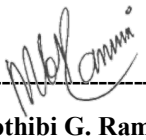
INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

NO. 6066 **28 March 2025**

DRAFT REGULATIONS ON DYNAMIC SPECTRUM ACCESS AND OPPORTUNISTIC SPECTRUM MANAGEMENT IN THE INNOVATION SPECTRUM 3800 - 4200 MHz AND 5925 – 6425 MHz

1. The Independent Communications Authority of South Africa ("ICASA / 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 publishes the Draft Regulations on the Dynamic Spectrum Access and Opportunistic Spectrum Management in the Innovation Spectrum Frequency Ranges 3800 - 4200 MHz and 5925 – 6425 MHz.
2. The Authority in the process of building a database of systems operating in the frequency sub-bands 3 800 to 4 200 MHz and 5 925 to 6 425 MHz with the key focus of ensuring the protection of Primary Radiocommunications Services, engaged on the following:
   2.1 The Authority on 26 March 2024, in Government Gazette Number 48352 (Notice 3242), published the Findings document and Position paper on Implementation of Dynamic Spectrum Access and Opportunistic Spectrum Management.
   2.2 The Authority, on 21 June 2024, in Government Gazette 50850 (Notice 2593 of 2024) conducted a process of building a database of systems operating in the frequency sub-bands 3 800 to 4 200 MHz and 5 295 to 6 425 MHz.
   2.3 Further, Authority, on 12 June 2024, in Government Gazette 50924 (Notice 5028 of 2024), requested further information regarding systems operating in the frequency bands 3800 to 4200 MHz and 5925 to 6425 MHz in order to supplement data received by the closing date.
   2.4 Furthermore, the Authority, accordingly, invited and engaged Interested Stakeholders for an hour-long one-on-one meeting for discussions to address foreseen issues and clarification on matters at hand.
3. Pursuant to the Radio Frequency Spectrum Regulations 2015, the Authority enabled Trials and Experiments to be conducted in terms of Regulation 40, that is, “Licences for Trials, Experimentation and Demonstration of Systems”.
4. Further, the Authority performed sample simulations in Urban and urban areas making using the current database available.

5. The summary results of the simulations form a baseline for the development of the Draft Regulations on the Dynamic Spectrum Access and Opportunistic Spectrum Management in the Innovation Spectrum Frequency Ranges.
6. These draft Regulations govern the authorization of electronic communications equipment to opportunistically access radio frequency (RF) spectrum within the 3800–4200 MHz and 5925–6425 MHz sub-bands, collectively referred to as the "Innovation Spectrum".
7. Access to the Innovation Spectrum is granted on a geographical basis, utilizing the Dynamic Spectrum Assignment and Opportunistic Spectrum Management approach.
8. Interested persons and parties are hereby invited to submit written representations, on the Draft Regulations on the Dynamic Spectrum Access and Opportunistic Spectrum Management in the Innovation Spectrum Frequency Ranges.
9. The written representations must be submitted to the Authority no later than 16h00 on 30 May 2025 by email (in Microsoft Word and PDF) or hand delivery and marked specifically for attention: Ms Pumla Ntshalintshali
   Delivery Address: 350 Witch-Hazel Road, Eco-Park; Centurion
   Email: DSA2023@icasa.org.za
   Copy: PNtshalintshali@icasa.org.za and rmakgotlho@icasa.org.za
10. Enquiries should be directed to Ms Pumla Ntshalintshali at 0125684005 between 10h00 and 16h00, Monday to Friday.
11. All written representations submitted to the Authority pursuant to this notice shall be made available for inspection by interested persons from XX May 2025 at the ICASA Library or website and copies of such representations and documents will be obtainable on payment of a fee.
12. Where persons making written representations require that their representation or part thereof be treated as confidential, 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 discussion document and plan. All confidential material must be pasted onto a separate annexure which is clearly marked as "Confidential". If, however, the request for confidentiality is not granted, the person making the request can elect to withdraw the representation or document in question.
13. The guidelines for confidentiality request are contained in Government Gazette Number 41839 (Notice 849 of 2018).



Mothibi G. Ramusi
ICASA Chairperson
Date: 26/03/2025

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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;

"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;

"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);

"C Band" means a segment of the radiofrequency (RF) spectrum within the range of 4000 MHz to 8000 MHz;

"**Client device**" means an ISD certified by the Authority to operate without an exclusive license in ISFR1 and ISFR2. It is not authorized to communicate with the USS to request operational parameters for itself but may receive such parameters from an associated Master device;

"Communication Protocol to Access Unified Spectrum Switch (CPAUSS)" means a secure machine-to-machine communication standard defined by the Council for Scientific and Industrial Research (CSIR), designed for ISDs to automatically access USS services;

"Contiguous channels" means a minimum of two (2) non-interleaved channels that the USS can assign to a certified Master device in the same location within the ISFR1 and ISFR2;

"Contiguous License Area (ConLA)" means a combined geographical area formed by a minimum of two (2) and a maximum of three (3) overlapping Minimum License Areas (MinLAs) of which a single network operator may be authorized by the Authority to provide network coverage within the ISFR1;

"Database Proxy (DbP)" means an entity engaging in communications with the Unified Spectrum Switch (USS) as an intermediary on behalf of a single or multiple ISDs or networks of ISDs. The

Database Proxy can also provide a translational capability to interface legacy radio equipment in the Innovation Spectrum Frequency Ranges 1 and 2 (ISFR 1&2) with a USS to ensure compliance with these regulations;

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

"Dedicated antenna" means a removable antenna that has been designed for use and supplied with the device;

"Dynamic Spectrum Assignment (DSA)" 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 it does not cause harmful interference with the primary user or licensee;

"End User Equipment (EUE)" means a fixed, nomadic, or mobile wireless device certified by the Authority to operate without an exclusive license within ISFR 1 & 2, with the capability of communicating with an associated Master device;

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

"EIRP Spectral density" means the EIRP in dBm over a desired frequency bandwidth;

"ETSI" is an acronym for the European Telecommunications Standards Institute;

"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 device" means ISD that has an integral antenna, a dedicated antenna, or an external antenna and is intended to operate in a fixed location only;

"Function Virtualized Device (FVD)" means an ISD where key functions like signal processing and network management are implemented through software, allowing them to run on standard computing hardware instead of dedicated, specialized hardware;

Frequency - Agile Device" means a radio equipment capable of being tuned across the entire width of the ISFR1 or ISFR2 sub-bands;

"Geo-location capability" means the capability of an ISD to determine and report the latitude, longitude, and altitude coordinates of its antenna and its geo-location uncertainty;

"Geo-location uncertainty" means the potential positioning error in latitude and longitude defined by the maximum difference (in meters) between the point reported by the ISDs to the USS and the actual position of the ISD antenna;

"ICASA-ID" means a unique identifier assigned by the Authority to a specific ISD model upon receiving Type Approval certification in accordance with the Type Approval Regulations of 2013. This identifier must appear in the Authority's Equipment Authorisation Register (EAR);

"Innovation Spectrum (IS)" means the unused radiofrequencies (RF) within the 3800 MHz to 4200 MHz, and 5925 MHz to 6425 MHz sub-bands;

“Innovation Spectrum Customer’s Premises Equipment Category 1 (IS-CPE Cat 1)” means a client device equipped with geo-location capability, permanently affixed to a structure certified by the Authority, and authorized to operate without an exclusive license in ISFR 1. This device is capable of communicating with an associated Master device;

“Innovation Spectrum Customer’s Premises Equipment Category 2 (IS-CPE Cat 2)” means a client device equipped with geo-location capability, permanently affixed to a structure certified by the Authority, and authorized to operate without an exclusive license in ISFR 2. This device is capable of obtaining Operational Parameters (OPs) from the Unified Spectrum Switch (USS) and communicating with an associated Master device;

