INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

NOTICE 738 OF 2021

1. Pursuant to section 4B of the Independent Communications Authority of South Africa Act, 2000 (Act No. 13 of 2000), hereby issues a notice regarding its intention to conduct an inquiry into the Long-Term Spectrum Outlook for public consultation.

2. The purpose of the inquiry is to conceptualise Scenario Plans for the Long-Term Spectrum Outlook for South Africa.

3. Interested persons and parties are hereby invited to submit written representations, including an electronic version of the representation in Microsoft Word, of their views on the Draft Consultation Document on Spectrum Outlook by no later than 16h00 on 04 March 2022.

4. Persons making representations are further invited to respond to the questions using the attached template which can be obtained on the ICASA website: www.icasa.org.za.

5. Written representations or enquiries may be directed to:

350 Witch-Hazel Avenue, Eco Point Office Park

Eco Park, Centurion

South Africa

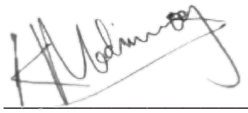
Private Bag X10,
Highveld Park 0169
Centurion, Pretoria, marked for the attention of:

Mr. Manyaapelo Richard Makgotlho
e-mail: rmakgotlho@icasa.org.za

6. All written representations submitted to the Authority pursuant to this notice shall be made available for inspection by interested persons from 09 March 2022 at the ICASA Library or website and copies of such representations and documents will be obtainable on payment of a fee.

7. Where persons making 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 regulations 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 will be allowed to withdraw the representation or document in question.

8. The guidelines for confidentiality request are contained in Government Gazette Number 41839 (Notice 849 of 2018).



DR KEABETSWE MODIMOENG
CHAIRPERSON
DATE: 15/12/2021

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1 INTRODUCTION

The Authority is developing a long-term spectrum outlook spanning between ten and twenty years. The consultation document contains an analysis of regulatory, technical and economic factors, including relevant regional and international best practices. The main aspects of spectrum planning include:[1]

- Setting spectrum management goals for the future and to establish steps to achieve those goals;
- Provide a framework within which spectrum is made available for the constantly evolving radio spectrum needs, and the spectrum management system;
- Facilitate decision-making by creating the basis for consideration and evaluation of the course of action; and
- Support and follow the major directions and needs of the current and future spectrum users.

For example:

- Mobile spectrum needs will increase over 5 to 10 years and more (discussed in more detail in Section 4.2.1);
- The spectrum management process should attempt to anticipate those developments and ensure that adequate spectrum will be allocated to the mobile service to meet those needs; and
- To achieve this goal: capacity analysis, coordination procedures, frequency shifts and supporting databases are necessary to be able to support the accommodation of mobile systems.

The most important element for spectrum planning is the national table of frequency allocation, derived from the International Table of Frequency Allocations of the Radio Regulations (Article 5). Even though administrations may allocate frequencies according to their national needs, frequencies do not stop at the border but spill over into neighbouring countries. Frequencies should be assigned to compatible services especially near the borders in order to avoid harmful interference.

Good planning is crucial for achieving the economic and social benefits of spectrum. It can facilitate radiocommunication growth especially when the demand for spectrum increases, for preventing interference and for the identification of spectrum for future needs. Considering that the use and technology development in this domain is dynamic, it is important that long term planning is flexible:

- Any commitment to long term planning must include a commitment to a process of regular revision and review in which spectrum managers regularly reconsider plans in the light of developments; and
- It is possible that a projected service will not develop as anticipated for technological or economic reasons.

Thus, spectrum planning should not be rigid and dogmatic: It should avoid irreversible decisions, but should survey a long period of time to set out a path to achieve spectrum management objectives, derived from legislation and government policy.

Spectrum planning should cover any of the spectrum management actions or decisions that directly govern how spectrum will be used, such as:

- Allocations, policies, allotments, assignment rules and standards;
- Actions in each of these areas determine how bands will be used, how radio services are implemented, which technologies will be accepted or if the market alone decides which technologies prevail.

[1] See, for instance, report ITU-R SM.2015.

In this context, the national allocation table serves as the primary plan for spectrum use and other planning actions form subsets of that framework. Planning should also take into account factors such as:

- Significant shifts in spectrum use (including re-farming);
- Emerging technologies;
- New services for which there are no current allocations;
- User plans for changes in use;
- Projected crowding in specific bands; and
- Any changes due to WRC (changes made to Article 5).
- The IMT Roadmap
- The Frequency Migration Plan (FMP)

It is also important to consider:

- Inventory of spectrum users and to identify what spectrum is available, including: The number of spectrum users, relevant characteristics of the radio stations, geographical distribution of the radio stations, potential influence of the radio stations on one another.
- Current use based on the national frequency register. This register should contain technical and management information, such as:
    - Frequency, user name, location, equipment used, costs involved with system implementation and details of technical characteristics; and
    - If used for international communication, the national register should be supplemented by the ITU Bureau Radiocommunication (BR) International Frequency Information Circular (IFIC).
- Information obtained through spectrum monitoring on the actual use of frequencies to supplement the national register; and
- Exchange of information with other administrations as it will have an impact on spectrum users outside the national borders.

There are a range of policy and legal factors that affect spectrum planning:

- National radiocommunication laws, regulatory requirements, ITU frequency allocation table, user needs, security and public safety, regional frequency management bodies, standardization policy, etc.
- Economic factors: Market demand, spectrum auctions or fees, procedures and practices used by service providers, overall economic growth, etc.
- Social and ecological factors; Changes in demand as a result of changes in social structure, electromagnetic pollution and radiofrequency interference, etc.
- Technical factors: User mobility, signal processing, communication media, coding and modulation techniques, antenna design and characteristics, etc.

The remainder of this document is set out as follows. First, the underlying regulatory framework is described, together with policy objectives, in Section 0. The economic impact of broadband, and key trends for spectrum management, are discussed in Section 3. The spectrum outlook is then considered in Section 4, in respect of key service allocation categories. Frequency migration and costing is then discussed in Section 5, and tables of acronyms and abbreviations are provided in the appendix (Section 8).

Each of the sections contain questions on which a response from the stakeholders is required. These responses will guide ICASA in preparing the Spectrum Outlook document for Long Term (up to 20 years).

2 REGULATORY FRAMEWORK AND POLICY OBJECTIVES

The Authority's objectives where spectrum management in South Africa is concerned are set out in the Electronic Communications Act No 36, 2005 ('the ECA'). There are also several government policies that inform radio frequency spectrum planning. The first is the National Development Plan 2030 ('NDP'), published in 2011, which considers a number of policy questions relating specifically to radio frequency spectrum. Second, the SA Connect policy provides South Africa's national broadband plan, which includes targets for broadband speeds, among other objectives. Third is the Strategic Infrastructure Plan 15 - Expanding access to communication technology ('SIP-15'). Fourth is the Communications Regulators' Association of South Africa ('CRASA') regulatory principles for mobile financial services. Additionally, the African Telecommunications Union ('ATU') has launched spectrum recommendations that are relevant for radio frequency spectrum planning. Each of these regulatory and policy documents are discussed in turn in this section.

2.1 THE ECA ON FREQUENCY SPECTRUM MATTERS

The Authority's main objective related to spectrum planning, set out in Section 2 of the ECA, is to: *"ensure efficient use of the radio frequency spectrum"*. In addition, the Authority has a range of obligations with respect to the control of radio frequency spectrum:

Section 30 of the ECA says that:

> *(2) In controlling, planning, administering, managing, licensing and assigning the use of the radio frequency spectrum, the Authority must—*
>
> *(a) comply with the applicable standards and requirements of the ITU and its Radio Regulations, as agreed to or adopted by the Republic, as well as with the national radio frequency plan contemplated in section 34;*
>
> *(b) take into account modes of transmission and efficient utilisation of the radio frequency spectrum, including* ***allowing shared use of radio frequency spectrum*** *when interference can be eliminated or reduced to acceptable levels as determined by the Authority;*
>
> *(c) give high priority to applications for radio frequency spectrum where the applicant proposes to utilise* ***digital electronic communications facilities for the provision of broadcasting services, electronic communications services, electronic communications network services****, and other services licensed in terms of this Act or provided in terms of a licence exemption.*
>
> [emphasis added]

The use of radio frequency spectrum for broadcasting and electronic communications services and network services features prominently in the ECA, and spectrum sharing is promoted.

In addition, Section 34 of the ECA sets out that the Authority must have regard to internationally accepted methods for radio frequency planning:

> *(7) In preparing the national radio frequency plan as contemplated in subsection (4), the Authority must—*
>
> *(a) take into account the ITU's international spectrum allocations for radio frequency spectrum use, in so far as ITU allocations have been adopted or agreed upon by the Republic, and give due regard to the reports of experts in the field of spectrum or radio frequency planning and to internationally accepted methods for preparing such plans;*

This spectrum outlook consultation document has been prepared taking into account such internationally accepted methods, including in respect of considering international trends in spectrum demand.

2.2 THE NATIONAL DEVELOPMENT PLAN AND SIP 15.

The National Development Plan 2030 for South Africa ('NDP') provides a framework for economic development, including for the information and communications technology ('ICT') sector.[2] The NDP emphasizes the development of a knowledge-based economy and information society. The plan considers the development of a seamless ICT infrastructure delivering services to consumers, businesses and the public sector, at competitive levels of cost and quality. In respect of planning and policy priorities, the NDP considers, in relation to radio frequency spectrum:

- Affordable, widely available broadband for economic and social development.
- An ICT sector that enables economic activity.

The NDP emphasizes broadband, and an ICT sector that supports economic activity. SIP-15 (described in Box 1) will play a role in developing the infrastructure needed to achieve this. There are also a number of activities relating to spectrum, including:

- Implement a service and technology-neutral flexible licensing regime to allow flexible use of resources in dynamic and innovative sectors, especially for spectrum that should be made available urgently for next generation services.
- Free spectrum for efficient use, to drive down costs and stimulate innovation.
- Spectrum can be allocated with set asides or obligations to overcome historical legacies and inequalities in the sector, but this should not delay its competitive allocation.

These activities propose technology neutrality and the roll out of innovative new services, reducing costs, and ensuring that spectrum is competitively allocated, important objectives for spectrum planning in South Africa.

Box 1: SIP 15.

A further important government policy is SIP 15: Expanding access to communication technology. SIP 15 provides for broadband coverage to all households by 2020 by:[3]

- establishing core Points of Presence (POPs) in district municipalities
- extend new Infraco fibre networks across provinces linking districts
- establish POPs and fibre connectivity at local level
- further penetrate the network into deep rural areas.

The SIP 15 considers that the private sector will invest in ICT infrastructure for urban and corporate networks, and government will co-invest for township and rural access, as well as for e-government, school and health connectivity. More recently, SIP 35 envisages rolling out SA Connect Phase 1B.[4]

2.3 SA CONNECT

The 'South Africa Connect' broadband policy ("SA Connect") published by the Department of Communications in 2013 emphasizes the links between broadband access and growth, stating that

[2] See National Planning Commission, 11 November 2011, 'National Development Plan', available at: https://www.gov.za/sites/default/files/gcis_document/201409/devplan2.pdf

[3] See: https://www.gov.za/sites/default/files/PICC_Final.pdf

[4] See: https://www.gov.za/sites/default/files/gcis_document/202007/43547gon812.pdf

although there may be variation in the findings of different studies on the precise economic impact of broadband:[5]

> *"there is enough evidence to support claims that increases in broadband penetration are correlated with increases in Gross Domestic Product (GDP), new jobs, broadening of educational opportunities, enhanced public service delivery and rural development".*

The SA Connect report furthermore recognises that access to broadband (fixed and mobile) has lagged in South Africa relative to expectations as well as international comparators. This has particularly been highlighted with respect to fixed services. SA Connect highlighted the slow deployment and high costs of fixed broadband services, raising concerns over the fact that these costs have meant that mobile services have become a primary form of broadband access rather than a complementary form as has occurred in other mature economies.

In addition, several other constraints were identified:

- There was insufficient investment in networks: The development of national terrestrial networks and a high capacity access network were seen as a critical infrastructure constraint in the SA connect report. SA Connect highlights costs of leasing facilities from the incumbent operator, and the lack of large-scale investment in networks as an issue impacting on competitiveness.
- South Africa has low broadband penetration relative to other lower-middle-income countries: South Africa had fixed household penetration of 11% while its peers had an average of 34%. LTE coverage was 60% at the time of the publication of SA Connect, but speeds are lower than the global average.

These constraints have important implications for spectrum planning in South Africa, since the lack of fixed line penetration means significantly greater reliance on mobile services for broadband connectivity. The lack of broadband uptake and usage and relatively slow LTE speeds in South Africa suggest that larger radio frequency spectrum allocations for mobile and fixed-wireless access are needed in order to reduce the costs of broadband.

The targets set out in SA Connect, and in particular the broadband access speed target for 100MBbps by 2030, are shown in Table 1. These targets provide important parameters for spectrum planning in South Africa. National broadband plans in other African countries are described in Box 2, and have similarly ambitious targets.

Table 1: SA Connect targets

Target	Penetration measure	Baseline (2013)	By 2016	By 2020	By 2030
Broadband access in Mbps user experience	% of population	33.7% Internet access	50% at 5 Mbps	90% at 5 Mbps 50% at 100Mbps	100% at 10Mbps 80% at 100Mbps
Schools	% of schools	25% connected	50% at 10 Mbps	100% at 10Mbps 80% at 100Mbps	100% at 1Gbps
Health facilities	% of health facilities	13% connected	50% at 10Mbps	100% at 10Mbps	100% at 1Gbps

[5] Department of Communications, December 2013, 'South Africa: Creating opportunities, ensuring inclusion. South Africa's broadband policy.', Government Gazette number 37119.

Target	Penetration measure	Baseline (2013)	By 2016	By 2020	By 2030
				80% at 100Mbps	
Public sector facilities	% of government offices		50% at 5 Mbps	100% at 10Mbps	100% at 100Mbps

Box 2: National broadband strategies in other African countries

Kenya's NBS[6] provides one example of how the ATU's recommendations on spectrum management could be utilized. Spectrum management is defined as facilitating 'converged service availability and maximize value and use of spectrum' - this includes:

- Ensuring flexibility in spectrum licensing and authorization (e.g. spectrum trading)
- Flexible usage rules for existing licenses
- Internationally harmonized band plans during allocation and assignment of spectrum
- Market mechanisms used to assign spectrum
- Making sure that spectrum management is responsive to the market realities and in line with best-practice

The NBS acknowledges that worldwide spectrum authorities are making various decisions about how best to utilize spectrum, alongside driving technology and investment across connectivity platforms and services - including end user broadband access, backhaul, broadcast, fixed terrestrial, fixed satellite and mobile services. Kenya's NBS thus views their broadband policy reform as being underpinned by the principles of flexibility – for spectrum licensing, authorizations, and rules of use. The principles of spectrum policy thus include:

a) Ensure there is always sufficient supply of spectrum available - reducing the barriers to entry by service provider barriers, as well as increasing competition and innovation. Spectrum allocation will be re-evaluated periodically by the Government of Kenya to ensure that it is efficiently utilized.

