Engineering Task Force (IETF), RFC 7545<sup>5</sup>.
- (2) The Master WSD must initiate communication with the secondary GLSD.
- (3) The secondary GLSD must acknowledge the initial request from the Master WSD.
- (4) The Master WSD in registering with secondary GLSD must provide:
- information specifying that it is a Master device;
  - manufacturer's serial number of Master device;
  - the Type Approval identification designated by the Authority;
  - name, contact information and email address of the Master device owner;
  - name, contact information and email address of the Master device operator;
  - information specifying whether the Master device is Fixed or Nomadic;
  - its emission class in compliance with ETSI EN 301 598 standard, or successor directives, if applicable;
  - its antenna height above ground level (AGL) in metres, if applicable;
  - the geo-location of its antenna expressed in latitude and longitude coordinates;
  - the geo-location uncertainty (in metres) of its antenna corresponding to ninety five percent (95%) confidence level report to the secondary GLSD; and

<sup>4</sup> <http://www.etsi.org/technologies-clusters/technologies/regulation-legislation/red>

<sup>5</sup> <https://www.rfc-editor.org/rfc/pdf/rfc7545.txt.pdf>

- (k) Sufficient capacity for storing geo-location information and antenna height.
- (5) The secondary GLSD must validate the accuracy and authenticity of the information;
- (6) The secondary GLSD must decide on the registration of the Master WSD;
- (7) The Master WSD in requesting for the Operational Parameters from the secondary GLSD, must provide:
- (a) information specifying that it is a Master device;
  - (b) manufacturer's serial number of Master device;
  - (c) the Type Approval identification designated by the Authority
  - (d) information specifying whether the Master device is either Fixed or Nomadic;
  - (e) its emission class in compliance with ETSI EN 301 598 standard, or successor directives, if applicable;
  - (f) its antenna height AGL (in metres), if applicable;
  - (g) the geo-location of its antenna expressed in latitude and longitude coordinates;
  - (h) the geo-location uncertainty (in metres) of its antenna corresponding to a ninety five percent (95%) confidence level report to the secondary GLSD; and
  - (i) sufficient storage capacity for storing geo-location information and antenna height.
- (8) If requirements in sub-regulations 10(7) e and 10(7) f are not communicated to the secondary GLSD by the Master WSD, the secondary GLSD must use the default WSD technical parameter values set forth in Regulation 22.
- (9) The secondary GLSD upon receipt of the request from the Master WSD may provide Operational Parameters if requirements set forth in sub-regulations 10(7) to 10(8) have been met;
- (10) Upon receipt of the Operational Parameters the Master WSD must:
- (a) communicate periodically its usage of TVWS channel to that secondary GLSD;
  - (b) communicate periodically the usage of TVWS channel to that secondary GLSD on behalf of each of its associated Client WSDs; and
  - (c) communicate periodically with the secondary GLSD to confirm the validity of the Operational Parameters.
- 11 The secondary GLSD must instruct the Master WSD to end its operation when Operational Parameters are no longer valid.
- 12 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.
- 13 The Master WSD must perform network initialisation with the Client WSD using the TVWS channels obtained from the secondary GLSD.
- 14 The Client WSD must communicate the following information to the secondary GLSD through the Master WSD in requesting for Operational Parameters:
- (a) information specifying that it is a client device;
  - (b) manufacturer's serial number of its associated Master WSD;
  - (c) manufacturer's serial number of Client device;
  - (d) information specifying whether the Client device is Fixed or Nomadic;
  - (e) the Type Approval identification designated by the Authority;
  - (f) its emission class in compliance with ETSI EN 301 598 standard, or successor directives, if applicable;
  - (g) its antenna height AGL (in metres), if applicable;
  - (h) the geo-location of its antenna expressed in latitude and longitude coordinates, if applicable;
  - (i) the geo-location uncertainty (in metres) of its antenna corresponding to ninety five percent (95%) confidence level, if applicable; and

- (j) sufficient capacity for storing geo-location information and antenna height, if applicable.
- 15 The geo-location coordinates and location uncertainty of the Master WSD will be communicated to the secondary GLSD on behalf of an associated Client WSD that has no internal geo-location capability.
  - 16 the secondary GLSD must use the default WSD technical parameter values set-forth.
  - 17 The Master WSD must communicate Operational Parameters as determined by the secondary GLSD to the associated Client WSD
  - 18 Each Master WSD must communicate an instruction to all Client WSDs associated with that Master WSD to stop transmission, when Operational Parameters are no longer valid;
  - 19 When Operational Parameters are no longer valid, the Client WSD must stop transmission immediately.