"Innovation Spectrum Device (ISD)" means a wireless device authorized to operate within the ISFR 1 & 2 without an exclusive license;

"Innovation Spectrum Frequency Range 1 (ISFR 1)" means the unused radiofrequencies (RF) within the 3800 MHz to 4200 MHz sub-band;

"Innovation Spectrum Frequency Range 2 (ISFR 2)" means the unused radiofrequencies (RF) within the 5925 MHz to 6425 MHz sub-band;

"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;

"Interference" means the undesired impact of energy from the summation of emissions, radiation, or induction generated by a radiocommunication system, causing degradation, misinterpretation, or loss of information in the reception of another system that would not occur without such energy;

"Licence" means a radio frequency spectrum licence;

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

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"MaxEIRP" means the base station’s maximum mean EIRP per carrier;

"Maximum Contiguous License Area (MaxConLA)" refers to a combination of three (3) contiguous Minimum License Areas (MinLAs). It represents the maximum geographical area within the ISFR1 for which a single network operator is authorized by the Authority to provide network coverage;

"MHz" means a radiofrequency value designated in megahertz;

"Minimum License Area (MinLA)" means a geographical area under network coverage by a single authorized IS-BTS within the ISFR 1;

"Mobile device" means an ISD that has an integral antenna, or a dedicated antenna intended to operate continuously with full mobility within a coverage area;

"National Radio Frequency Plan" means a plan that allocates the radiofrequency (RF) spectrum to wireless 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;

"Network Operator" means a person issued with an Electronic Communications Network Service licence in terms of section 5 of the Act or is licence exempt in terms of section 6 of the Act.

"Nomadic equipment" means an ISD 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 USS in response to a request made by the Master device as set-forth in Regulation 8;

"Out-of-band emissions" means the unwanted emissions that fall outside the ISFR 1 & 2;

"Out-of-block emissions" means emissions that occur outside the assigned frequency block or channel bandwidth allocated to a device or system but still within the broader frequency band;

"Primary basis" means a primary service has priority over all other users of a spectrum band of interest in the National Radio Frequency Plan (NRFP) and is entitled to protection from harmful interference by other services;

"Primary service" means the service to which a specific band in the NRFP is licensed;

"**Professional Installer**" means any competent person or entity registered with the professional body or have a relevant technical qualification from an accredited technical education institution to install and commission radio equipment;

"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);

"Registered Incumbents" means Fixed Satellite Services (FSS) and Fixed Service (FS) operators within the 3800–4200 MHz and 5925–6425 MHz sub-bands whose technical details are registered with the Authority to ensure protection from potential harmful interference caused by secondary users;

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

"S Band" means a segment of the radio frequency (RF) spectrum within the range of 2000 MHz to 4000 MHz;

"Secondary user" means a secondary radiocommunications service allocated for use in a specific band in the NRFP 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;

"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;

"Innovation Spectrum Access Point (IS-AP)" means a Master device with geo-location capability that operates without an exclusive license in the ISFR 2 by obtaining operational parameters from the USS;

"Standard-Power Devices (SPDs)" means an umbrella term that collectively describes ISDs, which are authorized to operate with an increased power levels outdoors and indoors within the ISFR 2;

"Time validity" means the time period during which Operational Parameters (OPs) provided by the USS to a Master ISD are in force;

"Total Radiated Power (TRP)" means the total radiated power measured in all directions of the transmitting antenna;

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

"Type Approval dataset" means a dataset containing unique Type Approval identifiers (ICASA-IDs) of specific ISD models as listed in the Authority's EAR. This dataset is under the sole custodianship of the Authority and is used by the USS to calculate ISD operational parameters;

"Unified Spectrum Switch (USS)" means a database system operated by an entity that has been authorized by the Authority to calculate and generate Operational Parameters for ISDs and to provide spectrum switch services to network operators within the ISFR 1 & 2;

"Unified Spectrum Switch Provider (USSP)" means an entity delegated or designated by the Authority to provide USS services;

"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 aerial photographs or other information;

"USS services" include the registration of primary users, IS network operators, the registration of ISDs, and the provision of operational parameters in response to spectrum requests from ISDs.

2. Objective

The objective of the regulations is to:

(a) expand broadband access to the rural, underserved, remote communities;

(b) reduce barriers to entry and promoting equitable access to spectrum, while encouraging broader participation from non-dominant players, small micro and

medium enterprises and communities consistent with the Next-Generation Radio Frequency Spectrum for Economic Development policy1;

(c) foster innovation in network deployment use cases, applications, and services;

(d) promote socio-economic development;

(e) establish a technology-agnostic regulatory framework through which the Authority may authorise the implementation of DSA approach for use of innovation spectrum on a geographical basis;

(f) encourage spectrum sharing in a dynamic and opportunistic manner; and

(g) establish a non-market-based, non-competitive pricing framework to reduce barriers to entry and encourage participation by non-dominant players, SMMEs, and community network operators.

3. Purpose

The purpose of the regulations is to:

(a) facilitate the use of innovation spectrum by a secondary user; and

(b) mitigate against harmful interference between the incumbents and the secondary user in the innovation spectrum.

4. Access to IS Requirements

(1) The applicable radio frequency channel widths under these regulations are as follows:

(a) Innovation Spectrum Frequency Range 1 (ISFR 1): 10 MHz, 20 MHz, 30 MHz, and 40 MHz; and

(b) ISFR 2: 20 MHz, 40 MHz, 80 MHz, and 160 MHz.

(2) Network operators seeking to utilise the Innovation Spectrum must obtain the necessary licensing/or exemptions from the Authority.

(3) An ISD intended for use in the Innovation Spectrum must be type approved/authorised by the Authority.

(4) Electronic communications equipment deployed by the Network Operator must operate in the IS on a secondary basis and must not cause harmful interference to incumbent users.

[1] https://www.gov.za/sites/default/files/gcis_document/202407/50725proc166.pdf

(5) A Secondary User is permitted to operate in the Innovation Spectrum exclusively through the USS.

5. Innovation Spectrum Devices

(1) An ISD must be:

(a) A Frequency agile device capable to transmit or receive in the ISFR1 or ISFR 2;
(b) fixed device, nomadic device, mobile device, or function virtualized device (FVD); and
(c) master or client device.

(2) The Categories of ISDs:

(a) A Master ISD must be:
(i) a fixed device or FVD with a dedicated, integral or external antenna and internal Geo-Location capability and Internet access;
(ii) able to directly or through a database proxy (DbP) communicate with the USS) to request OPs for itself and on behalf of its associated client devices; and
(iii) able to transmit and receive within the ISFR1 and ISFR 2 under specific OP limitations.

(b) Types of Client ISD are:
(i) a fixed device, nomadic device, mobile device, or FVD with a dedicated, integral, or external antenna and with or without geo-location capability that does not have direct access to the USS; or
(ii) an innovation spectrum customer's premises equipment category 2 (IS-CPE Cat 2) with geo-location capability and can directly or through a DbP communicate with the USS.

(c) The Client ISD must be:
(i) able to obtain OPs from an associated Master device or through a DbP for use by one (or all) Client device(s) within a IS network served by that Master device; and
(ii) able to transmit and receive only when under the direction of a Master device, and only within the ISFR1 and ISFR 2 under specific OP limitations.

6. Registration of Network Operator and Spectrum Authorisation

(1) A Network Operator seeking to roll-out a network utilizing IS must submit an application to be registered with the USSP.

(2) The USSP shall provide a secure online form on the portal to facilitate registration of new applicants.