(b) Promote flexible use - ensuring that spectrum policies are flexible enough to allow multiple party use in unserved and underserved areas. Additionally, policies must promote flexible use of spectrum and sharing across users and platforms (e.g., mobile, satellite, and new technologies like high altitude platform stations (HAPS and Terragraph) in order to increase the spectrum available for broadband.

(c) Balance licensed and unlicensed spectrum - policy needs to support both allocations and promote technology neutrality. In circumstances where the case for deployment of one is less attractive, licence fees need to be set in a way that ensures that investment incentives are balanced.

(d) Promote both the capacity and coverage of networks - it is imperative that the Kenyan Government engage in policy that not only enhances network capacity, but also expands coverage to underserved areas and populations.

Nigeria's National Broadband Plan (NBP 2020-2025)[7] places emphasis on regulatory rules and conditions being clear, non-discriminatory and easily manageable - with fair and competitive access

[6] See: https://www.ict.go.ke/wp-content/uploads/2019/05/National-Broadband-Strategy-2023-FINAL.pdf

[7] See: https://ncc.gov.ng/documents/880-nigerian-national-broadband-plan-2020-2025/file

to spectrum. This is required in order to enhance competition in the telecommunications market - encouraging investor confidence and so enabling society to benefit from the process. Investment would also support the development of new mobile technologies and platforms (such as 5G) that can address socioeconomic challenges in the country.

Nigeria's NBP has been designed with the target to deliver data download speeds of 25Mbps minimum in urban areas, and 10Mbps in rural areas by 2025 (respectively 10Mbps and 5Mbps by 2023). This is in the overall context of a target towards at least 90% of the population having effective broadband coverage by 2025 - at a maximum price of N390 per 1GB of data (2% of median income or 1% of minimum wage). The plan targets the full deployment of 4G LTE networks, noting that the existing 2G and 3G services are unable to achieve these kinds of download speeds with large population numbers.

2.4 CRASA

In 2019 CRASA published the 'Key Regulatory Principles and Guidelines for Mobile Financial Services'[8]. This provides guidance with regards to the role of CRASA members. The following are key recommendations to the National Regulatory Authorities (NRA) in SADC:

a) A collaborative approach to regulation;

b) MoUs between the different regulators in order to address overlaps between different sectors;

c) Service specific regulations rather than institutional based regulations; and

d) Enabling cross-border transactions.

Additionally, in 2019 the 'Mobile Broadband Gap Analysis Guidelines' was produced as a set of recommendations for SADC countries in order to work towards the goal of 'a harmonised pursuit for universal broadband access in the region'[9]. The guideline includes 6 steps, with full explanations that cover the tasks, inputs and outputs required:

1 Source input data: This essentially includes two tasks. Firstly, sourcing, validating and blending input data from MNOs - including mobile broadband subscriber numbers, average prices, network coverage, unit costs, etc. Secondly, sourcing and validating other input data (population, population density, spectrum tables, etc).

2 Analyse the connectivity gap: Identifying the geographical regions and population / addressable market (age 6 years and older) that are covered by either: mobile broadband service, by 2G only, or those with no coverage. This data is then used to quantify the connectivity gap (by numbers and percentages) and create an infrastructure index that assess the lack of infrastructure using GSMA enabler, dimension and indicator scores.

3 Analyse the demand gap: Estimate the demand gap (broadband coverage – broadband penetration), then pull out the affordability (price as % of GNI per capita at PPP) using metrics for services and installation. Use GMSA scores to create affordability index, consumer readiness index and a local content index. Finally, analyse the demand gap drivers in order to update mitigation programmes considering affordability, digital literacy and local content.

[8] See: https://www.crasa.org/common_up/crasa-setup/18-04-2019-1555573441-publication.pdf

[9] See CRASA. 2019. 'Mobile broadband gap analysis guidelines edition 2019', available at: https://www.crasa.org/crasa-publications-details/id/255/mobile-broadband-gap-analysis-guidelines-edition-2019/

4 Analyse spectrum availability: Use the spectrum roadmap (if it exists) and GSMA spectrum dimension and indicator scores in order to identify and remove any spectrum-related barriers that either increase costs or delay MNOs from closing the connectivity or demand gaps.

5 Analyse the investment gap: This is based on the coverage gap, demand gap and spectrum analyses, alongside blended network unit costs from the MNOs.

6 Deliver results: Using the results from steps 2-5, put together a Mobile Broadband Gap Analysis Report. Then review the report internally and with relevant industry stakeholders, and finally submit the report to CRASA.

Thus, spectrum availability for broadband, and in particularly assessing inputs from mobile network operators, are important areas of emphasis in the CRASA approach to broadband planning.

2.5 ATU

In April 2021, ATU launched the 1st set of 'ATU Spectrum Recommendations'[10]. This consists of four documents that give guidance towards the fast-track roll out of technology across the continent. These recommendations serve to enable the CSPs in having access to spectrum amounts and types that allows for the development of a variety of use cases, as well as meeting the increasing communication demand and preparing for delivery of new technologies - such as 5G. The recommendations also encourage SADC countries to enable spectrum sharing by giving licensees the right to share their spectrum voluntarily through trading and national roaming agreements.

The recommendations place emphasis on the importance of awarding the radio spectrum in a 'timely, predictable and cost-effective fashion'. This would support affordable, high-quality delivery of ICT services and stimulate initiatives in smart technology. These spectrum management principles include strategies for National broadband spectrum plans, licencing roadmaps, and emerging and future spectrum management. A summary of the recommendations include:

1. Develop a national broadband plan that includes spectrum plans in support of the roll-out of mobile broadband (reviewed annually). This should consider the development of a 'Spectrum Roadmap' that includes a plan to make spectrum available for new technologies and demand for mobile broadband services (existing and future). In addition, licensing should be technology-neutral and allow for service innovations - flexibility to accommodate new and emerging technologies within existing licensing frameworks.
2. Estimate future spectrum requirements for broadband, taking into account 'geographic status cities, population density, average spectral efficiency for different planned technologies, forecasted number of subscribers, and behaviour of users'.
3. Support broadband deployment by developing a 5 - 10 year spectrum outlook.
4. Open up opportunities for innovative spectrum access models, including reallocation or repurposing of spectrum.
5. Transparency in spectrum allocation and utilization.
6. Plan for the availability of all mobile broadband spectrum (and backhaul spectrum). This would include sufficient quantities of low, mid, and high bands for the rollout of broadband (licenced and licence-exempt).

[10] See: https://www.atuuat.africa/2021/05/12/the-african-telecommunications-union-launches-the-1st-set-of-atu-spectrum-recommendations/

7. A clear timeline for the release of additional mobile broadband spectrum (short term, medium term and long term).
8. Identify future technological trends (spectrum sharing mechanisms and emerging standards) and their impact on spectrum policy and planning.
9. Monitor the implementation of broadband spectrum plans.
10. Flexibility in spectrum regulation in order to ensure efficiency in spectrum use. This would include the development of a spectrum sharing framework for mobile broadband, developing models for spectrum trading, encouraging network deployments by National Roaming (particularly in rural, unserved and underserved areas), 'Use it or lose it' / 'Use it or Share it' obligations on spectrum licenses, and allowing for staggered/instalment payments for settling spectrum fees.
11. Accommodating emerging technologies and standards that would extend mobile broadband networks into unserved and underserved areas.
12. Coordinated standards for reflecting information within spectrum licensing and usage databases.
13. Standardize frequency allocations for wireless broadband regionally, allowing for the reduction of border interference and supporting common technical standards.
14. Maximize spectrum efficiency for broadband services with the use of techniques such as band planning approaches and the incorporation of innovative authorization approaches and technologies.
15. Study various propagation models that cover a variety of different environments, so as to accommodate future mobile broadband services while taking into account the characteristics of the cell radius and the antenna parameters.

The ATU recognizes the importance of identifying future technological trends, including those on spectrum sharing mechanisms, and emerging standards. Thereafter, it is recommended that an assessment is carried through on the impact on spectrum policy and planning[11].

Consultation question:

1. Please comment on whether the above captures the relevant regulatory and policy aspects of long term spectrum planning.
Comment:

2.6 SARAO

2.6.1 RADIO ASTRONOMY

The Astronomy Geographic Act, 2007 (AGA Act No. 21 of 2007) provides the legal basis and framework for the declaration of astronomy advantage area and protection of such areas from harmful radio frequency interference that may hamper the cosmic observations by scientific instruments located within those areas. The authority develops the national spectrum allocation, assign frequencies to licensees, and monitor compliance with license terms. The Astronomy Management Authority (AMA) within the Department of Science and Innovation was assigned to manage the declared Karoo

[11] See: https://www.atuuat.africa/wp-content/uploads/2021/04/English-ATU-R-Spectrum-Recommendation-004-0.pdf

Central Astronomy Advantage Areas (KCAAAs). The Authority gave notice to all radio frequency spectrum licensees operating within the KCAAAs to apply for a permit with the AMA in terms of KCAAAs Regulations; through GG No. 42080 under Notice No. 765 of 4 December 2018.
This section provides information on the regulatory framework established for the protection of radio astronomy in South Africa.

2.6.2 DECLARATION OF ASTRONOMY ADVANTAGE AREAS

The Minister responsible for science and technology may declare any area or part of an area in the Province of the Northern Cape as an astronomy advantage area to be protected, preserved and properly maintained in respect of radio frequency interference or interference in any other way.

i. The whole of the territory of the Northern Cape Province excluding Sol Plaatje Municipality is declared for radio astronomy purpose, as Declared in GG No. 32951 Notice No. 115 of 19 February 2010.

ii. The Karoo Core Astronomy Advantage Area (KCoreAAA) is used for the purposes of radio astronomy and related scientific endeavors, as declared in GG No. 33462 Notice No. 723 of 20 August 2010.

iii. The Karoo Central Astronomy Advantage Area (KCAAAs) is used for the purpose of radio astronomy and related scientific endeavors, as declared in GG No. 37434 Notice No. 198 of 12 March 2014.

The purpose of the declaration of areas as astronomy advantage areas is to ensure that the geographic area, which are suitable for astronomy and related scientific endeavors is protected, preserved and properly maintained in accordance with good national and international practices.

2.6.3 REGULATIONS OF ASTRONOMY ADVANTAGE AREAS

The Minister responsible for science and technology may make regulations for the management and protection of astronomy advantage areas.

i. Regulations on radio astronomy protection levels in astronomy advantage areas declared for the purpose of radio astronomy were published in Government Gazette No. 35007 under Notice No. R. 90 of 10 February 2012.

ii. Regulations to prohibit or restrict certain activities in the core astronomy advantage areas declared for the radio astronomy purposes were published in Government Gazette No. 35450, under Notice No. R. 465 of 22 June 2012.

iii. Regulations on the protection of the Karoo central astronomy advantage areas declared for the purpose of radio astronomy were published in Government Gazette No. 41321, under Notice No. 1411 of 15 December 2017.

The Minister obtained concurrence of ICASA when making regulations for prohibiting or restricting activities that have an adverse effect on astronomy and related scientific endeavors.

2.6.4 ASTRONOMY DEVICES

The Minister may declare any existing or proposed scientific endeavor to be astronomy and related scientific endeavors for the purpose of the Astronomy Geographic Advantage Act.

i. The establishment and operation of MeerKAT telescope is declared a scientific endeavor in Government Gazette No. 33614, under Notice No. 897 of 15 October 2010.

ii. The establishment and operation of Square Kilometre Array (SKA) telescope is declared a scientific endeavor in Government Gazette No. 33614, under Notice No. 897 of 15 October 2010.

iii. The operation of C-BASS telescope within the spectrum between 4.5 GHz and 6.5 GHz is declared a scientific endeavor in Government Gazette No. 36826, under Notice No. 684 of 13 September 2013.

iv. The development and operation of PAPER telescope and HERA telescope within the spectrum between 100 MHz and 200 MHz is declared a scientific endeavor in Government Gazette No. 36826, under Notice No. 684 of 13 September 2013.

2.6.5 SPECTRUM LIST EXEMPTED FROM PROHIBITION

From one (1) year after the date that KCAAAs Regulations become operational, no licensee or license exempted operator shall use, or continue to use the radio frequency spectrum from 100 MHz to 25.5 GHz to conduct radio transmissions within the declared KCAAAs, unless the spectrum is exempted from prohibition. The Minister published a list of the radio frequency spectrum and applications that are exempted from the prohibition of use for transmissions located within the KCAAAs in Government Gazette No. 45045, under Notice No. 753 of 26 August 2021.

2.6.6 ASTRONOMY FACILITIES WITHIN THE DECLARED AREAS

The use of radio frequency bands in the areas declared as Karoo Core and Central Astronomy Advantage Areas are regulated as follows:
Unless required for the purpose of radio astronomy and related scientific endeavors the use of the radio frequency spectrum in Table 1 is restricted within the declared as Karoo Core and Central Astronomy Advantage Areas.

Table 1: Restrictions on the use of radio frequency spectrum

Declared Area	Prohibited Band
KCoreAAA	9 kHz to 3 000 GHz
KCAAA 1	100 MHz to 2 170 MHz
KCAAA 2	100 MHz to 6 GHz
KCAAA 3	100 MHz to 25.5 GHz

3 SPECTRUM MANAGEMENT AND ECONOMIC IMPACT

3.1 IMPACT OF BROADBAND

As set out above, the NDP, SA Connect, CRASA and the ATU all consider broadband services as playing an important role in economic development. In this section, the Authority considers the impact of broadband on economic growth in more detail.

The effects of broadband on economic growth can be categorised as ‘direct’ in terms of the investments in infrastructure and the actual rollout, and ‘indirect’ in terms of the services and capabilities enabled by broadband access which in turn drive economic growth.[12] These include, for example, its positive impact on innovation, firm productivity and the development of consumer applications and services

[12] Organisation for Economic Co-operation and Development (OECD). (2007). Broadband and the Economy: Ministerial Background Report DSTI/ICCP/IE(2007)3/FINAL. Available here.

which enhance consumer surplus.[13] Through facilitating the improved efficiency of Information and Communication Technologies (ICT), broadband access allows for innovation in terms of how and where economic activity takes place,[14] a factor which is especially important in the context of rural development initiatives in South Africa. There may also be 'induced' effects which arise from the household spending based on income derived from the direct and indirect effects.[15]

It is important to note that the impact of broadband access on economic growth depends, in part, on the level of penetration of broadband. Higher rates of penetration (above 20% in some studies) lead to a higher contribution to economic growth[16], which has to do with establishing critical mass, scale economies in provision and network effects whereby there are greater benefits to individual users if there is a greater number of other people also making use of the technology. Benefits may also decline beyond a certain level of penetration[17]. Levels of penetration in South Africa are considered to be sub-optimal (as discussed in more detail below), such that there are likely to be significant benefits from increasing access for some time to come. Furthermore, given a low base in terms of broadband coverage in South Africa (owing to slow rollout of fixed-line access, delays in LLU, and regulatory constraints, amongst other factors discussed in the ITA), gains to consumers from increased access are likely to be high, particularly in rural and under-developed settings.