#### **11 Requirements for Installers of White Space Devices**

- (1) A WSD network shall be installed by:
  - (a) an installer of wireless equipment in possession of a radio dealer certificate<sup>6</sup> or;
  - (b) by a professional radio technician, registered with the institute of Electrical engineers
- (2) The installer must not reconfigure or tamper with any technical operational features settings of the WSD.
- (3) The installer must ensure that characteristics of the WSD remain constant.
- (4) The installer must ensure that the WSD complies with type approval certificate.

#### **12 Antenna Requirements and Limits**

- (1) A WSD must at first power-on, and at any time after it has been relocated 100 m or more:
  - (a) store its geo-location coordinates;
  - (b) store its antenna height;
- (2) The maximum permitted transmit antenna height of a Master WSD must not exceed:
  - (a) 30 m AGL in the urban areas; and
  - (b) 80 m AGL in the rural areas.

#### **13 Frequency of GLSD Access**

- (1) A Fixed Master WSD must access the secondary GLSD once every twenty four (24) hours to verify that the Operational Parameters continue to remain valid.
- (2) A Nomadic Master WSD must access the secondary GLSD once every twelve (12) hours to verify that the Operational Parameters continue to remain valid
- (3) Master WSD must access the secondary GLSD to report its new geo-location coordinates if it has been relocated 100 m or more.
- (4) Master WSD must access the secondary GLSD to report new geo-location coordinates on behalf of its associated Client WSDs if they have been relocated 100 m or more.
- (5) The Master WSD must communicate Operational Parameters as determined by the secondary GLSD to the associated Client WSD at least once every 60 seconds, except when in sleep mode.

#### **14 Continuous Operations**

- (1) The Master WSD may continue to operate up to forty eight (48) hours after the last secondary GLSD access where after it must cease its operation.

<sup>6</sup> Radio-Frequency-Spectrum-Regulations-2015, Government Gazette 38754 (Notice 386 of 2015) as amended.

- (2) The Master WSD must re-establish contact with the secondary GLSD and verifies its Operational Parameters and that of its associated Client WSD.
- (3) The Client WSD must cease operation within ten (10) seconds if it does not receive a contact verification signal from the associated Master WSD after sixty (60) seconds of last contact;
- (4) If not in sleep mode, the Client WSD must re-establish a contact with the associated Master WSD within nine hundred (900) seconds of last contact;
- (5) The Client WSD must then receive the Operational Parameters from the associated Master WSD as determined by the secondary GLSD.

#### **15 Geo-location Spectrum Database Security Mechanisms**

- (1) Communications security must be instituted to protect GLSDs from unauthorised data input and modification.
- (2) Authentication procedures must be instituted to ensure that GLSDs are protected from unauthorised alteration of stored data.
- (3) Communications between secondary GLSD and WSDs must be secured to prevent unauthorized parties from accessing or modifying information during transmission.
- (4) Communications between reference GLSD and secondary GLSDs must be secured to prevent unauthorized parties from accessing or modifying information during transmission.
- (5) Communications among secondary GLSDs must be secured to prevent unauthorized parties from accessing or modifying information during transmission.
- (6) Communications between Master WSDs and Client WSDs must be secured to prevent unauthorized parties from accessing or modifying information during transmission.
- (7) GLSDs must incorporate sufficient security measures to prevent the unauthorised WSDs from accessing GLSDs.
- (8) A Master WSD must only obtain Operational Parameters from a secondary GLSD authorised by the Authority for the purpose.