(3) During the application stage, a network Operator must submit on the online form of the USSP portal the:

(a) name of the company/operator;
(b) physical address of the operator's offices;
(c) name of the operator's contact person;
(d) email address of the contact person;
(e) landline telephone and cell phone numbers of the contact person;
(f) copy of ECNS and ECS licenses/or license exemption issued by the Authority;
(g) copy of the company registration certificate;
(h) type approval details of the specific ISD model to be used for network deployment;
(i) radio access technology (RAT) of the ISD to be deployed;
(j) geographical areas with location coordinates indicating where the IS-BTS shall be deployed;
(k) proof of payment of the USS access fees to the USSP; and
(l) any other information that may be requested by the Authority.

(4) Upon receipt of the application in terms of sub-regulation (3) the USSP shall:

(a) authenticate model of the ISDs by confirming that the provided information about the Type Approval and owner contact matches details in the Authority's equipment authorisation register (EAR).
(b) verify the information submitted by the applicant, register the applicant, notify the applicant of the application outcome via email, and create an account for the applicant on the USSP portal.
(c) inform the applicant of the preliminary availability of the requested spectrum in the specified geographical area(s) of interest prior to network roll-out by issuing a digital spectrum availability certificate, valid for seven (7) working days.

(5) Upon receipt of information in sub-regulation 4(c), the Network Operator must submit the preliminary spectrum availability digital certificate obtained from the USSP and pay the

required spectrum fees, as published in a government gazette, to the Authority or obtain an exemption within 2 working days:

(a) for ISFR1, the applicant shall provide the USS provider with proof of payment or exemption of the spectrum license fees to be obtained from the Authority; and
(b) for ISFR2, the applicant is not required to pay spectrum license fees. consistent with the applicable radio regulations developed by the Authority.

(6) Upon receipt of information in terms of sub-regulation (5), the USSP shall activate the applicant's account on the USS platform enabling:

(a) registration of operator ISDs,
(b) commencement of network roll-out; and
(c) ISDs to access the USS to request for Operational Parameters (OPs).

7. USS Access Requirements for Innovation Spectrum Devices

(1) All communications between the USS and the following devices must comply with the latest version of the communication protocol for accessing the USS (CPAUSS):

(a) The Master device,
(b) IS-CPE Category 2 (IS-CPE Cat 2), and
(c) Database Proxy (DbP).

(2) The Master device, IS-CPE Cat 2 and DbP must initiate communication with the USS.

(3) Upon receipt of the initial request in terms of sub-regulation (2), the USS shall acknowledge the initial request from the Master device, IS-CPE Cat 2 and DbP.

(4) The Master device, IS-CPE Cat 2 or DbP in registering with USS must provide:

(a) information specifying that it is a Master device or IS-CPE Cat 2;
(b) its manufacturer's serial number;
(c) its ICASA-ID;
(d) name, contact information and email address of the device owner;
(e) name, contact information and email address of the device operator;
(f) its antenna height above ground level (AGL) in metres, if applicable;
(g) its antenna azimuth;
(h) its antenna directivity;

(i) the geo-location of its antenna expressed in latitude and longitude coordinates;
(j) the geo-location uncertainty (in metres) of its antenna corresponding to ninety five percent (95%) confidence level report to the USS; and
(k) adequate storage to maintain geo-location information, antenna specifications, and OPs received from the USS.

(5) When registering with the USS, in terms of sub-regulation (4), through the DbP, the DbP must provide the information in sub-regulation (4)(a) to (k) on behalf of its associated ISDs.

(6) Upon receipt of information in terms of sub-regulation (5), the USS shall:

(a) validate the accuracy and authenticity of the information; and
(b) decide on the registration of the Master device and IS-CPE Cat 2.

(7) The Master device, IS-CPE Cat 2 or DbP in requesting for the Ops from the USS, must provide:

(a) information specifying that it is a Master device or IS-CPE Cat 2;
(b) its manufacturer's serial number;
(c) its ICASA-ID;
(d) its antenna height AGL (in metres), if applicable;
(e) its antenna azimuth;
(f) its antenna directivity;
(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 USS; and
(i) adequate storage to maintain geo-location information, antenna specifications, and OPs received from the USS.

(8) If the request in terms of sub-regulation (7) is through DbP, the DbP must provide the required information in sub-regulation (7)(a) to (i) on behalf of its associated ISDs.

(9) If requirements in sub-regulation (7)(d) are not communicated to the USS by the Master device, IS-CPE Cat 2 or DbP, the USS shall use the default technical parameter values set-forth in regulation 14.

(10) The USS, upon receipt of the request from the Master device, IS-CPE Cat 2, or DbP may provide OPs if requirements set forth in sub-regulations (1) to (9) have been met.

(11) Upon receipt of the OPs the Master device, IS-CPE Cat 2 or DbP must:

(a) communicate periodically with USS, its usage of IS channel(s);
(b) communicate periodically with USS, the usage of IS channel(s) on behalf of each of its associated clients; and
(c) communicate periodically with the USS to confirm the validity of the OPs.

(12) Upon receipt of OPs from the USS, through the DbP, the DbP must provide the required information in sub-regulations (11)(a) to (c) on behalf of its associated ISDs.

(13) When the OPs are no longer valid, the USS shall instruct the Master device, IS-CPE Cat 2 or DbP to cease transmission.

(14) When OPs are no longer valid:
(a) a master device must communicate an instruction to all its associated client devices to stop transmission;
(b) a master device must cease transmission;
(c) an IS-CPE Cat 2 must cease transmission; and
(d) if DbP, it must inform all its associated ISDs to cease transmission.
(e) a Master device must perform network initialisation with its associated Client devices using the IS channels obtained from the USS.

(15) In requesting OPs, the Client devices must communicate the following information to the USS through the Master device or DbP:

(a) information specifying that it is a client device;
(b) manufacturer's serial number of its associated Master device;
(c) its manufacturer's serial number;
(d) its antenna height AGL (in metres), if applicable;
(e) the geo-location of its antenna expressed in latitude and longitude coordinates, if applicable; and
(f) the geo-location uncertainty (in metres) of its antenna corresponding to ninety five percent (95%) confidence level, if applicable.

(16) If requirements in sub-regulation (15)(d) are not communicated, the USS shall use the default technical parameter values found in regulation 14.

(17) Each Master ISD must communicate an instruction to all its associated Client device to cease transmission when OPs are no longer valid.

(18) When OPs are no longer valid all ISDs must cease transmission immediately.

(19) The geo-location coordinates and location uncertainty of the Master device must be communicated to the USS on behalf of its associated Client device that has no internal geo-location capability.

8. Innovation Spectrum Operational Parameters

IS operational parameters (OPs) shall include:

(a) The lower and upper boundaries of each channel within the ISFR 1 and 2 within which an ISD may transmit and receive;
(b) The maximum permitted EIRP (MaxEIRP) for each corresponding channel within which a ISD may transmit;
(c) The time period during which the OPs are valid if less than that set-forth under Regulation 15;
(d) The geographic area within which the OPs are valid; and
(e) The duration (in seconds) within which a Master device and IS-CPE Cat 2 must regularly check with a USS that the OPs received are still valid.

9. Channel Assignment per License Area

(1) The minimum license area (MinLA) for which the USS may assign available channels in ISFR 1 shall consist of a single Master device.
(2) A single Master device operating in ISFR 1 shall be assigned a minimum of one 10 MHz channel per license area.
(3) The USS may assign to a single Master device operating in ISFR 1 a maximum of two (2) contiguous 10 MHz channels in urban license areas and maximum of four (4) contiguous 10 MHz channels in rural license areas.
(4) The USS shall assign the same channels in ISFR 1 to different Master devices belonging to the same network operator, provided that the operator has a contiguous license area (ConLA).
(5) The maximum contiguous license area (MaxConLA) for which the USS may assign the same channels in ISFR 1 to different Master devices belonging to the same network operator is limited to three (3) areas.