Most studies internationally find a positive (and in many cases causal) relationship between broadband penetration and GDP growth.[18] At the same time, there is a risk that broadband may lead to the displacement of labour for capital in developing countries and SMEs may take time to adapt their business processes to using internet-based functionality to improve their operations.[19] Nonetheless, it is important to highlight that recent research by Hjort and Poulsen (2019) shows that the expansion of high-speed internet access in African countries, including South Africa, results not only in greater employment but in greater productivity as well.[20] Broadband access has also been shown to lead to benefits in terms of productivity in sectors with high labour intensity (such as tourism), which aligns with the emphasis in the NDP on growth and development of labour-intensive sectors.[21] It is therefore likely that expanding access to broadband services in South Africa will lead to greater economic growth, productivity and employment.

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[13] Katz, R. (2012). 'Impact of Broadband on the Economy'. International Telecommunication Union. Available here.

[14] OECD (2007).

[15] Katz, R. L. 'The impact of South Africa Connect on jobs and the economy'. Presentation at DoC Broadband Workshop, 11-12 November 2013, Pretoria. Available here.

[16] Katz (2012); and Koutroumpis, P. (2009). 'The Economic impact of broadband on growth: A simultaneous approach'. Telecommunications Policy, vol. 33 (9). Available here.

[17] Atkinson, R., Castro, D., & Ezell, S. (2009). 'The Digital Road to Recovery: A stimulus plan to create jobs, boost productivity, and revitalise America'. The Information Technology and Innovation Foundation. Available here.

[18] For a detailed review of studies applying various methodologies to estimate this impact, see Minges, M. 'Exploring the Relationship between Broadband and Economic Growth', Background Paper prepared for the World Development Report 2016: Digital Dividends, available here. Also see Bonakele, T., Cull, D., Hawthorne, R. and Lewis, C., 'Review of economic regulation of the telecommunications sector', Centre for Competition, Regulation and Economic Development Working Paper No. 2014/7, available here; and Katz (2012).

[19] Katz (2012).

[20] Hjort, J., & Poulsen, J. (2019). The arrival of fast internet and employment in Africa. *American Economic Review*, *109*(3), 1032-79.

[21] NPC (2011).

Consultation question:

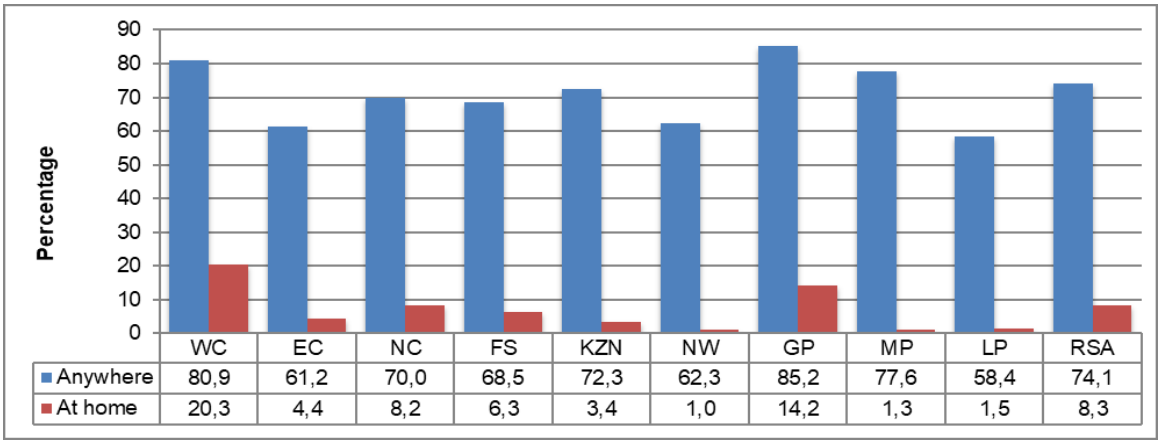
2. Are there services, in addition to broadband, that ought to be considered as important for economic growth? If so, please explain what these services might be and what the trade-offs are between using spectrum for broadband and alternative services. Please provide any evidence from other countries that may be relevant.
Comments:

3.2 BROADBAND PENETRATION IN SOUTH AFRICA

Based on the General Household Survey for 2020 (published in December 2021), approximately 74.1% of households in South Africa had at least one member who used the internet either at home, work, at a place of study or internet cafes, which has increased significantly from 32.9% in 2011, though in more recent years appears to have plateaued (2019: 63.3%, 2018: 64.7%, 2017: 61.8%).[22] In 2020 we saw an increase of approximately 10%. The distribution of access has been uneven and many households remain without any access to internet.. Importantly, access to the internet is driven by the use of mobile phones[23] which speaks to the importance of distributing additional spectrum to enhance (mobile) broadband service provision.

In most provinces other than Gauteng and the Western Cape, internet access at the home is at alarmingly low levels (below 10%). Internet access by any available means was also very low in the mainly rural provinces, including Limpopo (58.4%) and the Eastern Cape (61.2%).[24]

Figure 1: Percentage of households with access to internet at home, or for which at least one member has access to or used the internet by province, 2020



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Anywhere	80,9	61,2	70,0	68,5	72,3	62,3	85,2	77,6	58,4	74,1
At home	20,3	4,4	8,2	6,3	3,4	1,0	14,2	1,3	1,5	8,3

Source: Statistics South Africa General Household Survey Report 2020, publication P0318

The potential for growth in internet access and adoption of various ICTs in areas outside of the major metros and economic centres remains very large. For example, the use of ICTs other than mobile phones

[22] Statistics South Africa General Household Survey Report, 2011 and 2020.

[23] StatsSA (2020).

[24] StatsSA (2020).

(fixed-line telephones, computers and the internet) among informal businesses has historically been very low.[25]

In formal businesses, the situation is somewhat different with greater adoption of internet services. Surveys of South African SMEs[26] have found positive correlations between the use of a webpage and business profitability and estimate that approximately 63% of formal SMEs actually had a website.[27] The direction of causality is not clear in this regard, and it may be that more profitable businesses are more likely to use a website, although it is nonetheless significant that higher profitability is associated with usage of ICTs. This is consistent with findings in a BCG study indicating that high web use SMEs showed higher revenue growth (by approximately 22%) than low or no web use SMEs in 11 G-20 economies.[28] SMEs use internet access for various functions including staff recruitment, geographic expansion, improved marketing, better customer interaction, and use of cloud services and online platforms such accounting functions which reduces capital requirements.[29]

Katz (2013) finds at a high level that the conservative broadband investment of R65 billion which is envisaged in the SA Connect policy could result in the creation over ten years of 435,000 jobs and a total contribution to GDP of R130 billion.[30] The majority of the impact estimated is through direct effects. The assessment uses input-output tables to estimate the direct (short term) impacts on employment and production of broadband construction, and estimates medium and long term effects and externalities in the economy as a whole by looking at a digitization index within an endogenous growth model which links GDP with the fixed capital stock, labour force and level of digitization. The digitization index comprises various measures relating to affordability, infrastructure reliability, capacity, usage and human capital aspects of ICT in general, rather than broadband in isolation. This raises concerns about the applicability of the analysis for drawing conclusions on the impact of interventions in broadband, and potential endogeneity. Nonetheless, the findings overall are consistent with other studies on the South African market and internationally.

Given South Africa's challenges in terms of access to basic needs and services amongst the poorest in the population, it is significant that greater access to the internet across the population can enhance service delivery and access. For example, various ICT-based education programmes have been launched as well as 'telemedicine' services which enable medical specialists to connect with hospitals and patients in rural settings.[31]

Innovation based on internet-based platforms and digitisation has also grown significantly and is projected to increase in future. Furthermore, a large proportion of social media services such as WhatsApp and Facebook, banking and e-commerce services are now used via mobile services.[32]

The potential for innovation in internet-based platforms and services will no doubt lead to benefits for businesses in terms of reducing transaction costs and allowing firms to expand the geographic reach of

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[25] Esselaar, S., Deen-Swarray, M., Ndiwalana, A. & Stork, C. (2007). 'ICT usage and its impact on profitability of SMEs in 13 African countries'. Information Technologies and International Development, Vol. 4(a).

[26] Firms with up to 200 employees.

[27] Goldstuck (2012).

[28] Boston Consulting Group (BCG). (2012). The Internet Economy in the G-20: The $4.2 Trillion Growth Opportunity. Available here.

[29] BCG (2012).

[30] Katz (2013).

[31] Analysys Mason. (2010). Assessment of Economic Impact of Wireless Broadband in South Africa. Available here.

[32] Goga, S., Paelo, A. and Nyamwena, J. (2019). Online Retailing in South Africa: An Overview

their operations.[33] Consumers also stand to benefit, and have already gained, from access to new internet-based services and mobile platforms that provide greater convenience, safety and reduce costs, such as mobile and internet banking.

A key question, however, is the low rates of uptake of mobile broadband in South Africa, as shown on Figure 1, given almost full coverage of at least 3G services reported by MTN and Vodacom. One possible explanation for this is affordability, and therefore pricing of data services. A barrier to lower mobile data prices in South Africa which has frequently been cited is the lack of spectrum assigned to the mobile operators. This is since having access to spectrum lowers the cost to operators of rolling out both improved coverage and capacity, since it requires them to build fewer base stations. In addition, large amounts of spectrum are necessary to provide high speed mobile broadband, especially as the demand for data increases rapidly. If operators with inadequate spectrum assignments are struggling to meet data capacity requirements from their existing customers, this lowers their incentive to reduce prices as lower prices will lead to higher volumes which could result in declining network quality. There are therefore a number of reasons why spectrum assignment is critical to achieving cheap, high quality mobile broadband. Additional spectrum is needed to expand access to broadband, improve the quality of service to those customers that already have access, and reduce the cost of access for all.

Consultation questions

3. Please comment on the above assessment of the status quo on broadband penetration in South Africa, and what role spectrum may play in addressing the gaps identified.
Comments:

3.3 KEY TRENDS

Technology can develop in unpredictable ways and so Ofcom has proposed a spectrum management plan for the 2020s, which includes a section on 'Contextual trends for future spectrum management'[34]. There are a number of trends that Ofcom identifies that are relevant for long term planning in South Africa:

Changing external contexts

- Diversity of healthcare and wellbeing technologies such as wearable technology and medical devices, as well as increasing automation in the care for the aging and the disabled.
- Environmental concerns that will encourage the reduction of environmental impact through asset monitoring, smart utilities management or climate monitoring. Climate changes could also change how signals propagate, affecting the risk of interference between spectrum users.
- Safe and secure infrastructure will require greater use of wireless communications for remote monitoring and management of critical infrastructure sites and equipment.
- Long term implications of COVID-19 might mean increased home, flexible, or dispersed working requirements – resulting in greater demands on connectivity in the home and rural areas.

Changing technology and network architectures

[33] Katz (2012).

[34] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0027/208773/spectrum-strategy-consultation.pdf

- Higher frequency bands that are not currently utilised will mean greater network speeds and capacity, improving consumer experiences. However, these spectrum bands have different propagation characteristics and so have different management requirements.
- Progression of radio technology will enable more efficiency in spectrum use, as well as more products and services having access the spectrum they need and when they need it.
- Deployment of increasingly localised telecoms infrastructure (e.g., to lampposts) will enable more devices, more data use, and quicker connectivity responses. This would lead to better resource utilisation but would also require very high-speed network connections.
- More stratospheric and satellite deployments could enable improved broadband internet in inaccessible locations.
- The retirement of analogue services in favour of newer digital ones.

Changing application demands

- Growing capacity demands for people and business and thus increasing quantities of data moving across networks – e.g., increasing use of communications devices (particularly smart devices), and the importance of AI and data analytics.
- A shift towards wireless needing to have characteristics that match wired connections, allowing for increased complementarity between fixed and wireless services (product convergence and service substitution).
- Communication requirements of smart cities and industrial IoT will become more diverse.
- Robotics and drone usage becoming more common, including in industrial contexts - requiring a combination of low latency, ultra-high reliability and high download and upload speeds.
- Connected vehicles becoming increasingly common, meaning more 'vehicle-to-everything' communication, such as traffic management services. Additionally, autonomous and semi-autonomous vehicles will have various communication requirements.

Changing spectrum demands

The trends above, alongside future technological advancements, will support the greater adoption of wireless technologies throughout the economy and society. This continued adoption of digital technologies transforms businesses and organisations as they offer large gains in terms of productivity, cost reduction, sustainability and flexibility in responding to market changes.

These trends would lead to new wireless applications alongside changes in the provision of existing wireless services – leading to new spectrum demands that may look very different from that of today.

Growing use of higher frequencies

Radio technologies continue progressing and so much higher frequencies can be used, thus increasing the effective supply of usable spectrum. These higher frequency bands offer higher capacity and their propagation characteristics (limited range and the need for highly directional antennas) mean that there is a significantly different risk of interference compared to lower bands – in some ways easier to manage and in other ways harder. Notably, higher frequency bands are limited to short and variable ranges, meaning that they are not suitable for all applications. But at the same time, other technologies such as radar could make use of higher frequencies and wider bandwidths so as to provide high resolution imaging or sensing.

The move into these higher frequency bands may also create opportunities for new approaches to spectrum management - especially considering the larger capacity and fewer incumbents.

Other potentially disruptive technology developments

Technology developments could have a more disruptive impact on how spectrum is managed over time - for example, consider the role of automated tools that manage spectrum. There are also a number of prospective technologies that may offer a reduction in the need for spectrum use to be regulated to the

extent that it is today – for example, if devices had advanced capabilities to coordinate their use with others.

Looking at the number of other potential emerging technologies (AI, self-configuring networks, automated spectrum management tools, blockchain, spectrum in the 3000 GHz range and above, and 6G technology), it is too early to conclude definitively whether or not they will lead to disruptive changes for spectrum management within the next ten years. However, it is still important to work on understanding and developing relevant and new spectrum management technologies and techniques over time.