#### **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 technical information about incumbent licensees to be protected;
  - (b) implement propagation algorithms and interference parameters issued by Authority to calculate a country-wide map of baseline Operating Parameters for WSDs.
  - (c) utilise the maps 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 secondary GLSD and Master WSDs are accurate and secured;
- (f) ensure that unauthorised 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, incorrect data, and perform system audit in the event that the Authority or a party brings a claim of inaccuracies in the secondary GLSD to its attention;
- (h) have functionality such that upon request from the Authority be able to indicate that no TVWS channels are available when queried by WSDs;
- (i) synchronise with other secondary GLSD operators designated by the Authority in every twelve (12) hours to share the lists of TVWS channels it have provided to WSDs, and in every twenty four (24) hours to share the list of protected incumbents;
- (j) not provide service to Master WSD until it receives a confirming response from the provided contact person verifying their information, if the registration record has been modified the secondary GLSD operator must verify the new information before continuing to provide service to the Master WSD;
- (k) not discriminate between WSDs in providing the minimum information levels; and
- (l) may provide additional information to certain classes of devices.

#### Service fees

- (4) A secondary GLSD operator may charge a service fee to the TVWS network operators for:
  - (a) registration of WSDs;
  - (b) the provision of Operational Parameters to Master WSDs;
  - (c) the provision of Operational Parameters to Client WSDs via Master WSDs; and
  - (d) the provision of Operational Parameters on a per-request basis, or for a certain time-period.

### 17 Display of Available Channels

A Master WSD must incorporate the capability to store and display a list of TVWS channels given to it by the secondary GLSD including the channels selected for use;

### 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 immediately discontinued.

## 20 Compliance with Radio Frequency Exposure Requirements

A Master WSD must be accompanied by instructions for protecting human body from possible exposure to electromagnetic fields when the device is in active operation, this instruction shall be displayed in all formats of user manual detailing exposure limits expressed in terms of Specific Absorption Rate (SAR) in accordance with the latest version of the International Commission on Non-Ionising Radiation Protection (ICNIRP) guidelines<sup>7</sup>.

## 21 Protection of Radio Astronomy Service

- (1) The secondary GLSD is prohibited to provide radio frequency sub band 606 MHz to 614 MHz as available for use by WSDs in compliance with protection thresholds prescribed in ITU recommendation 769<sup>8</sup> as amended.
- (2) WSDs are country-wide prohibited to operate in radio frequency sub band 606 MHz to 614 MHz which is allocated for Radio Astronomy Service (RAS).
- (3) WSDs are prohibited to operate within the demarcated polygons in the Karoo Astronomy Advantage Areas (KAAAs) 1, 2 and 3 in compliance with the Astronomy Geographic Advantage Act (AGA Act No. 21 of 2007).

## 22 Default Values for WSD Technical Parameters

- (1) The default antenna height of a Fixed Master WSD must be recorded by the secondary GLSD as 20 m AGL, unless the WSD notifies the secondary GLSD otherwise.
  - (2) The default antenna height of a Fixed Client WSD must be recorded by the secondary GLSD as 5 m AGL, unless the WSD notifies the secondary GLSD otherwise.
  - (3) The default antenna height of Nomadic WSDs must be recorded by the secondary GLSD as 1.5 m AGL, unless the Nomadic WSD notifies the secondary GLSD otherwise.
  - (4) The default emission class of all WSDs must be recorded by the secondary GLSD as emission class five (5); in compliance with ETSI EN 301 598 standard, or successor directives, unless the WSD notifies the secondary GLSD otherwise.

## 23 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.

## 24 Offences, Contraventions and Penalties

- (1) Any person that contravenes regulation 4 of these Regulations commits an offence and is subject, on conviction, to:

<sup>7</sup> <http://www.icnirp.org/cms/upload/publications/ICNIRPStatementEMF.pdf>

<sup>8</sup> <https://www.itu.int/rec/R-REC-RA.769-2-200305-I/en>

- (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 one year.

**25 Short Title**

These regulations are called “Regulations on the use of Television White Spaces, 2018”

**26 Commencement**

These regulations shall come into force on a date determined by the Authority by notice in the Government Gazette.