(6) The conditions in sub-regulations (1) to (4) above, do not apply to ISDs operating in ISFR 2, as they are license-exempt.

10. Maximum Permitted Transmit Power Levels of ISDs

(1) The permitted transmit power levels of ISDs per channel may vary depending on location-specific factors including:

(a) terrain and clutter;

(b) frequency offsets;

(c) antenna elevation angles;

(d) ISD deployment situation;

(e) ISD density; and

(f) out-of-band emission limits.

(2) The maximum permitted transmit power levels specified in ISFR 1 are:

Maximum permitted ISD transmit power levels in ISFR 1

ISD Deployment Area	Max Permitted Antenna Height AGL	Max Permitted Transmit Power
Urban outdoor	20 m	27 dBm/20 MHz EIRP per carrier
Rural outdoor	30 m	47 dBm/40 MHz EIRP per carrier
Indoor	10 m	28 dBm TRP

(3) The maximum permitted ISD transmit power levels in ISFR 2 are:

Maximum permitted ISD transmit power level in ISFR 2

ISD Deployment Area	Max Permitted Antenna Height AGL	Max Permitted Transmit Power
Urban outdoor	20 m	30 dBm
Rural outdoor	30 m	36 dBm

(4) An ISD must reduce its transmit power levels per channel below the thresholds specified in sub-regulations (2) and (3), if so required by the USS, to ensure adherence to the protection thresholds of incumbent users.

(5) For ISDs operating indoors, an additional 14 dB in-building penetration loss2 for calculating transmit power levels is applicable.

11. Measures to Prevent Harmful Interference

(1) Any incumbent user operating in the IS seeking protection from harmful interference must register with the Authority.

(2) When registering in terms of sub-regulation (1), the incumbent user must submit accurate and up-to-date technical details of their facility to the Authority's online portal, including the following:

(a) company name;
(b) company physical address;
(c) name of the contact person;
(d) landline telephone/cellphone numbers of the contact person;
(e) site Name/call sign;
(f) service type;
(g) technology;
(h) location coordinates (longitude, latitude) in decimal degrees;
(i) antenna polarization;
(j) antenna elevation angle in degrees;
(k) azimuth;
(l) directivity;
(m) antenna heigh above ground level (AGL) in meters;
(n) transmit and receiving frequencies in MHz;
(o) transmit and receiving antenna gains dBi;
(p) satellite transmit power;
(q) satellite position;
(r) dish size;
(s) antenna sensitivity; and
(t) Any other information requested by the Authority.

(3) An ISD must be installed by a professional installer and must:

(a) not alter or interfere with the ISD's technical or operational settings;
(b) maintain the ISD's original characteristics without modification; and
(c) ensure the ISD aligns with the specifications outlined in its type approval certificate.

[2] https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-P.2346-3-2019-PDF-E.pdf

(4) The USSP shall calculate and assign OPs to ISDs to ensure a low probability of harmful interference to incumbent users in compliance with:

(a) the Astronomy Geographic Advantage (AGA) Act 21 of 2007 as amended;

(b) the National Radio Frequency Plan 2021, as amended;

(c) the applicable International Telecommunication Union (ITU) recommendations; and

(d) applicable intergovernmental bilateral cross-border harmonization agreements.

(5) When calculating OPs, the USS shall:

(a) utilise the radio propagation model, terrain dataset and clutter dataset set-forth under Regulation 15;

(b) ensure long-term protection of FSS receivers in ISFR 1;

(c) adhere to the protection criterion of I/N = -10.5 dB, not to be exceeded for 20% of the time, where I is the ISD interference power level and N is the FSS receiver's noise;

(d) include all FSS recovers within a predetermined coordination distance;

(e) only consider the cases where center-to-center frequency offset between the ISD and FSS receiver is less than 2.5 times the bandwidth;

(f) exclude all FSS receivers with larger frequency offsets;

(g) ensure long-term protection of FS receivers in ISFR 1, not to be exceeded for 20% of the time;

(h) adhere to the protection criterion of a ratio between the FS receiver's sensitivity threshold3 to ISD interference power level;

(i) include all FS receivers within a predetermined coordination distance;

(j) only consider the cases where the center-to-center frequency offset between the ISD and FS receiver is less than 2.5 times the bandwidth;

(k) exclude all FS receivers with larger frequency offsets;

(l) ensure the ISD’s out-of-block power spectral density does not exceed the limits specified in Table 3, consistence with CEPT Report 08;

(m) ensure long-term protection of FS receivers in ISFR 2 not to be exceeded for 20% of the time;

(n) adhere to the protection criterion of I/N = -6 dB, where I is the ISD interference power level and N is the FS receiver's noise;

(o) include all FS recovers within a predetermined coordination distance;

(p) only consider the cases where center-to-center frequency offset between the ISD and FSS receiver is less than 2.5 times the bandwidth;
(q) exclude all FSS receivers with larger frequency offsets; and
(r) ensure the ISD's out-of-block power spectral density does not exceed the specified limits.

(6) The ISD's must ensure out-of-block power spectral density does not exceed the following limits:

Out-of-block emission limits

Frequency offset (df)	**Mean EIRP Spectral Density**
-5 to 0 MHz df^{4}_{L}, df^{5}_{U} 0 to 5 MHz	(MaxEIRP – 42 dBm)/5 MHz
-10 to-5 MHz df_{L}, df_{U} 5 to 10 MHz	(MaxEIRP – 45 dBm)/5 MHz
<-10 MHz dfL, df_{U} 10 MHz	(MaxEIRP – 45 dBm)/5 MHz

(7) The USS shall calculate OPs to coordinate operations among ISD networks to minimize the risk of harmful interference caused by Master devices to IS receivers by:

(a) applying a protection threshold of -88 dBm/20 MHz and;
(b) assuming a receiving antenna height of 1.5 meters.

(8) The USS shall protect services operating above 4200 MHz by:

(a) enforcing a 5 MHz guard band below 4200 MHz; and
(b) ensuring the ISD out-of-band power spectral density does not exceed the limits specified in sub-regulation (10).

(9) The USS shall protect services operating below 3800 MHz by:

(a) enforcing a 5 MHz guard band above 3800 MHz; and
(b) ensuring the ISD out-of-band spectral density does not exceed the limits specified in sub-regulation (10):

(10) The maximum out-of-band density is the following:

Out-of-band emission limits

Lower and Upper Band Edges of the ISFR1	Mean EIRP Spectral Density
3795 -3800 MHz	(MaxEIRP – 42 dBm)/5 MHz
4200-4205 MHz	(MaxEIRP – 42 dBm)/5 MHz

(11) The USS shall assign to ISDs only those channels that are adjacent to the frequencies occupied by incumbent users operating in the same geographical area.

(12) Geo-location coordinates and geo-location uncertainty of Master device antenna and IS-CPE Cat 2 antenna must be determined automatically:

(a) using ISD internal geo-location capability prior to its initialisation with the USS 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.

(13) If the Master device or IS-CPE Cat 2 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 device.

(14) Only Master device or IS-CPE Cat 2 is permitted to communicate with the USS directly or through a DbP for purposes of:

(a) Initialisation;
(b) registration;
(c) in requesting for OPs for itself; and
(d) on behalf of Client devices associated to it.

(15) Operations of ISDs are permitted only on channels and at power levels that are determined by USS as being available for each ISD in a particular location.

(16) If the USS 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.