Consultation questions

4. What future changes, if any, should ICASA examine with regard to the existing licensing regime to better plan for innovative new technologies and applications and allow for benefits that new technology can offer, such as improved spectrum efficiency?
Comment:

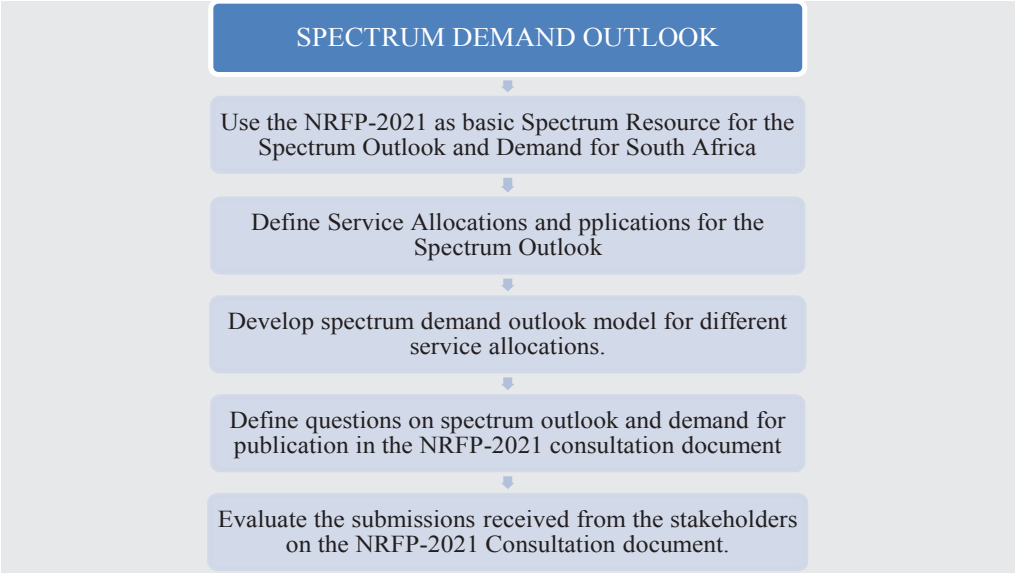
5. What future emerging technologies are to be taken into consideration and which technologies will have a significant impact? When are these technologies expected to become available?
Comment:

6. What and how will technology developments and/or usage trends aid in relieving traffic pressures? When are these technologies expected to become available?
Comment:

7. Are there any IoT applications that will have a large impact on the existing licence-exempt bands? If so, what bands will see the most impact from these applications?
Comment:

4 SPECTRUM DEMAND OUTLOOK

The basic workflow for the spectrum demand outlook includes the following steps:



The Authority has published the NRFP-2021, which is a key resource for developing the future spectrum outlook. The next step is to consider standard lists of applications for different radio services, discussed next. This is followed by considering the spectrum outlook for electronic communications network services (commercial fixed and mobile network services), and then the outlook for various specialised applications. Frequency migration and costing is then considered. Questions for consultation are set out throughout this document.

4.1 STANDARDISATION OF LISTS OF APPLICATIONS FOR DIFFERENT ITU RADIO SERVICES

It is important to assess spectrum demand against categories of services. The purpose of this section is to request comments on the standardisation of the applications that is applicable to the different ITU services in the Radio Regulations (RR). In the European Union, there is a list of service applications that provides a basis for analysis. All EU members maintain their databases and also provide input on the standard application being used in the region. The European Conference of Postal and Telecommunications Administrations (CEPT) maintains this database, called the European Communications Office (ECO) Frequency Information System (EFIS).

In South Africa and SADC there are no such standard list of applications for the different services applications, and this can cause confusion on what the associated application shall be called in the 3rd column of the NRFP-21.

The list of radio services in the ITU RR is divided into three layers of detail in accordance with the definitions given in the RR. When searching for and comparing information, EFIS makes use of these layers. For example, a search for a specific term in layer 2 will automatically start a search for all terms in layer 3 under that specific term. If nothing is found in either layer 2 or 3, EFIS also checks layer 1 and informs the user if an item is found.

It is important to define such a structure on applications for ICASA and South Africa, because:

- It will improve efficiency in the licensing system;

- It will provide a structured environment for categorisation of equipment that needs to be type approved; and
- It contributes to harmonisation of the frequency spectrum.

The following section describes the three layers of allocations:

Layer 1	Layer 2	Layer 3
Amateur		
Amateur-Satellite		
Broadcasting		
Broadcasting-Satellite		
Earth Exploration-Satellite	Earth Exploration-Satellite (active)	
	Earth Exploration-Satellite (passive)	
	Meteorological-Satellite	
Fixed		
Fixed-Satellite		
Inter-Satellite		
Mobile	Aeronautical Mobile	Aeronautical Mobile (R)
		Aeronautical Mobile (OR)
	Land Mobile	
	Maritime Mobile	

Layer 1	Layer 2	Layer 3
		Maritime Mobile (distress and safety)
		Maritime Mobile (distress and calling)
		Maritime Mobile (distress, safety and calling)
		Maritime Mobile (distress and calling via DSC)
	Mobile (distress and safety)	
	Mobile (distress and calling)	
	Mobile (distress, safety and calling)	
	Mobile except aeronautical mobile	
	Mobile except aeronautical mobile (R)	
Mobile-Satellite	**Aeronautical Mobile-Satellite**	
	Land Mobile-Satellite	
	Maritime Mobile-Satellite	
	Mobile-satellite except aeronautical mobile-satellite	
	Mobile-satellite except aeronautical mobile-satellite (R)	
	Mobile-satellite except maritime mobile satellite	
Meteorological Aids		
Radio Astronomy		
Radiodetermination	Radionavigation	Aeronautical Radionavigation Maritime Radionavigation Maritime Radionavigation
	Radiolocation	
Radiodetermination-Satellite	**Radionavigation-Satellite**	**Aeronautical Radionavigation-Satellite Maritime Radionavigation-Satellite**
	Radiolocation-Satellite	
Space Operation		Space Operation (satellite identification)
Space Research	Space Research (active) Space Research (deep space) Space Research (passive)	
Standard Frequency and Time Signal		
Standard Frequency and Time Signal-Satellite		

The corresponding application layers that are proposed for the service allocations is given below:

Layer 1	Layer 2	Layer 3
Aeronautical	Aeronautical communications	Aeronautical satcoms, AGA communications (civil), SAR (communications), WAIC
	Aeronautical emergency	ELT
	Aeronautical navigation	ASDE, Airborne doppler navigation aids, Airborne weather radar, Altimeters, Beacons (aeronautical), DME, GBAS, ILS Loran C,MLS, SAR (navigation), VOR
	Aeronautical surveillance	ADS, ASDE, Primary radar, SSR
	Aeronautical telemetry/telecommand	Aeronautical telemetry, Aeronautical telecommand
	Satellite navigation systems	GALILEO, GLONASS, GPS
Broadcasting	Broadcasting (terrestrial)	AM sound analogue, DRM, DVB-T, DVB-T2, FM sound analogue, MWS, T-DAB, T-DAB+, TV analogue (terrestrial)
	Broadcasting (satellite)	Satellite radio, Satellite TV, SIT/SUT
Defence systems	Aeronautical military systems	AGA communications (military), IFF, JTIDS/MIDS, TACAN-DME
	Land military systems	Fixed radio relay (military), Tactical mobile, Tactical radio relay
	Maritime military systems	Sonobuoy
	Meteorological aids (military)	
	Radiolocation (military)	Air-defence radar, Tactical radar
	Satellite systems (military)	Earth exploration-satellite (military), GLONASS, GPS, Satellite communications (military)
	Telemetry/Telecommand (military)	Telemetry (military), Telecommand (military)
Fixed	BWA	BFWA, FWA
	MFCN	IMT
	Point-to-Multipoint	MWS, Scanning telemetry, Subscriber access excluding MWS, Unplanned, uncoordinated fixed links
	Point-to-Point	Private fixed networks, Public fixed networks, Audio links, Video links, Unplanned, uncoordinated fixed links
Land mobile	BWA	
	Cordless telephones	DECT
	D-GPS	
	Digital cellular	DA2GC, GSM, IMT, MCA, MCV
	RMR	GSM-R, FRMCS
	Inland waterway communications	
	ITS	
	MFCN	IMT
	Paging	NP2M, On-site paging, POCSAG, Talkback pocket unit, Wide area paging
	PMR/PAMR	PAMR, PMR, PMR 446, TETRA, TETRAPOL
	PPDR	BBDR, LAES, PLB
	Telemetry/Telecommand (civil)	Scanning telemetry, Telemetry (civil)
Maritime	GMDSS	DSC, EPIRBs, INMARSAT C, MSI, NAVTEX, SAR (communications), SAR (navigation)
	Maritime communications	AIS, Inland waterway communications, INMARSAT, On-board communications
	Maritime navigation	Beacons (maritime), Inland waterway radar, Loran C, Maritime radar, RTE, SAR (navigation)
	Satellite navigation systems	GALILEO, GLONASS, GPS
Meteorology	Lightning detection systems	
	Oceanographic buoys	
	Sondes	
	Weather radar	
	Weather satellites	
	Wind profilers	
Other	Amateur	
	CB radio	DSB/SSB AM CB / CEPT PR 27
	GNSS Pseudolites	
	GNSS Repeater	

Layer 1	Layer 2	Layer 3
	HAPS	
	ISM	
	Land radionavigation	
	MBR	
	Meteor scatter communications	
	Radiolocation (civil)	
	Standard frequency and time signal	
	Tracking systems	
	UAS	
PMSE	Audio PMSE	In-ear monitor systems, Radio microphones, Audio links
	Video PMSE	Airborne Video Links, Cordless cameras, Video links
	Service links	Talkback
Radio astronomy	Continuum measurements	
	Spectral line observations	
	VLBI observations	
Radiolocation (civil)	Aeronautical radar	Airborne weather radar, Primary radar
	Maritime radar	Inland waterway radar, RTE
	Weather radar	Airborne weather radar
Satellite systems (civil)	Aeronautical satcoms	INMARSAT
	Amateur-satellite	
	Broadcasting (satellite)	Satellite radio, Satellite TV, SIT/SUT
	Earth exploration-satellite	Active sensors (satellite), Passive sensors (satellite), Synthetic aperture radar, Weather satellites
	Feeder links	
	FSS Earth stations	AES, ESIM, ESV, GSO ESOMPs, HEST, LEST, NGSO ESOMPs, SIT/SUT, SNG, VSAT, NGSO FSS
	Inter-satellite links	
	Meteorological satcoms	
	MSS Earth stations	AES, CGC, INMARSAT, IMT-2000 satellite component, S-PCS
	Satellite navigation systems	GALILEO, GLONASS, GPS
	Space operations	
	Space research	Active sensors (satellite), Deep space (satellite),Passive sensors (satellite)
	Standard frequency and time signal-satellite	
	Weather satellites	
Short Range Devices	Active medical implants	LP-AMI, Medical implants, Medical telemetry, ULP-AMI, ULP-MMI
	Alarms	Social alarms
	Inductive applications	
	Medical Data Acquisition	MBANS, ULP-WMCE
	Model control	Flying model control
	Non-specific SRDs	Emergency detection
	Radiodetermination applications	BMA, Detection of movement and alert, GBSAR, GPR/WPR, LPR Material Sensing, NMR, TLPR
	Radio microphones and ALD	Aids for hearing impaired, ALS, Personal hearing aids, Radio microphones
	Railway applications	Eurobalise, Euroloop
	RFID	
	Tracking, tracing and data acquisition	Animal tracking, Asset tracking and tracing, Emergency detection, LAES
		LT2, Meter reading, WIA
	TTT	Automotive radar, SRR, Vehicle and infrastructure radar
	UWB applications	BMA, Communication applications, GPR/WPR, LAES, LT2, Material Sensing, SRR
	Wideband data transmission systems	DECT, Radio LANs
	Wireless audio/multimedia	Baby monitoring, Band II LPD, Cordless headphones and loudspeakers,Narrow band analogue voice devices
	Non-beam WPT	

The following abbreviations apply to the tables above.

ABBREVIATION	DESCRIPTION
ADS	Automatic Dependant Surveillance (Aeronautical)
AES	Automatic Dependant Surveillance (Aeronautical)
AGA	Aircraft Earth Station
AIS	Air-Ground-Air
ALS	Universal Shipborne Automatic Identification System
AM	Assistive Listening Systems
ALD	Amplitude Modulation
ASDE	Assistive Listening Devices
BBDR	Airport Surface Detection Equipment
BFWA	Broad Band Disaster Relief
BWA	Broadband Fixed Wireless Access
CB	Broadband Wireless Access
CGC	Citizen's Band
CT	Complementary Ground Component
DA2GC	Cordless Telephone
DECT	Direct Air-to-Ground Communications
D-GPS	Digital Enhanced Cordless Telecommunications
DME	Differential Global Positioning System
DRM	Distance Measuring Equipment
DSC	Digital Radio Mondiale
DVB-T	Digital Selective Calling
ELT	Digital Video Broadcasting – Terrestrial
ENG/OB	Emergency locator transmitter
EPIRBs	Electronic News Gathering / Outside Broadcasting
ESIM	Emergency Position Indicating Radio Beacons
ESOMPs	Earth Stations In-Motion
ESV	Earth Stations On Mobile Platforms
FM	Earth Stations on-board Vessels
FRMCS	Frequency Modulation
FSS	Future Railway Mobile Communication System
FWA	Fixed-Satellite Service
GBAS	Fixed Wireless Access
GBSAR	Ground Based Augmentation System
GLONASS	Ground Based Synthetic Aperture Radar
GMDSS	Global Maritime Distress and Safety System
GNSS	Global Navigation Satellite System
GNSS Pseudolites	Global Navigation Satellite System Pseudolites
GPR	Ground Probing Radar
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GSM-R	Global System for Mobile Communications on Railways
GSO	GeoStationary Orbit
HAPS	High Altitude Platform Station
HEST	High e.i.r.p. Satellite Terminal
IFF	Identification Friend or Foe
ILS	Instrument Landing System
IMT-2000	International Mobile Telecommunications-2000
IMT-Advanced	Systems beyond IMT-2000
IMT	International Mobile Telecommunications (includes IMT-2000 and IMT-Advanced
ISM	Industrial, Scientific and Medical applications
ITS	Intelligent Transport Systems
JTIDS	Joint Tactical Information Distribution System
LAES	Location Application for Emergency Services
LANs	Local Area Networks
LEST	Low e.i.r.p. Satellite Terminal
LP-AMI	Low Power Active Medical Implants

ABBREVIATION	DESCRIPTION
LPD	Low Power Device
LPR	Level Probing Radar
LT2	Location Tracking Type 2
MBANS	Medical Body Area Network System
MBR	Maritime Broadband Radio
MCA	Mobile Communications on Board Aircraft
MCV	Mobile Communication Services on Board Vessels
MFCN	Mobile/Fixed Communications Networks
MIDS	Multifunctional Information Distribution System
MLS	Microwave Landing System
MSI	Maritime Safety Information
MSS	Mobile-Satellite Service
MWS	Multimedia Wireless System
NAVTEX	Narrow-band direct-printing telegraphy system for transmission of navigational and meteorological warnings and urgent information to ships
NGSO	Non-GeoStationary Orbit
NMR	Nuclear Magnetic Resonance applications
NP2M	Narrowband Point to Multipoint system
PAMR	Public Access Mobile Radio
PLB	Personal Locator Beacon
PMR	Private (Professional) Mobile Radio
PMSE	Programme Making and Special Events
POCSAG	Post Office Code Standards Advisory Group
PPDR	Public Protection & Disaster Relief
RFID	Radio Frequency Identification
RMR	Railway Mobile Radio
RTE	Radar Target Enhancer
SAB	Service Ancillary to Broadcasting
SAP	Service Ancillary to Programme making
SAR	Search and Rescue
SATCOM	Satellite Communication
SIT/SUT	Satellite Interactive Terminal / Satellite User Terminal
SNG	Satellite News Gathering
S-PCS	Satellite - Personal Communications System
SRD	Short Range Devices
SRR	Short Range Radars
SSR	Secondary Surveillance Radar
TACAN	Tactical Air Navigation
T-DAB	Terrestrial Digital Audio Broadcasting
TETRA	Terrestrial Trunked Radio
TETRAPOL	Digital PMR technology
TLPR	Tank Level Probing Radar
TRA-ECS	Terrestrial radio applications capable of providing electronic communications services
TTT	Transport and Traffic Telematics
TV	Television
UAS	Unmanned Aircraft System
ULP-AMI	Ultra Low Power Active Medical Implants
ULP-MMI	Ultra Low Power Medical Membrane Implants
ULP-WMCE	Ultra-Low Power Wireless Medical Capsule Endoscopy
VLBI	Very Long Baseline Interferometry
VOR	VHF Omnidirectional Radio Range
VSAT	Very Small Aperture Terminal
UWB	Ultra Wideband
WAIC	Wireless Avionics Intra-Communications systems
WIA	Wireless Industrial Applications
WPR	Wall Probing Radar
WPT	Wireless Power Transmission