(17) During operation, the Master device or IS-CPE Category 2 (IS-CPE Cat 2) must automatically query the USS and report its spectrum usage at least once every 24 hours.

(18) If the Master device or IS-CPE Cat 2 fails to notify the USS for seven (7) consecutive calendar days:

(a) it must cease operation immediately;

(b) within 60 seconds, it must provide to the USS its location information, ICASA-ID, antenna height and confirm spectrum use;

(c) failure of which, the USS may reassign the spectrum to another operator.

12. Interference Mitigation Protocol

(1) Affected incumbent users operating in the IS must report any incident of harmful interference on their network to the Authority for further investigation. Such report must be submitted only after confirming that the conditions outlined under Regulation 11(1) and (2) have been met.

(2) Upon identification of harmful interference, the USSP shall immediately suspend spectrum assignments to all ISDs associated with the operator found to be causing the interference.

(3) Any ISD found to be causing harmful interference to incumbent users must cease transmission within 60 seconds of receiving an instruction from the USS.

(4) Affected ISDs shall resume operation only after the Authority has completed its investigation and resolved the interference issue.

(5) The suspension shall remain in effect until the harmful interference is resolved.

(6) The incumbent user shall bear sole responsibility for resolving interference incidents if the conditions specified under regulation 11(1) and (2) have not been met.

13. Responsibilities of the Designated Unified Spectrum Switch Provider

(1) The Authority shall designate a USSP to provide USS services.

(2) The designated USSP(s) shall:

(a) maintain a secure database containing information about incumbent licensees requiring protection;

(b) establish a secure process for registering new IS network operators;

(c) establish a secure process for synchronizing and acquiring necessary technical information from the Authority's systems at least once a week, including updates on newly licensed facilities or changes to existing licensed facilities;

(d) implement propagation algorithms and interference parameters prescribed by the Authority to calculate and provide accurate OPs to ISDs;

(e) establish protocols and procedures to ensure that all communications and interactions between the USS, ISDs, and DbPs are accurate and secure;

(f) ensure that unauthorized parties cannot access or alter the database or the OPs;

(g) respond promptly to verify, correct, or remove incorrect data, and conduct system audits in the event that the Authority or another party raises concerns about inaccuracies in the USS;

(h) include functionality to indicate, upon request from the Authority, that no IS channels are available when queried by ISDs;

(i) refrain from providing service to ISDs until it receives confirmation from the designated contact person verifying their information. if the registration record is modified, the USSP must verify the new information before continuing to provide service to the ISDs;

(j) ensure non-discrimination between ISDs in providing the minimum required information levels; and

(k) have the discretion to provide additional information to specific classes of devices.

14. Default Values and Technical Parameters

(1) The default antenna height for a Master device must be recorded by the USS as 20 meters above ground level (AGL), unless the ISD provides alternative information to the USS.

(2) The default antenna height for an IS-CPE must be recorded by the USS as 10 meters AGL.

(3) The default antenna height for end-user equipment (EUE) must be recorded by the USS as 1.5 meters AGL.

(4) The default radio propagation model for protecting incumbent users is ITU-R P.452-18.

(5) The default digital terrain dataset resolution for use with the radio propagation model is 3 arc seconds.

(6) The default clutter dataset for use with the radio propagation model is the South African National Land Cover (SANLC).

15. ISD Operational Continuity Requirements

(1) The Master device and IS-CPE Cat 2 must not operate in excess of one hundred sixty-eight (168) hours after the last access to the USS, after which it must cease operation.

(2) The Master device and IS-CPE Cat 2, after having reached the maximum hours stipulated in sub-regulation (1), must re-establish contact with the USS and verify its OPs, as well as those of its associated client devices.

(3) The associated Client device must cease operation within ten (10) seconds if it fails to receive a contact verification signal from the associated Master device within sixty (60) seconds of the last contact.

(4) If not in sleep mode, the Client device must re-establish contact with the associated Master device within nine hundred (900) seconds of the last contact.

(5) The Client device must then receive the OPs from the associated Master device, as determined by the USS.

16. ISD Labelling Requirements

An ISD must display a label that adheres to the Equipment Authorization Regulations of 2022.

17. Display of Available Channels

A Master device and IS-CPE Cat 2 must have the capability to store and display a list of available channels provided by the USS, including the channels selected for use.

18. Innovation Spectrum License Validity and Renewal

(1) The IS spectrum license shall be valid for a maximum duration of three (3) years.
(2) The license shall only be valid for use within the locality specified by the applicant during the application process.
(3) The license may be renewed, subject to spectrum availability in the designated geographical location.

19. Commence of operations

The IS licensee must commence operations within thirty (30) calendar days from the date of issue of the license.

20. Innovation Spectrum License Fees and Pricing Principles

(1) A Network Operator must pay the license fees to the Authority for access to the IS, if applicable.
(2) The requirement to obtain spectrum licenses applies solely to the operation of ISDs within the ISFR 1 consistent with regulation 6 (5)(a).
(3) Operation of ISDs in the ISFR 2 band is license-exempt, consistent with the applicable radio regulations developed by the Authority.

21. USS Access Fees

The USSP shall impose reasonable and non-discriminatory access fees on network operators for the use of USS services.

22. Revocation of Innovation Spectrum License

Failure to comply with regulation 19 will result in the revocation of the licence assignment.

23. Offences and Penalties

Any person that contravenes regulation 4 of these Regulations is guilty of an offence and is liable, on conviction, to a term of imprisonment not exceeding six (6) months and/or a fine not exceeding one million Rands (R 1,000,000.00).

24. Short Title and Commencement

These Regulations are called Regulations on the Use of Innovation Spectrum, 2025 and shall come into effect at a date to be determined by the Authority by notice in a Government Gazette.

A: Summary Results of Simulations and Trials

A1.1 Analysis of the Fixed Satellite Services (FSS) and Fixed Links (FS) Dataset

On 21 June 2024, the Authority published Notice Number 2593 of 2024 in the Government Gazette 50850 requesting satellite operators in the 3800 to 4200 MHz and 5925 to 6425 MHz sub-bands to submit technical details of their deployments. The purpose of this initiative was to register these systems in a database and ensure their protection from potential harmful interference. Following an exploratory data analysis (EDA), the following observations were made:

A1.1.1Fixed Satellite Services (FSS)

The FSS dataset revealed the following trends:

- 84% of all C-band FSS receivers are concentrated in the Johannesburg area.
- The majority of FSS receive antennas have elevation angles between 27 and 63 degrees, with an average elevation angle of 44 degrees.

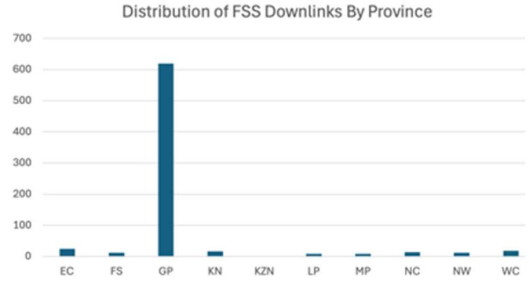

Figure A1.1a: Distribution of FSS downlinks by province, Gauteng province has majority of FSS downlink deployments.

A1.1.2 Fixed Services Links (FS)

The FS dataset provided by operators, highlighted the following trends:

- 98% of all FS receivers in the country operate within the 5925 to 6425 MHz sub-band.
- 37% of all FS receivers are deployed in the Gauteng Province (GP).