Consultation questions

8. Please provide your views regarding the standardization of the naming of applications in the NRFP in accordance with CEPT ECC decision 1(03) approved 15 November 2001 and its subsequent revisions.
Comment:

9. What are your forecasts for data traffic and radio frequency spectrum needed over the next 5, 10 and 20 years for each of the EFIS application layers?
Comment:

10. How much spectrum is allocated to each of the EFIS application layers, and what is the economic value of spectrum used in each of the above EFIS application layers? What are the opportunity costs for current spectrum allocations for EFIS these application layers (what is the value to alternative users of these allocations)?
Comment:

4.2 SPECTRUM OUTLOOK FOR COMMERCIAL ELECTRONIC COMMUNICATIONS NETWORK SERVICES (FIXED, MOBILE, INCLUDING IMT)

As explained in Section 0, there is an emphasis in the ECA on spectrum allocations for electronic communications services, and electronic communications network services. As set out in the Authority's IMT roadmap[35], there are a range of applications for IMT that overlap with services allocated for more specialised services (discussed below in Section 4.3). The applications set out in the IMT roadmap are:

(a) mobile telephony/broadband internet (LTE/IMT);

(b) broadband access to scarcely populated areas;

(c) services ancillary to broadcasting, which already coexist with broadcasting;

(d) low power devices (licence exempt or not);

(e) private mobile radio;

(f) military communications; and

[35] See Government Gazette 42829.

(g) public protection and disaster relief (PPDR).

There is a considerable degree of overlap between the capabilities of mobile network technologies and services provided for specialised applications, and there is therefore a question as to what degree various specialised applications will simply use commercial mobile and fixed wireless technologies in future.[36]

In the sections that follow, the demand for mobile internet services in the coming years is discussed first, in Section 4.2.1. Next, the outlook for spectrum used for fixed-wireless applications is described in Section 4.2.2.

4.2.1 MOBILE

The Authority's IMT roadmap considers the key applications for mobile in the coming years, and therefore provides a basis for the spectrum outlook for mobile service applications. The IMT roadmap reflects on the IMT 2020 vision set out by the ITU, which envisages:[37]

- Enhanced mobile broadband (faster and more reliable broadband),
- Massive machine type communications, often overlapping with services offered by short-range devices (discussed in Section 4.3.10), and
- Ultra-reliable and low latency communications, such as for driverless cars and smart manufacturing.

The IMT roadmap 2019 documents that, historically, 460MHz of spectrum was assigned for IMT purposes. The previous IMT roadmap 2014 considered an additional 2x133MHz of paired spectrum and 290MHz of unpaired spectrum be made available, a total of 1016MHz. At the conclusion of the Authority's current spectrum auction, 1015MHz of spectrum will be assigned.[38]

The need for IMT spectrum is likely to increase significantly in the coming years. This is for a number of reasons, according to the ITU (Figure 2, reflected in the Authority's IMT Roadmap):[39]

1. **Enhanced mobile broadband** applications serving consumers, including multi-media content, services and data.
2. **Ultra-reliable and low latency communications**: applications such as wireless control of manufacturing facilities, remote medicine, transportation safety, etc have stringent latency, throughput and reliability requirements.
3. **Massive machine type communications:** there may be large numbers of low-usage devices with non-time-sensitive transmission requirements connected via mobile.

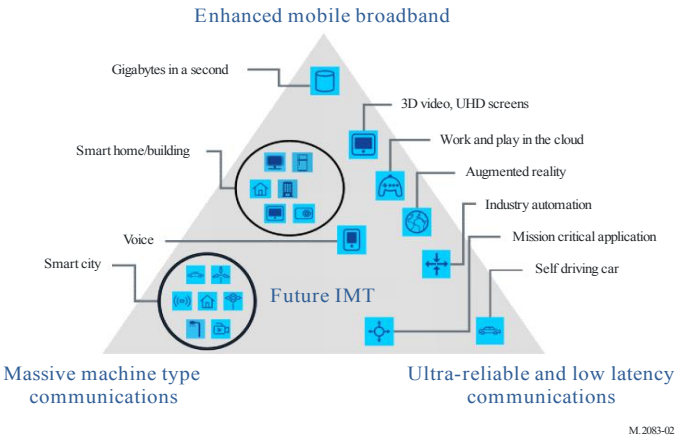
[36] See: Ofcom, 2021, 'Technology Futures Spotlight on the technologies shaping communications for the future.'

[37] See Government Gazette 42829.

[38] See Government Gazette 43768.

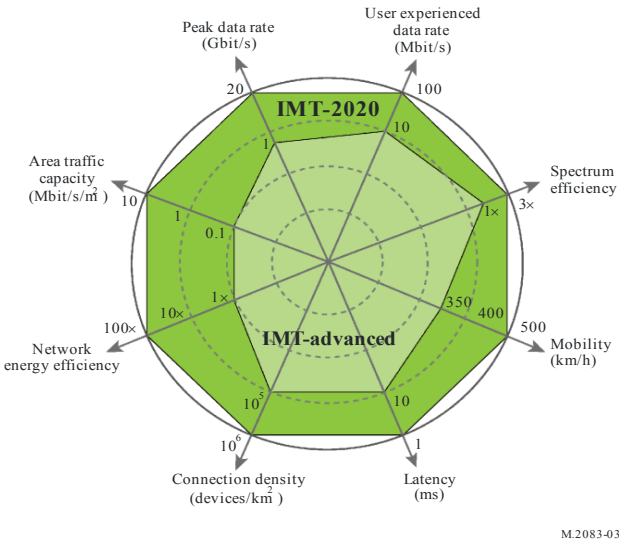
[39] See ITU M.2083, available at: https://www.itu.int/rec/R-REC-M.2083-0-201509-I/en

Figure 2: Usage scenarios for IMT-2020 and beyond



The main changes arising from IMT-2020 compared to IMT-Advanced are in respect of peak data rates, latency, mobility, connection density, energy efficiency, spectrum efficiency, and area traffic capacity (Figure 3). In short, users can expect to experience speeds of 100Mbps, spectrum efficiency is expected to improve three-fold, without an increase in energy use, very low latencies of 1ms over the air, and connection density up to 10^6/km^2.

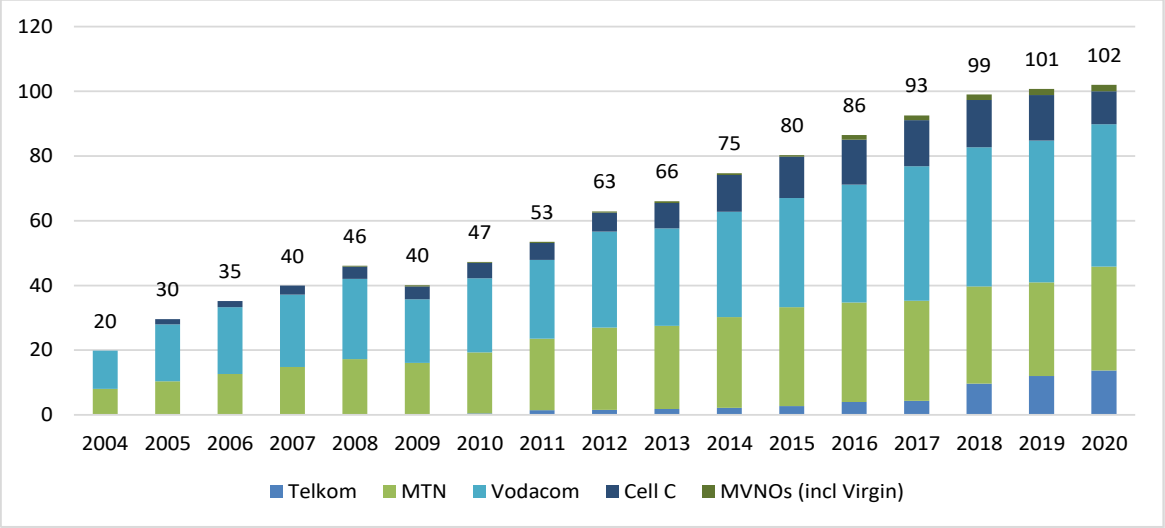
Figure 3: Enhancement of key capabilities from IMT-Advanced to IMT-2020



It is also important to consider existing growth in mobile connections and usage in order to forecast future spectrum needed for IMT. In South Africa, the number of mobile connections has grown substantially over time, though growth has slowed in recent years (See Figure 4). The total number of connections of more than 100m in 2020 far exceeds the number of adults in South Africa (approximately 41.5m in 2019).[40] Over the 16 years between 2004 and 2020, the number of connections grew by 10.5% per year. More recently, over the past 5 years, growth has slowed to approximately 4.8% per year.

[40] See: https://data.worldbank.org/indicator/SP.POP.1564.TO?locations=ZA (added to population 65+).

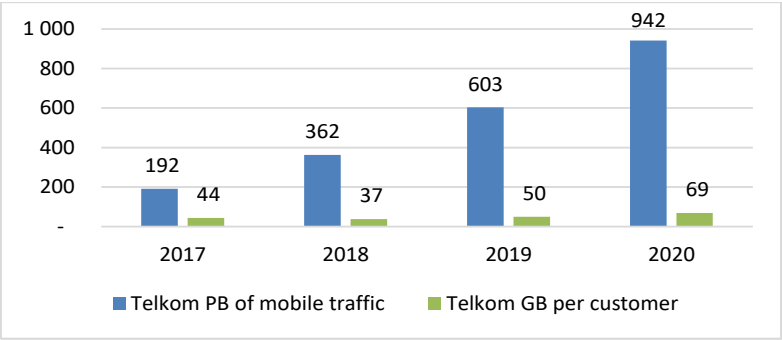
Figure 4: Mobile connections in South Africa – 2004-2020



Source: Operator annual results

Not only is the number of connections growing, but data usage per customer is increasing too. Telkom reports the total number of petabytes used by mobile customers on its network, which reached 942PB in 2020, growing at approximately 70% per year over the past 3 years (See Figure 5). Telkom's subscriber base has also grown over the past years, and so it is more important to calculate increase in usage per connection. Usage per connection has grown from 44GB per year (3.7GB per month) in 2017 to 69 GB in 2020 (5.7GB per month), at a rate of 16% per year.

Figure 5: Growth in annual mobile data traffic on the Telkom network (2017-2020)

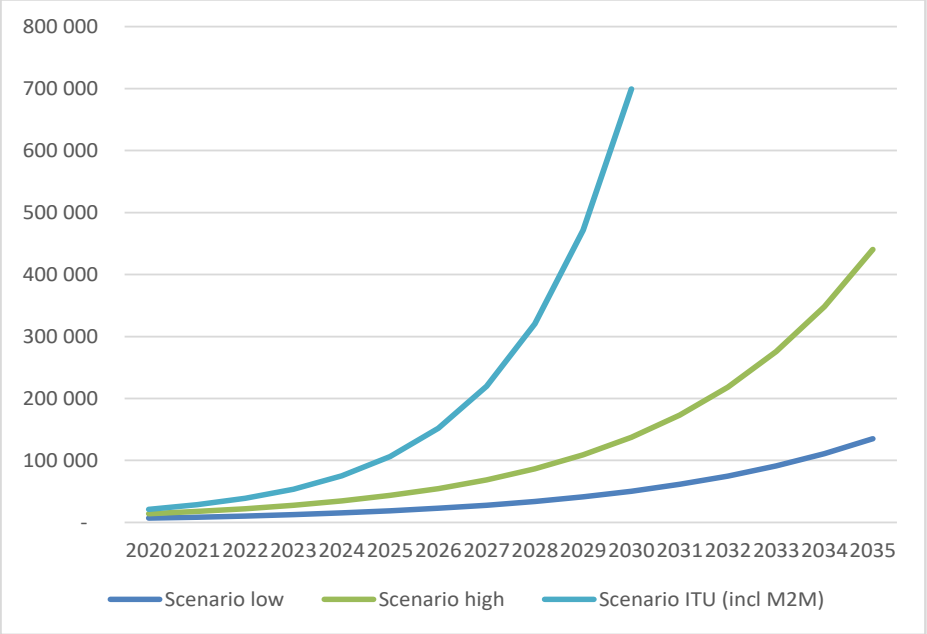


Source: Telkom annual reports

If we consider that MTN, Vodacom, Cell C and MVNOs have a similar traffic profile to Telkom, then mobile data usage in 2020 was in the region of 7,023 PB. If the number of connections grows as it has been for the past 5 years and average data usage per connection grows as it has for the past 3 years, then by 2030, 86,841PB will be used each year, and by 2040, 361,781 will be used (growth of approximately 22% per year). If instead the longer term subscription growth path is used, resulting in growth of 29% per year, then over 1m PB will be used by 2040. The ITU has also developed a range of scenarios for the period 2020-2030, the upper bound of which is growth of 55% per year, which if applied to South Africa, would result in consumption of 562PB per year by 2030.[41]

[41] ITU-R, 'IMT traffic estimates for the years 2020 to 2030'. Report ITU-R M.2370-0, (07/2015).

Figure 6: Growth scenarios in annual mobile data traffic for SA (2020-2040)



It may be that the number of connections, and usage, grows significantly in excess of current growth rates in South Africa, for the reasons discussed above. As a result, data usage may increase significantly in excess of current growth rates, due to the proliferation of connections, together with significant usage per connection. This suggests that mobile networks in South Africa may need to supply substantially higher volumes of data in future than are currently supplied, up to 80-fold more if one ITU scenario is used, by 2030.

As mentioned above, spectrum efficiency is expected to increase three-fold with the use of IMT-2020. Considering that mobile networks are currently at capacity with 609 MHz assigned to wireless broadband operators in sub-3.8GHz bands, then if there was no increase in network demand and site density remained the same, then only 203MHz would be needed to serve current needs. However, site density is anticipated to increase, reducing the need for spectrum, while at the same time volume demanded may grow up to 80-fold over the next 10 years, as mentioned above.

In 2013, the ITU estimated that up to 1,960MHz of spectrum would be needed for IMT in 2020, in respect of radio access technique groups (RATG) 1 and 2, which relate to pre-IMT systems and IMT-2000 and enhancements in the first group (RATG 1) and IMT – Advanced in the second group (RATG 2).[42] Post-auction, the Authority anticipates licensing 1,015MHz (including to the Wholesale Open Access Network), as discussed above. Thus, spectrum assigned in South Africa will fall short of what was needed for IMT under the IMT-Advanced requirement.

[42] These are explained more clearly in Methodology for calculation of spectrum requirements for the terrestrial component of International Mobile Telecommunications, Recommendation ITU-R M.1768-1 (04/2013).

Table 2: Total spectrum requirements for both RATG 1 and RATG 2 in the year 2020

	Total spectrum requirements for RATG 1	Total spectrum requirements for RATG 2	Total spectrum requirements RATGs 1 and 2
Lower user density settings	440 MHz	900 MHz	1 340 MHz
Higher user density settings	540 MHz	1 420 MHz	1 960 MHz

Source: ITU-R M.2290

Since then, the requirements for IMT-2020 have been developed, necessitating new estimates of demand. In Europe, for example, a report prepared for the GSMA estimates that an additional 1,000-2,000MHz of additional mid-band spectrum is needed to deliver speeds of 100Mbps downlink and 50Mbps uplink, similar to the speed targets set out in SA Connect discussed in Section 2.3, and consistent with the standards for IMT-2020 described above.[43] Thus, approximately double the spectrum currently planned for wireless broadband use needs to be considered for South Africa.

Consultation questions:

11. How should demand for commercial mobile services and IMT in the next few years be determined? What traffic model should be used in South Africa for traffic demand expectations? What are your comments on the spectrum requirements set out on Table 2**Error! Reference source not found.**? What are your views on using the Recommendation ITU-R M.1768-1 methodology to forecast IMT spectrum demand in South Africa? Please complete the input parameters in the attached spreadsheet for the market study information needed to apply the Recommendation ITU-R M.1768-1.
Comment:

12. Provide your support or reasons for objections on the bands being considered internationally for 5G commercial mobile allocations.
Comment:

13. Are the spectrum allocations comprehensive enough for spectrum demand projections for commercial mobile services in South Africa for the next 10 to 20 years?
Comment:

[43] See: IMT spectrum demand Estimating the mid-bands spectrum needs in the 2025-2030 timeframe. A report by Coleago Consulting Ltd, 14th of December 2020.

14. Is there a demand for more flexible frequency licensing and frequency assignment/allotments processes on a regional basis required to complement the national frequency licensing and frequency assignments/allotments in the next 10 to 20 years?
Comment:

15. Are there any other frequency bands that should be considered for release in the next 10 to 20 years for commercial mobile that are not discussed? Provide motivations for your proposal.
Comment:

16. Which vertical markets will require the most secured licensed spectrum to overcome their current interference and congestion issues?
Comment:

17. Assuming that South Africa follows the ITU's recommendations to assign up to 1,940MHz of spectrum for IMT-2000 and IMT-advanced services, and that South Africa follows trends in Europe for potentially another 2,000 MHz of spectrum for IMT-2020, what bands would need to be freed up?
Comment:

18. What are your views on reallocating the following bands for IMT over the next years?[44]

Table 3: List of possible future IMT bands (please supplement or delete as your organisation considers reasonable)

- 450-470 (20MHz)
- 617-698 (70MHz)
- 1 427-1 518 (91MHz)
- 1 710-2 025 (315MHz)
- 3 300-3 400 (100MHz)
- 3 400-3 600 (200MHz)
- 3 600-3 800 (200MHz)
- 4 800-4 990 (190MHz)
- 24 250-27 500 (3250MHz)
- 37 000-43 500 (6500MHz)
- 45 500-47 000 (1500MHz)
- 47 200-48 200 (1000MHz)
- 66 000-71 000 (5000MHz)

Comment:

19. Provide your support or reasons for objections on the bands being considered internationally for 5G commercial mobile, fixed, satellite, or licence-exempt allocations.

Comment:

4.2.2 FIXED

Fixed services include high-capacity point to point wireless links that are required for a variety of networks (connectivity to mobile base stations to support mobile services, corporate networks and control networks for utilities). Ofcom's 'Technology Futures' report[45] recognizes that the underlying technologies in fixed networks and optical technologies will be impacted by complex multi-core and hollow-core fibre deployment techniques. Quantum based techniques will also have an impact in the near future, alongside denser and more complex integrated optical chips.

ITU data from 2019 shows that with internet use surpassing the 50 per cent mark (51.4 % globally by the end of 2019), fixed broadband subscription had grown to just over 15% (75% had a mobile

[44] See: https://www.itu.int/en/ITU-R/Documents/ITU-R-FAQ-IMT.pdf

[45] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0011/211115/report-emerging-technologies.pdf

broadband subscription)[46]. Fixed broadband markets have shown some growth over the last four years, but Africa still has one of the lowest fixed broadband subscription rates in comparison with other regions. This is largely due to the absence of legacy infrastructure and the relatively lower costs of deploying wireless broadband infrastructure. The ITU estimates that the fixed broadband subscription rate for Africa was 0.5 per 100 inhabitants in 2020 - below the global average of 15.2 subscriptions per 100.[47] In South Africa, only 9.1% of households have internet access (Section 3.2). This suggests there is significant scope for use of wireless technologies for broadband at fixed locations in South Africa, including via 5G.

According to a 2018 BEREC[48] report, bands currently considered as 'pioneer bands' for 5G, are a mix of low, mid and high frequencies. Using a combination of these frequency bands is suggested - noting that spectrum in the mid frequency range (3400-3800 MHz) may be used to increase capacity for much in demand mobile services, but might also be used for fixed wireless access (FWA) and backhaul services. In the 3400-3800 MHz band it may become relevant to have coverage obligations (similar to 2600 MHz and 2100 MHz bands) with 5G-compatible quality requirements.

The availability of enough spectrum for mobile backhaul applications will be important for advanced mobile access operations as 5G systems develop and traffic grows, while the traditional fixed service bands for backhaul run out of capacity [49]**.**

The ITU proposed the consideration of a portfolio of wireless technologies for 5G backhaul in addition to fibre, to increase coverage. This would include point-to-multipoint (PMP), microwave and millimetre wave (mmWave) radio relays, high altitude platform systems (HAPS) and satellites.[50]

There are also fibre-like services that may also need to be considered. For instance, the Facebook and Terragraph submissions to the Authority describe emerging applications that leverage the 60GHz band, including communication applications at multi-gigabit throughput, such as the Terragraph technology.[51]

Consultation questions:

20. Provide your support or reasons for objections on the bands being considered internationally for fixed applications. Please provide a list of such bands for potential fixed use.
Comment: Table 4: List of possible future fixed bands

[46]See: https://www.itu.int/en/publications/ITU-D/pages/publications.aspx?parent=D-IND-DIG_TRENDS_AFR.01-2021&media=electronic

[47]See: https://www.itu.int/en/publications/ITU-D/pages/publications.aspx?parent=D-IND-DIG_TRENDS_AFR.01-2021&media=electronic

[48] See: https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8314-berec-report-on-practices-on-spectrum-authorization-and-award-procedures-and-on-coverage-obligations-with-a-view-to-considering-their-suitability-to-5g

[49] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[50]See: https://www.itu.int/en/publications/ITU-D/pages/publications.aspx?parent=D-IND-DIG_TRENDS_AFR.01-2021&media=electronic

[51] See submissions from Facebook and Siklu, dated 27 August 2021 and 23 August 2021 respectively.

21. Are the spectrum allocations comprehensive enough for spectrum demand projections for fixed services in South Africa for the next 10 to 20 years?
Comment:

22. Is there a demand for more flexible frequency licensing and frequency assignment/allotments processes for fixed services on a regional basis required to complement the national frequency licensing and frequency assignments/allotments in the next 10 to 20 years?
Comment:

23. Are there any other frequency bands that should be considered for release in the next 10 to 20 years for fixed services that are not discussed? Provide motivations for your proposal.
Comment:

24. Will the demand for commercial mobile, licence-exempt, satellite, or fixed wireless services/applications impact the demand for backhaul spectrum? If so, how and which of these
Comment:

25. Are there adequate spectrum allocations for video backhaul for broadcast and security services in South Africa? What is the realistic demand for these services in the next 10 to 20 years?
Comment:

26. How much will transmission technology improve the volume of traffic in the next 10 to 20 years?
Comment:

27. What and how will technology developments and/or usage trends aid in relieving traffic pressures and addressing spectrum demand for backhaul services? When are these technologies expected to become available?
Comment:

28. How much bandwidth for backhaul will be saved due to the deployment of fibre networks in South Africa for the next 5, 10 to 20 years?
Comment:

4.3 SPECTRUM OUTLOOK DEMAND FOR SPECIALISED APPLICATIONS (AERONAUTICAL, BROADCAST, DEFENCE, MARITIME, ETC)

The specialised use of wireless communications or other specialised use of radio spectrum may be required for various applications by both the private and the public sector. Some of these applications are important for the delivery of key services, including for emergency service and defence. Examples of sectors and applications with long established requirements (and their future outlook demand) are outlined below:

4.3.1 AERONAUTICAL (INCLUDING RADIOLOCATION)

Spectrum is needed for specialised radio equipment used onboard aircraft, on the ground for communication with aircraft, and radars for air traffic control and navigation purposes.

The safety of current and future air navigation and traffic management systems is highly dependent on the availability of sufficient and protected (free from harmful interference) radio spectrum[52]. Looking towards technology improvements, high frequency range (3–30 MHz) becomes important for the provision of high availability services to aviation, including digital voice and data, in remote and oceanic areas[53].

[52] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[53] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

Additionally, low Earth orbit satellite relay of certain VHF frequencies in the aeronautical mobile (route) service in some remote and oceanic areas may be a very cost-effective way to improve air/ground pilot to controller communications[54].

Consultation question:

29. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Aeronautical services in South Africa?
Comment:

4.3.2 BROADCASTING

Ofcom's 'Technology Futures' report[55] recognizes that in the next 10 years it is expected that there will be significant developments in both television and radio broadcasting, live-streaming and on-demand media technology. Emerging media technologies will thus impact both the creation and production of media content and its distribution. Consumption will evolve too, such as optional graphics shown on screen and alternative audio options. In Europe, the use of 5G for content production is of considerable interest to major broadcasting. This could be the case in South Africa too as Emedia also notes in their submission that the future of broadcasting may be realised on developing technologies such as 5G[56]. Furthermore, converged architecture such as Further evolved multimedia broadcast multicast service (FeMBMS) can use different broadcast transmitters and networks including 5G and DTT.

The ITU's 'Digital trends in Africa 2021'[57] research discusses the management and monitoring of the radio-frequency spectrum and transition to digital broadcasting, with Africa member states increasingly making the transition to digital terrestrial television broadcasting. In South Africa, the government has committed to digital migration, and the Authority published a plan to clear the 700MHz and 800MHz bands for IMT in 2020 following the digital migration.[58] However, new technology may not require this as EMedia notes in its submission that new technologies allow for broadcasting and IMT services to co-exist.[59]

Digital audio broadcasting is currently used in the 235-267 MHz band and channel 13F is currently being used in the DAB+ trials. There is support for this band being permanently allocated for DAB+ use. In contrast 1452-1492MHz is no longer used for this purpose and can be reallocated. 3600-4200MHz is also used and suffering interference. There are trade-offs in the use of this band compared with for IMT services which need to be carefully considered.

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[54] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[55] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0011/211115/report-emerging-technologies.pdf

[56] See EMedia submission par 18

[57]See: https://www.itu.int/en/publications/ITU-D/pages/publications.aspx?parent=D-IND-DIG_TRENDS_AFR.01-2021&media=electronic

[58] See Government Gazette number 43341.

[59] See Emedia submission par 20.

Additional spectrum in the 470MHz to 694MHz band is being studied for IMT services for region 1, in the 617-698MHz band, which may require broadcasters freeing up further spectrum for IMT.[60] At the same time, there are 4K and 8K broadcasting technologies that would require approximately 40Mbps in capacity.[61] This is possible using the DVB-T2 technology adopted by South Africa, together with technologies such as High Efficiency Video Encoding (HEVC). It is therefore not clear that additional spectrum will be needed for terrestrial broadcasting services.

Consultation questions:

30. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Broadcasting services in South Africa?
Comment:

31. How much spectrum should be maintained for terrestrial broadcasting in the band 470MHz to 694MHz in the next 10 to 20 years?
Comment:

4.3.3 DEFENCE SYSTEMS

Defence systems make use of a wide range of radio equipment in support of operations and training, including point to point communications, weapons calibration, airborne telemetry, radar and remotely controlled vehicles. This falls under the public service provisions by the government, who is a large spectrum user in general.

Government spectrum users, including for defence systems, usually operate within the same spectrum management framework as all other users. However, in order to recognise their unique needs and responsibilities, government spectrum sometimes requires specific regulatory arrangements[62]. In this sense, government users' access to spectrum can be categorised as either 'ordinary licensed' (on equal footing with other non-government users), or access under 'purpose-specific planning arrangements.

As a practical example of the latter, a portion of defence spectrum access could be licenced under the Defence apparatus[63]. This can be issued in bands with certain footnotes ascribed - these footnoted bands are not the same as spectrum that defence accesses under (ordinary) non-Defence licences. In order to ensure that defence systems have ongoing access to the spectrum required for their key capabilities, the

[60] See ITU-R M.1036-6.

[61] See: Ofcom, 2021, 'Technology Futures Spotlight on the technologies shaping communications for the future.'

[62] See: https://www.acma.gov.au/sites/default/files/2020-09/FYSO%202020-24.pdf

[63] See: https://www.acma.gov.au/sites/default/files/2020-09/FYSO%202020-24.pdf

Department of Defence needs to be regularly consulted. This dialog extends to situations where non-defence use may require the services of certain spectrum bands that are designated for defence systems.

In addition, it can be noted that several countries have arrangements in the 4940– 4990 MHz band for defence and national security purposes. This is to support high-speed localised coverage around an incident or event - allowing public safety agencies to perform public safety activities and provide flexibility in deployment during emergency response and disaster recovery activities.

Consultation question:

32. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Defence services in South Africa?
Comment:

4.3.4 MARITIME (INCLUDING RADIOLOCATION)

This includes specialized radio equipment required for communication between ships and with coast stations, for satellite, radar and beacons, and for navigation and the safety of shipping. In South Africa, Telkom offers maritime services.[64]

Over the past few years, the International Maritime Organization (IMO) has put arrangements in place to facilitate the introduction of additional Global Maritime Distress and Safety System (GMDSS) mobile satellite service providers[65]. This means that availability of the frequency bands to be used by recognized GMDSS satellite service providers (for the provision of GMDSS services) is important. In addition, increasing numbers of autonomous maritime radio devices that use AIS technology or digital selective calling (DSC) technology (or both) are being developed - altering the spectrum needs.