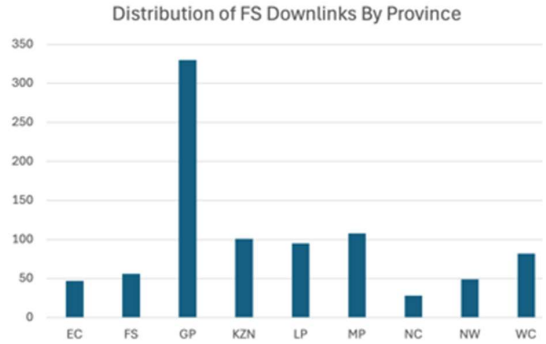

Figure A1.1b: Distribution of FS links by province.

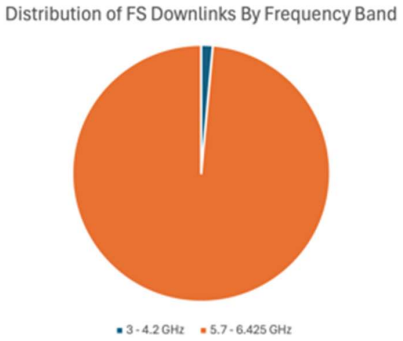

Figure A.1c: Distribution of FS links by frequency band, majority of links operates in the 5700 to 6425MHz.

A1.1.3 Key Insights

The Authority has observed the following:

- The Johannesburg area is a significant hub for FSS receivers, indicating a high concentration of satellite communication activity in the country.
- The 5925 to 6425 MHz sub-band is the most utilized frequency range for FS receivers nationwide, with Gauteng Province hosting a substantial portion of these deployments.
- The dataset indicates that the majority of FSS downlinks utilise higher antenna elevation angles (typically between 27 and 63 degrees). This has significant implications for determining separation distances between FSS and secondary services, as higher elevation angles can influence interference mitigation strategies.

A1.2 Our Approach to Coexistence

The Authority's approach to protecting primary systems (FSS and FS receivers) involves assessing the possible interference (I) that might be generated by the operation of a secondary system relative to the noise bandwidth (N) of the primary system receivers. At each point of interest, the interference must not exceed the specified Interference-to-Noise (I/N) ratio for a defined percentage of time. This is expressed mathematically as:

$$(I/N)(t,\ d,\ \Theta i) = (Pi + Gi + PLdf - Lbld - NFD - \Theta i)\ - N \qquad \text{(Eq. A1.2)}$$

Where:

$\boldsymbol{Pi}$**:** Power (e.i.r.p) transmitted by the secondary system

$\boldsymbol{Gi}$**:** Antenna gain of the secondary system

$\boldsymbol{PLdf}$**:** Radio propagation and feeder losses between the secondary system transmitter and secondary system receiver

$\boldsymbol{\Theta i}$**:** Angular discrimination of primary system receiving antenna

$\boldsymbol{NFD}$**:** Net filter discrimination of the secondary system

$\boldsymbol{N}$**:** Noise power of the primary system receiver bandwidth

$\boldsymbol{Lbld}$: Building entry loss for systems operating indoor

A1.3 Protection of Radio Astronomy Services and International Borders

The procedure to protect Radio Astronomy Services is outlined under the Regulations for the Protection of the Karoo Central Astronomy Advantage Areas (KCAAA)[6]. This framework ensures that radio frequency interference (RFI) is minimized within these sensitive zones, preserving the integrity of astronomical observations. For the protection of international borders, a similar approach may be adopted, subject to harmonization agreements between neighbouring countries. This ensures consistent and cooperative measures to mitigate interference across borders, fostering international collaboration in spectrum management.

A1.4 Coexistence of Broadband Wireless Access Systems and Fixed Satellite Services

The Authority conducted desktop modelling and simulations using the Monte Carlo method and the ITU-R P.452-18 radio propagation model[7] to assess the coexistence between Broadband Wireless Access (BWA) systems and FSS receivers. The analysis focused on evaluating the probability of interference in two distinct scenarios:

Scenario A1.4a: Coexistence of low-power BWA system and FSS receivers in an urban environment where the two systems operate on the same channel. This scenario utilized only the Interference-to-Noise (I/N) ratio parameter of -10.5 dB to protect the performance of FSS receivers. Table A1.4a highlights the parameters used in the simulations.

Table A1.4a: Simulation parameters used in the scenario 1.

Common Parameter	Value		
Frequency band	3810 MHz		
Protection distance	0 km		
Protection criterion (I/N)	-10.5 dB		
Channel bandwidth	10 MHz		
Radio propagation model	ITU-R P.452-18		
Clutter model	ITU-R P.21081-1		
Situation	Outdoor		
Digital terrain model	Aster (30m x 30m)		
FSS Receiver Parameter	**Value**	**BWA Transmitter Parameter**	**Value**
Sensitivity	-98 dB	Tx power	27 dBm
Noise figure	5 dB	height	30 m
Noise floor	-120 dB	Emission mask	3GPP TS 36104
Azimuth	113 deg	Antenna pattern	ITU-R F.1336-4
Elevation angle	43 deg	Location	CSIR, PTA
Height	15 m		
Dish size	7 m		
Antenna pattern	ITU-R S.465-6		
Location	Randburg, JHB		

Results of the Monte Carlo simulations for scenario 1 are presented in Figure A1.4a below.

[6] https://www.dsti.gov.za/images/KCAAA-RegulationsV2.pdf

[7] Recommendation ITU-R P.452: "Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 0.1 GHz"

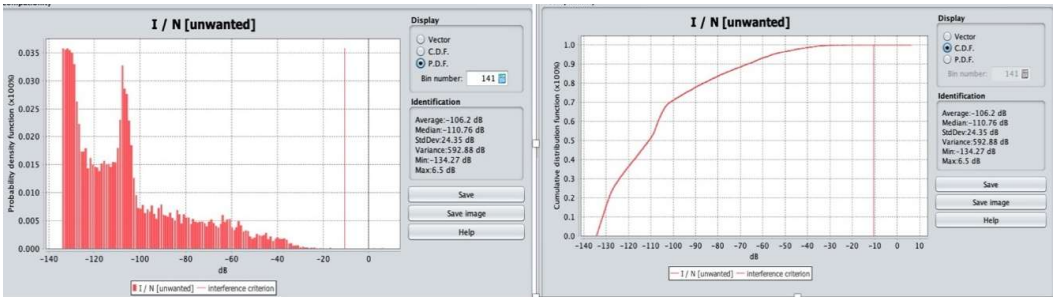

Figure A1.4a: (Left) Probability distribution function (PDF) plot and, (Right) Cumulative distribution function (CDF)plot, the results obtained from 2000 Monte Carlo simulation snapshots indicate no harmful interference is caused to FSS receivers by BWA system when only the protection ratio (I/N =-10.5 dB) was used.

Scenario A1.4b: Coexistence of medium-power BWA system and FSS receivers in the urban area where the two systems are operated on the same channel. This scenario applied both the protection ratio (I/N = -10.5 dB), and a protection distance of 10 km are utilised to safeguard the performance of FSS receivers. Table A1.4b highlights the parameters used in the simulations.

Table A1.4b: Simulation parameters used in the scenario 2.

Common Parameter	**Value**		
Frequency band	3810 MHz		
Protection distance	10 km		
Protection criterion (I/N)	-10.5 dB		
Channel bandwidth	10 MHz		
Radio propagation model	ITU-R P.452-18		
Clutter model	ITU-R P.21081-1		
Situation	Outdoor		
Digital terrain model	Aster (30m x 30m)		
FSS Receiver Parameter	**Value**	**BWA Transmitter Parameter**	**Value**
Sensitivity	-98 dB	Tx power	38 dBm
Noise figure	5 dB	height	30 m
Noise floor	-120 dB	Emission mask	3GPP TS 36104
Azimuth	113 deg	Antenna pattern	ITU-R F.1336-4
Elevation angle	43 deg	Location	CSIR, PTA
Height	7 m		
Dish size	2.4 m		
Antenna pattern	ITU-R S.465-6		
Location	Randburg, JHB		

Results of the scenario 2 simulations are presented in Figure A1.4b below.