'The Radio Regulations'[66] by the ITU proposes that for maritime mobile service, the frequency 160.9 MHz may also be used for experimental use for future applications or systems (e.g., new automatic identification system (AIS) applications, man overboard systems, etc.).

Consultation question:

33. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Maritime services in South Africa?
Comment:

4.3.5 METEOROLOGICAL (INCLUDING RADIOLOCATION)

[64] See Telkom submission on NRFP dated 27 August 2021.

[65] See: https://news.itu.int/maritime-communications-safeguarding-the-spectrum-for-maritime-services/

[66] See: http://handle.itu.int/11.1002/pub/814b0c44-en

Earth observation satellites collect data about the earth and atmosphere. This is used for applications such as weather forecasting, environmental monitoring, climate change research.

Consultation question:

34. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Meteorological services in South Africa?
Comment:

4.3.6 PROGRAMME MAKING & SPECIAL EVENTS (PMSE)

These are wireless services such as cameras and microphones - used for news gathering, sports events, live concerts, films, theatre, religious, cultural and educational activities. This needs to include wireless services for both indoor and outdoor capacities.

Consultation question:

35. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for PMSE services in South Africa?
Comment:

4.3.7 EMERGENCY SERVICES (INCLUDING PPDR)

In keeping citizens safe and providing rescue services, several radio technologies are important, including narrowband, wideband and broadband technologies.[67] It is important to recognise that commercial mobile networks are widely used for public protection and disaster recovery (PPDR) services, and so it is important to also consider spectrum for mobile services in this context (discussed above in Section 4.2.1). CRASA has recommended that spectrum for these services be harmonised across SADC countries, so as to achieve economies of scale in the region. This includes spectrum for narrowband, wideband and broadband services. CRASA also recommends adopting interoperable standards for PPDR, implementing the UN Tampere convention, and strengthening regional harmonisation processes.

Huawei points out the need for broadband as new services such as mobile video reporting from field locations, body worn cameras and drone cameras etc. require it. [68]

[67] CRASA 2019, 'Framework for Harmonisation of Radio Frequencies for Public Protection and Disaster Relief (PPDR)', available at: https://www.crasa.org/common_up/crasa-setup/18-04-2019_FRAMEWORK%20ON%20HARMONISATION%20OF%20FREQUENCIES%20FOR%20PPDR%20EDITION%202019.pdf

[68] See submission from Huawei dated 27 August 2021.

The result of not allocating specific portions of spectrum for PPDR related communications is that Public Sector bodies have to buy mobile broadband services from licenced commercial operators.[69] This may be problematic because commercial services are not designed to cater for public sector PPDR needs and prices will be high as commercial operators need to make a profit on the portion of the spectrum allocated to them.

In an emergency these commercial networks are swamped by public traffic or otherwise be unavailable due to the effects of the emergency. Existing systems and frequency bands are only suitable for Narrow Band applications, which cannot be used for streaming video and other similar high-bandwidth applications. Deployment of mobile CCTV and video surveillance for crime prevention & community safety is restricted due to the high cost of commercial mobile broadband connections. At the same time, if mobile broadband prices fall in the coming years as more spectrum becomes available, it may be more feasible for this to be used for PPDR services.

Consultation questions:

36. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for PPDR services in South Africa?
Comment:

37. Can mobile broadband currently be used for PPDR purposes? If not, will this be possible in the future with better quality of service and lower prices?
Comment:

38. Are there any reasons to consider further spectrum from broadcasting in the band 470MHz to 694MHz to public protection and disaster relief (PPDR) services in the next 10 to 20 years?
Comment:

[69] See submission from City of Cape Town dated 24 August 2021.

4.3.8 SATELLITE SYSTEMS

Satellite systems are not only used for satellite broadcasting and broadband for consumers, but also for a variety of specialised applications. These include connectivity to ships, aircraft, satellite news gathering and defence use. For instance, Viasat has recently established itself in South Africa, and offers a range of broadband services including via ESIM, for gate-to-gate aeronautical and pier-to-pier maritime services as well as for land-based mobile users, and for emergency response vehicles and buses and trains, as well as to the defence sector.[70]

Satellite systems are increasingly being used to deliver broadband services and are thus important in rural and remote areas, where access to internet is unreliable or unavailable, satellite internet is essential. With companies such as Starlink[71] planning to expand their services to global coverage, it is expected that the spectrum allocated to satellite communications will need to increase. Furthermore, it is key to a world that has next-generation connectivity and 5G technology, as satellites enable the reach and capabilities of 5G technology to be maximised[72].

Satellites also enable broadband connectivity to critical industries such as oil and gas, and mining[73] - with connections to Unmanned Aerial Vehicles (UAVs), for the IoT, driverless cars and buses being envisaged for the future. In addition, it is expected that the future of satellite systems will see experimentation and innovation through small satellite formations and virtual antennas, larger and more capable system, re-usable satellites, manufacturing in space, and studies into solar power in space.[74] Thus, without adequate spectrum, the satellite communication industry will neither be able to maintain and grow its 5G services or connect the unconnected.

At the same time, the ITU recognizes the spectrum requirements of International Mobile Telecommunications (IMT) in accommodating future user requirements and network deployments. This means that there is a challenge to identify spectrum for IMT while at the same time ensuring continued access to spectrum by other technologies, including satellite[75]. The costs and benefits of alternative use cases need to be considered in individual bands. For instance, in Eutelsat and ESOA's submissions to the Authority, concerns are raised about references to IMT services in the 4500-4800MHz band in the draft NRFP 2021.[76] ESOA's submission explains that tens of billions of dollars have been spent on deploying satellite capacity using the 28GHz band. These alternative uses need to be carefully understood, and stakeholders are requested to comment on the costs and benefits of alternative uses in Section 5.

Traditionally, spectrum was exclusively allocated to mobile operators but due to the increasing demand, sharing can provide a way to make the use of existing spectrum more efficient[77]. However, stakeholders such as Sentech have identified interference where sharing arrangements are in place, incurring costs

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[70] Submission from Viasat dated 27 August 2021.

[71] See: https://www.starlink.com

[72] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[73] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[74] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0011/211115/report-emerging-technologies.pdf

[75] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[76] Submission from Eutelsat dated 27 August 2021, and submission from the EMEA Satellite Operators Association (ESOA) on the NRFP 2021.

[77] See: https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-BB.5G_01-2018-PDF-E.pdf

to manage this.[78] The costs and benefits of sharing between satellite and IMT or fixed services need to be considered, as discussed further in Section 5.

Consultation questions:

39. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Satellite services in South Africa?
Comment:

40. Which applications and allocations will require the most frequency spectrum demand in the following frequency bands? • C-band • Ku-band • Ka-band
Comment:

41. What and how will technology developments and/or usage trends aid in relieving traffic pressures and addressing spectrum demand for satellite services? When are these technologies expected to become available?
Comment:

4.3.9 RADIO ASTRONOMY (INCLUDING SPACE SCIENCE)

This includes radio astronomy and space research – contributing to the knowledge of the universe. Additionally, space science provides information about space weather (needed to reduce the risks to infrastructure from solar activity).

At a recent meeting of the Space Frequency Coordination Group (SFCG), various plans for lunar exploration were discussed - access to and protection of the radio spectrum for these uses is thus important in order to understand the future of the planet and for space exploration[79].

'The Radio Regulations'[80] by the ITU considers the needs of the Earth exploration-satellite (passive) and space research (passive) services important in any future planning of the bands 6 425-7 075 MHz and 7 075-7 250 MHz. Other advancements that have become of interest for some include: a possible

[78] See submission from Sentech dated 27 August 2021.

[79] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[80] See: http://handle.itu.int/11.1002/pub/814b0c44-en

new allocation for the Earth exploration-satellite service in 22.55– 23.15 GHz; radiocommunications for sub-orbital vehicles; a possible upgrade of the allocation of the band 14.8–15.35 GHz to the space research service; and, the consideration of possible adjustments to passive remote sensing allocations between 231.5 and 252 GHz.

In addition, according to the 2020 Edition of 'The Radio Regulations'[81] by the ITU, all practicable protection in the band 1 660.5-1 668.4 MHz should be allocated for future research in radio astronomy. In particular, by the removal of air-to-ground transmissions in the meteorological aids service in this band.

Furthermore, exploratory space weather observations and study of the solar-terrestrial relationships have started to become more operational in nature, as countries increasingly monitor the impact that solar flares and geomagnetic storms may have on life and Earth. This means that it is important to consider regulation of this aspect of space science[82].

According to the ITU, recent advances in microwave technology mean that the use of frequencies above 275 GHz by active services for communications (and other uses) is possible[83]. The use of frequencies above 275 GHz creates future opportunities for land-mobile and fixed service applications. With the technological development of active services above 275 GHz still being relatively new, further studies are required to facilitate the use of frequencies above 275 GHz by all service applications - including the need to protect the Earth exploration satellite service (EESS) (passive) and radio astronomy applications.

Consultation question:

42. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Astronomy services in South Africa?
Comment:

4.3.10 SHORT-RANGE DEVICES[84]

Short-range devices (SRDs) offer a wide variety of capabilities, from active medical implants, to alarms, and radio frequency identification devices RFID). SRDs are continuously evolving and some SRDs (including RFIDs and certain types of medical devices) have great growth potential, meaning they may benefit from higher levels of harmonization - for example, consider tuning ranges.

The ITU considers harmonisation of spectrum usage as imperative for the efficiency of SRDs. This is to accommodate the growth and cross border expansion of SRDs as well as Ultra-Wide Band (UWB) - allowing for high data throughput for communications, high-resolution location and imaging devices[85]. In addition, SRDs are increasingly playing a role in the mobile Internet economy, mobile broadband applications and IoT.

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[81] See: http://handle.itu.int/11.1002/pub/814b0c44-en

[82] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[83] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

[84] See: http://www.itu.int/dms_pub/itu-r/opb/vadm/R-VADM-RES-2019-PDF-E.pdf

[85] See: https://www.eenewsembedded.com/news/itu-addresses-challenges-expanding-use-short-range-radio-devices

In general, SRDs use frequency bands that are already allocated to radiocommunication services, including frequency bands designated for the deployment of industrial, scientific and medical (ISM) applications. SRD operation should thus be situated in suitable harmonized frequency bands, in order to reduce harmful interference from SRDs to radiocommunication services. The trend therefore is to increase the use of advanced spectrum access and interference mitigation technologies.

The Authority also received a submission from ADC Automotive Distance Control Systems GmbH, indicating that short-range devices will also be used in the vehicle industry in future, including:[86]

- 57-64GHz: this band is to be used for in-cabin sensing including in order to detect whether a child has been left behind in a car, part of the EURO-NCAP 2025;
- 77-81GHz: to be used for new vehicle radar applications, which will require a higher number of sensors and a 360 degree view.

This suggests that considerable additional spectrum may be needed for short-range devices in the coming years in South Africa.

Consultation question:

43. What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Short-range services in South Africa?
Comment:

4.3.11 OTHER[87]

There are a range of other service applications for spectrum. For instance, amateur radio enables participants to experiment with and learn about radio, as well as being able to communicate with other radio amateurs around the world. Business radio provides both narrowband and wideband communications for applications including utilities, transport operators, hospitals, industrial sites and taxi firms.

The ITU recognises the importance of maintaining the existing spectrum access for amateurs (in particular when providing communications in disaster situations and for relief operations), as well as strengthening protections for radiocommunication services against interference from other current or future generators of radio frequency (RF) energy – for example, wireless power transmission for electric vehicles involves very large amounts of RF power[88].

In addition, there are increasing opportunities for businesses and organisations to benefit from wireless communications (including public sector users who rely on the predictability and quality of spectrum).

Wireless connections are enabling digital transformation objectives to be met in many industries - including utilities, agriculture, logistics and transport. Some new users and applications will have specialised requirements – for example, high reliability communications for critical infrastructure, low

[86] See submission from ADC Automotive Distance Control Systems GmbH dated 26 August 2021.

[87] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0027/208773/spectrum-strategy-consultation.pdf

[88] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

latency communications for manufacturing, low cost / delay-tolerant sensors for smart cities and agritech.

Some new applications will be supported by public mobile networks services, and wireless technology developments (5G and evolving LTE and Wi-Fi technology). However, other users and applications will have requirements that need other technologies and / or network models.

In 2017, Ofcom[89] proposed the use of spectrum in the 700 MHz, 3.4 GHz and 24 GHz bands for 5G use. Ofcom has also proposed to change the authorization regime in the 64–66 GHz band to licence-exempt and expand the use cases for the 57–66 GHz band. But it is important to note that work done by the ITU demonstrated that 5G can be used safely alongside other services, including weather sensing services, commercial satellite services, radar and others[90].

Consultation questions

44. Which vertical markets will require most secured licensed spectrum to overcome their current interference and congestion issues?
Comment:

45. How much will spectrum management and orderly frequency planning improve the interference situations in certain frequency bands?
Comment:

4.4 FREQUENCY BANDS CONSIDERED IN SPECTRUM OUTLOOK STUDIES IN OTHER COUNTRIES.

We have studied spectrum outlook and demand studies that were performed recently in countries situated in Region's 1, 2 and 3 around the world. This provides a benchmark for short term studies for spectrum outlook for up to five years. The ICASA long term study obviously are looking at more comprehensive requirements for up to 20 years .The table included below indicates the frequency bands which were consider in the studies undertaken for the following countries:

- New Zealand
- Australia
- Canada
- United Kingdom

The information below was extracted from the international spectrum outlook studies in the mentioned countries, can be considered in the ICASA long term Spectrum outlook study.