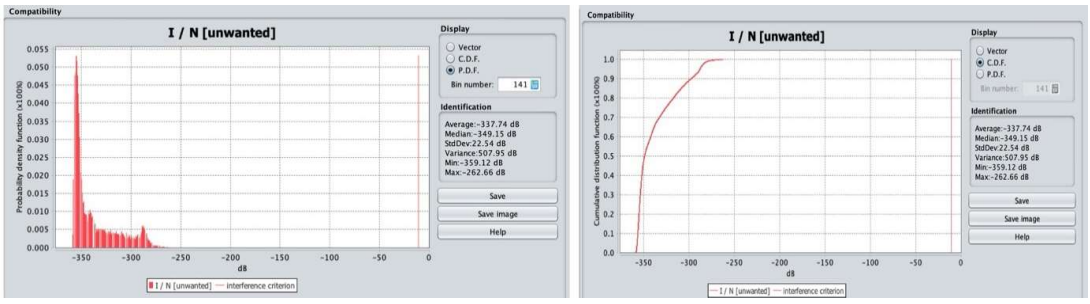

Figure A1.4b: (Left) PDF plot and, (Right) CDF plot, the results obtained from 2000 Monte Carlo simulation snapshots indicate reduced probability that BWA deployment will cause harmful interference to FSS receivers. This is due to utilising both the protection ration (I/N = -10.5 dB) and protection distance of 10 km.

A1.4.1 Key Insights:

- In both scenarios, the Authority has noted that the probability of the BWA system causing harmful interference to FSS receivers was found to be low.
- Furthermore, the probability of interference was further reduced when both protection mechanisms (I/N ratio and protection distance) were applied, demonstrating the effectiveness of combining these measures, this is inconsistence with studies conducted in ITU-R S.2199[8] and CEPT Report 088[9].

A1.5 Validation of the Findings from Monte Carlo Simulations

Furthermore, the Authority performed a validation of the findings in Section A1.4 (above) by conducting the I/N ratio scenario co-existence assessment across multiple urban and rural test points, leveraging FSS technical datasets provided by stakeholders. The primary objective was to determine whether the deployment of the BWA system would exceed the I/N threshold of -10.5 dB, taking into account local conditions such as terrain and clutter. For this analysis, the Authority utilised a point-to-point Irregular Terrain propagation model[10] and 3-arcsecond Shuttle Radar Topography Mission (SRTM) dataset was utilised to model terrain effects accurately. At each BWA deployment site, the Authority performed a detailed scan to identify all FSS receivers operating within the same frequency band as the BWA system within a 100 km radius. The collected data was then analysed to evaluate potential interference impacts at each location of the FSS receiver under two distinct scenarios.

Scenario A1.5a: Coexistence of Low and Medium Power BWA system with FSS receivers in Urban Area: The feasibility of deploying low and medium power BWA systems at Brummeria, Pretoria on a secondary basis was studied. The protection ratio (I/N = -10.5 dB) was used to protect performance degradation of FSS receivers deployed in various urban areas within a radius of 100 km from the BWA system operating on the same frequency. Figures A1.5a and A1.5b highlight results of point-to-point radio propagation on the evaluated FSS receiver sites.

[8] https://1f8a81b9b0707b63-19211.webchannel-proxy.scarabresearch.com/pub/publications.aspx?lang=en&parent=R-REP-S.2199-2010
[9] https://docdb.cept.org/download/4571
[10] https://its.ntia.gov/software/itm

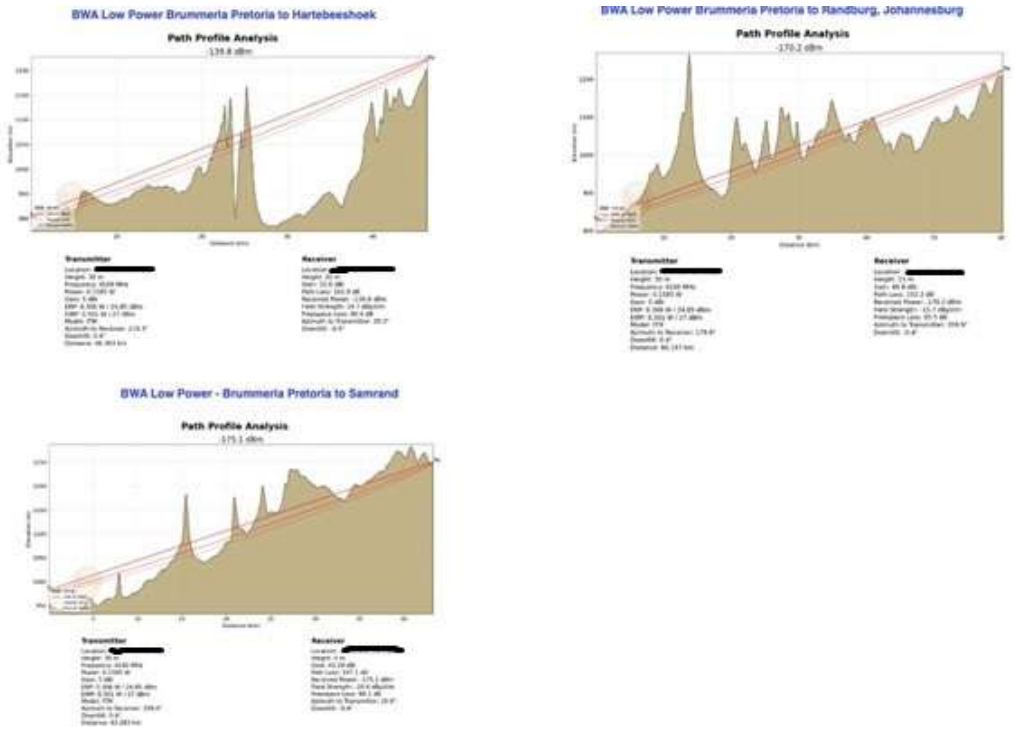

Figure A1.5a: Point-to-Point path analysis on between low-power BWA system and FSS receivers in urban area.

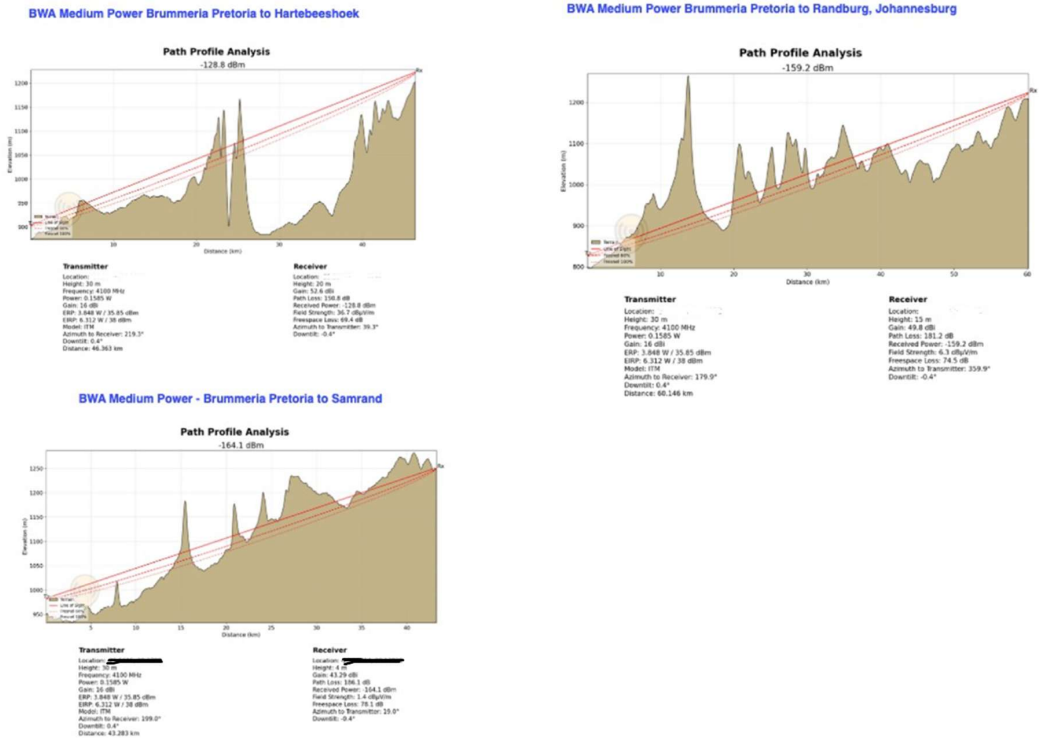

Figure A1.5b: Point-to-Point path analysis on between medium-power BWA system and FSS receivers in urban area.

Results of the scenario A1.45a simulations are presented in TableA1.5a below.

Table A.1.5a: The results for both low-power and medium-power BWA systems deployment at Brummeria, Pretoria indicate that the protection ratio (I/N = -10.5 dB) has not been exceeded at FSS receiver locations for the low-power BWA deployment and has exceeded by approximately 1.7 dB, in one FSS receiver location at Hartebeeshoek for the medium power BWA system deployment.

FSS Receiver Test Location	**Low Power BWA Interference at FSS Receiver (dBm)**	**I/N (dB)**	**Pass/ Not Pass**	**Medium Power BWA Interference at FSS Receiver (dBm)**	**I/N (dB)**	**Pass/ Not Pass**
Samrand	-175.1	-55.2	Pass	-164.1	-44.1	Pass
Randburg	-170.2	-50.2	Pass	-199.2	-79.2	Pass
Hartebeeshoek	-139.8	-19.8	Pass	-128.8	-8.8	Not Pass

Scenario A1.5b Medium Power BWA System Deployment in Rural Area: The feasibility of deploying a medium-power BWA system at iXopo, Harry Gwala, District Municipality, KZN, on a secondary basis was studied. The protection ratio (I/N = -10.5 dB) was used to protect the performance degradation of FSS receivers deployed in various areas within a radius of 100 km from the BWA system operating on the same frequency. Figures A1.5c and A1.5d highlight the results of point-to-point radio propagation on the evaluated FSS receiver sites.

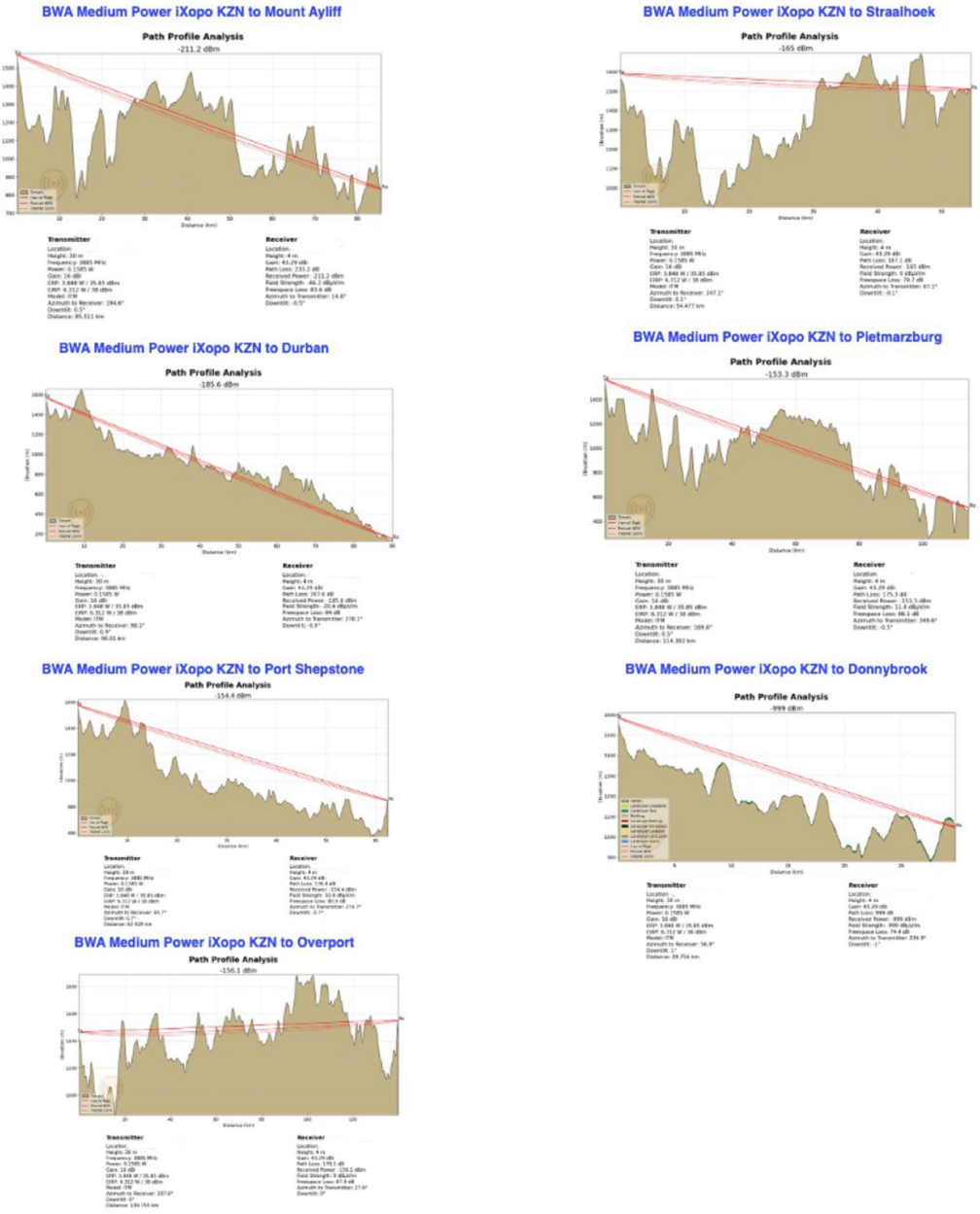

Figure A1.5c: Point-to-Point path analysis between medium-power BWA system and FSS receivers in rural area.

Assessment results of scenario A1.5b are provided in Table A1.5b below.

Table A1.5b: The results for both low-power and medium-power BWA systems deployment at iXopo, Harry Gwala District Municipality, KZN indicates that the protection ratio (I/N = -10.5 dB) has not been exceeded at all FSS receiver locations

FSS Receiver Test Location	**Medium Power BWA Interference Power at FSS Receiver (dBm)**	**I/N (dB)**	**Pass/ Not Pass**
Durban	-185.6	-65.6	Pass

Pietmaritzburg	-153.3	-33	Pass
Overpot	-156.1	-36.1	Pass
Donnybrook	-999	-999	Pass
Mount Ayliff	-211.2	-91.2	Pass
Port Shepstone	-154.1	-34.1	Pass
Straalhoek	-165	-45	Pass

A1.5.1 Key Insights:

Enhanced Spectrum Sharing with Terrain and Clutter Data:

- The Authority has noted that utilising digital terrain and clutter datasets can unlock additional spectrum sharing opportunities. These datasets enable more precise modeling of signal propagation and interference, facilitating efficient spectrum allocation and coexistence between services.