[89] See: https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-BB.5G_01-2018-PDF-E.pdf

[90] See: https://www.itu.int/en/itunews/Documents/2019/2019-05/2019_ITUNews05-en.pdf

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Item	Frequency Band	New Zealand	Australia	Canada	UK	WRC-15/19
1	27.5 to 29.5 MHz		Preliminary Replanning			
2	174 to 230 MHz	Review and Consultation				
3	617 to 698 MHz		Monitoring band	Release - Commercial Mobile		
4	809 to 824 MHz		Replanning band			
5	814-824 paired 859-869 MHz			Potential - Commercial Mobile		
6	854 to 869 MHz		Replanning band			
7	890 to 915 MHz		Replanning band			
8	835 to 960 MHz		Replanning band			
9	896 to 960 MHz			Potential - Commercial Mobile/Fixed/License exempt		
10	1427 to 1518 MHz		Preliminary Replanning	Potential - Commercial Mobile/Fixed		
11	1518 to 1525 MHz		Initial Investigation			
12	1695 to 1710 MHz			Potential - Commercial Mobile/Fixed		
13	1710 to 1785 MHz	Review and Consultation	Preliminary Replanning			
14	1710 to 2170 MHz	Review and Consultation				
15	1785 to 1805 MHz					
16	1900 to 1920 MHZ		Monitoring band			
17	1980 to 2010 MHz		Initial Investigation			
18	2010 to 2110 MHz	Review and Consultation				
19	2170 to 2200 MHz		Initial Investigation			
20	2200 to 2300 MHz	Review and Consultation				
21	2300 to 2302 MHz		Initial Investigation			
22	3300 to 3400 MHz		Monitoring band			
23	3400 to 3575 MHz		Preliminary Replanning			
24	3500 MHz	Review and Consultation		Release - Commercial Mobile/Fixed		
25	3700 to 4200 MHz		Initial Investigation			
26	4400 to 4500 MHz		Monitoring band			
27	4800 to 4990 MHz		Monitoring band			
28	5600 to 5650 MHz		Replanning band			
29	7 GHz band			Release - Satellite - EESS		
30	9 GHz band			Release - Satellite - EESS		
31	13 GHz band			Release - Backhaul		
32	24.25 to 27.5 GHz		Replanning band	Potential - Commercial Mobile/Fixed/License exempt		Res 238 (WRC-15)
33	26 GHz band	Review and Consultation			Further studies	
34	28 GHz band	Review and Consultation		Release - Commercial Mobile/Fixed		
35	31.8 to 33.4 GHz (32GHz)			Release Backhaul		Res 238 (WRC-15)
36	31.8 to 33.4 GHz (32GHz)			Potential - Commercial Mobile/Fixed		
37	32 GHz band			Release - Backhaul	Further studies	
38	37 GHz band			Release - Commercial Mobile/Fixed		
39	37 to 40.5 GHz					Res 238 (WRC-15)
40	38 GHz band			Release - Commercial Mobile/Fixed		
41	40 GHz band				Further studies	
42	40.5 to 42.5 GHz			Potential - Commercial Mobile/Fixed/Satellite		Res 238 (WRC-15)
43	42.5 to 43.5 GHz					Res 238 (WRC-15)
44	45.5 to 47 GHz					Res 238 (WRC-15)
45	45.5 to 50.2 GHz			Potential - Commercial Mobile/Fixed/Satellite		
46	47 to 47.2 GHz					Res 238 (WRC-15)
47	47.2 to 50.2 GHz					Res 238 (WRC-15)
48	50.4 to 52.6 GHz (51GHz)			Potential - Commercial Mobile/Fixed/Satellite		Res 238 (WRC-15)
49	66 to 76 GHz					Res 238 (WRC-15)
50	64 - 71 GHz			Release - License-exempt	Further studies	
51	71 to 76 GHz			Potential - Commercial Mobile/Fixed/License exempt		
52	81 to 86 GHz			Potential - Commercial Mobile/Fixed/License exempt		Res 238 (WRC-15)
53	Bands above 95 GHz			Potential - License exempt/Fixed		

4.5 BANDWIDTH AVAILABILITY IN DRAFT NRFP-21

We produced an extraction from the Draft NRFP 21 (see Annexure A) that summarise the available bandwidth per band allocation as included in the NRFP. This extraction does not distinguish between the primary allocations in a specific frequency sub-band where such band is shared or not. We do not have RFSAP's for all frequency bands and included references for the available RFSAP's.

We propose that the document in annexure A can be used to look at the total available spectrum that is shared between the primary allocations in the sub-band. It also summarise or calculate the total available frequency spectrum (unweighted between the different service allocations) for background information.

We did not distinguish between satellite services e.g. space-to-earth and earth-to-space as well as other pairing information.

The listed service allocation categories can be used to estimate the future requirement for each service allocation.

Consultation questions

46. Please provide input on future spectrum requirements for the different service allocations as well as the urgency for such additional frequency allocations for such a service.
Comment:

47. Which Service allocations require RFSAP's and for which frequency bands. Also specify the urgency for the creation of such RFSAP's.
Comment:

4.6 TASKS FLOWING FROM THE COMMENTS ON THE DRAFT NRFP-21 RELATING TO SPECTRUM OUTLOOK.

The publication of the draft NRFP-21 for comments and the feedback received from the stakeholders forms a valuable source for frequency outlook and demand for the next number of years. The information received during such a process are extremely valuable and assists the Regulatory Authority in preparation of the next WRC as well as the future trends in spectrum demand amongst the different service allocation categories. It also informs the stakeholders of the typical service applications that will be in demand for the future.

The specific comments received on the different frequency bands provide some indication of the spectrum demand for the band and will also pave the way to the future developments in the different industries. This set of information received during the consultation process can benefit South Africa in engineering, economic and socio economic studies and can act as a stimulus to the Universities for post graduate studies.

In the regulatory environment the following additional tasks will be generated:

- Radio Frequency Spectrum Assignment Plans
- Interference Mitigation Procedures
- Frequency Band Sharing Techniques
- Transmission Technology Studies
- Equipment demand studies

- Manufacturing and assembly opportunities
- Radiation safety studies
- Economic impact studies
- Technology comparative studies
- Radiation level increase studies
- Technology life cycle studies
- Mathematical models for bandwidth demand

All of the above and more can assist ICASA and the Ministry to predict the spectrum outlook and demand in a scientific way.

All the submissions received on the Draft NRFP-21 is available in the public domain and can ensure that spectrum outlook and demand become a year to year update exercise.

The above also demonstrate that the update of the NRFP on a 3 to 4 year period, following the WRC, is and exercise that requires much more preparation in order to ensure that the communication industry and the South African economy is stimulated.

Consultation questions

48. Please provide your organisations strategy and suggestions on how the Authority can ensure that spectrum outlook and demand studies can contribute to stimulation of the South African economy.
Comment:

5 FREQUENCY MIGRATION AND COSTING

Frequency migration from one frequency band to another remains one of the most challenging tasks in Spectrum Management. The reasons for the migration can include numerous reasons which include:

- Migration from analogue to digital
- Temporary agreements to overcome a specific problem at a time.
- International pressure to clear frequency bands for e.g. IMT.
- Migration from one technology to another due to spectrum efficiency.
- Obsolete equipment which requires a new technology in another frequency band.

The challenges for the regulator and licensees in respect of migration are significant. Shortage of resources and resistance to change are some of the aspects that hamper the migration process. The government departments in South Africa together with other private companies are important stakeholders in this area. No budgeting or insufficient budgeting is performed for this large expense due to various reasons. Money is required for other more important expenses which leaves the regulator stranded. Any company that does not have an engineering team will underestimate the cost. The factors that contribute to the migration problems include the following:

- Complexity of migration
- Dual illumination period
- Compilation of fleet maps
- Interruption to the operation of the company
- Installation of the radios into the vehicles
- Training of installation technicians and all other users
- Complex tender processes for equipment purchasing, installation, commissioning.
- Complex maintenance procedures
- Duplication of operational cost during the dual illumination period
- Poor network coverage and capacity planning especially if the conversion is from analogue to digital

The total cost of such a frequency migration can run into billions of Rands. Licensees may already be incurring costs in relation to changes in spectrum use over time, and it is important for the Authority to understand the nature of these costs, and the related benefits of any changes in use. For instance, in Sentech's submission to the Authority on the NRFP 2021, Sentech refers to a range of costs it has incurred in managing interference in the 3.4-4.2GHz band.[91] It is therefore important that the Authority briefs all licence holders and especially government entities of the importance of migration and also the cost and manpower involvement.

Frequency migration problems can drastically affect the spectrum outlook projections for the medium and long term. The frequency migration targets were defined in the Authority's frequency migration plans.

Consultation questions:

[91] See submission from Sentech dated 27 August 2021.

49. The spectrum outlook described above in Section 4, and in particular the substantial additional requirements for IMT and fixed-wireless spectrum, suggest that a number of additional bands will need to be assigned for the purposes of internet access, and incumbent users will need to be migrated out of the bands mentioned in the list on Table 3 and on any bands your organisation suggests on Table 4. What are the costs of migrating these users so that radio frequency spectrum is allocated to its highest value use?
Comment:

50. What would the costs of freeing up spectrum for commercial fixed and mobile use be (considering the bands mentioned above on Table 3 and Table 4)? What would the economic benefits of doing so be, in respect of increase consumer surplus, and increased producer surplus?
Comment:

51. Assuming that South Africa follows the ITU's recommendations to assign up to 1,940MHz of spectrum for IMT-2000 and IMT-advanced services, and that South Africa follows trends in Europe for potentially another 2,000 MHz of spectrum for IMT-2020, what would the costs of freeing up the various spectrum bands be? In this regard, please refer to Table 3 and Table 4, as explained above.
Comment:

6 SPECTRUM SHARING

As the demand for spectrum increases and frequency bands become more congested especially in densely populated urban centres, spectrum managers are following diverse approaches to sharing frequencies. This can include:

- Using of administrative methods including in-band sharing,
- Licensing such as leasing and spectrum trading,
- and the unlicensed spectrum commons combined with the use of low power radios or advanced radio technologies including ultra-wideband and multi-modal radios,

In the rest of this section, we expand on spectrum sharing and the methods that can be applied.

6.1 SPECTRUM SHARING

Spectrum sharing can be implemented using any of the following principles:

- Frequency Separation: e.g. different carrier frequencies, hence used bandwidths do not overlap each other –
- Spatial Separation: e.g. servicing different areas so they do not overlap each other –
- Time Separation: transmitting at different time –
- Signal Separation: different signal code, allowing to separate each other at the reception Those separations can be –
    - Steady: regulatory framework –
    - Dynamic (changing in short time) technical standards and management

The above techniques of spectrum sharing can be explained into more detail as described in Rec. ITU-R SM.1132-2 (10/2001):

6.1.1 FREQUENCY SEPARATION

Frequency separation can be achieved using any of the following techniques:

1. Channel plans
2. Band segmentation
3. Frequency agile systems
4. Dynamic sharing:
    a. Dynamic real-time frequency assignment
    b. Frequency division multiple access (FDMA)
    c. Control of emission
    d. Spectrum characteristics
    e. Dynamic variable partitioning
    f. Frequency tolerance limitation
    g. Demand assignment multiple access (DAMA)
    h. Frequency diversity

6.1.2 TIME SEPARATION

Time separation: can be achieved using any of the following techniques:

1. Duty cycle control
2. Dynamic real-time frequency assignment
3. Time division multiple access (TDMA)

6.1.3 SIGNAL SEPARATION

Signal separation: can be achieved using any of the following techniques:

1. Signal coding and processing
2. Forward error correction (FEC)
3. Interference rejection
4. Code division multiple access (CDMA):
    a. Spread spectrum
    b. Direct sequence
    c. Frequency hopping
    d. Pulsed FM
5. Interference power/bandwidth adjustments:
    a. Co-channel
    b. Dynamic transmitter level control
    c. Power flux density (pfd) limitation and spectral power flux density (spfd) limitation (energy dispersal)
6. Modulation complexity
7. Coded modulation
8. Adaptive signal processing
9. Antenna polarization

6.1.4 Licensed Shared Access (LSA) (Report ITU-R SM.2404-0 (06/2017)

License spectrum sharing holds the potential to:

- Improving the overall efficiency and effectiveness of spectrum use;
- Improve the quality of providing telecommunication services;
- Promoting economies of scale and encouraging investments;
- Exploiting temporal and geographical dimensions by allowing users to access a particular piece of spectrum for a defined time period or in a defined area to increase the utilization of spectrum.

Licensed Shared Access is a regulatory approach aiming to facilitate the introduction of radiocommunication systems operated by a limited number of licensees under an individual licensing regime in a frequency band already assigned or expected to be assigned to one or more incumbent users.

Under the Licensed Shared Access (LSA) approach, the additional users are authorized to use the spectrum (or part of the spectrum) in accordance with sharing rules included in their rights of use of spectrum, thereby allowing all the authorized users, including incumbents, to provide a certain QoS”

6.1.4.1 Key features of the LSA approach

1. A "sharing framework", for a given frequency band, will define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under LSA framework.

2. Establishing a "sharing framework" is under the responsibility of the RA and requires the involvement of all relevant stakeholders.

3. The NRA sets the "sharing framework" procedures for individual authorisations to LSA users and a set of "sharing rules" or "sharing conditions.

4. The "sharing framework" will materialize the change, if any, in the spectrum rights of the incumbent(s) and define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under LSA.

5. LSA excludes concepts such as "opportunistic spectrum access", "secondary use" or "secondary service" where the applicant has no protection from primary user.

Consultation questions

52. Due to the scarcity of high demand spectrum and the consequential fact that Spectrum Sharing in certain bands are non-negotiable, how shall you describe the best sharing conditions for the South African scenario?
Comment:

6.2 GENERAL COMMENTS ON SPECTRUM SHARING APPROACHES

The following comments on spectrum sharing are also applicable and additional options for consideration when spectrum sharing is applied.

Sharing can have different approaches:

- regulatory or a technology approach

- international or national levels

Sharing can be among:

- different radio communication services or applications

- different entities or type of users e.g. governmental vs commercial use

- different licensed users of the same/similar application (e.g. PMR services, Point to point links)

- protected primary users and licence-exempt users (e.g. radars and EESS vs 5 GHz RLANs);

- different licence-exempt users

In respect of the latter group, it is important to note for example that GH Communications documented in its submission to the Authority that the African Telecommunications Union recommended allocating the band 5925-6425MHz (lower 6GHz band) to licence exempt use.[92] Facebook explained in its submission that this additional 500MHz of licence exempt spectrum is needed because the 2.4GHz and 5GHz Wi-Fi bands are becoming congested, limiting the possibilities for what fibre broadband can

[92] See submission from GH Communications, dated 26 August 2021.

achieve, since this is typically distributed over Wi-Fi in homes and offices.[93] In addition, Wi-Fi is increasingly being used for telehealth, remote learning, and remote work. It is therefore important to consider the costs and benefits of using additional bands for licence free use.

6.3 ALTERNATIVE SPECTRUM SHARING SCENARIOS

A number of scenarios can be considered in respect of the spectrum outlook for South Africa. An important consideration when projecting spectrum allocations in the coming 10-20 years is the assignment of spectrum for electronic communications and electronic communications network services, as required in the Act. This is not least due to the convergence of a range of services and applications that increasingly rely on commercial mobile and fixed wireless networks, particularly in SADC countries.

In order to achieve this overarching objective, there are three key scenarios that might be discussed:

- Broadband delivery scenario: this involves adding at least another 2000MHz for wireless broadband services, whether WRC has allocated them to IMT or not, to the currently planned 1015MHz IMT assignments, including by means of shared and licence free spectrum assignments;
- Mixed broadband and traditional services: this envisage a steady approach to changing allocations, anticipating but not necessarily waiting for WRC processes to be finalised; and
- Low broadband scenario, essentially adding incrementally to the status quo.

Consultation questions

53. Due to the convergence of technologies and the changes in regulatory licensing environment do you believe that certain service allocations categories will or need to change?
Comment:

54. What existing licence-exempt frequency bands will see the most evolution in the next five years?
Comment:

55. How much spectrum, and in which bands, should be made available for licence-exempt purposes (such as Wi-Fi) over the 5, 10 and 20 years? What would the costs of freeing up these bands for IMT be? What would the economic benefits of doing so be, in respect of increase consumer surplus, and increased producer surplus? Which vertical markets will require most secured licensed spectrum to overcome their current interference and congestion issues?

[93] See submission from Facebook, dated 27 August 2021.

Comment:

56. How much spectrum, and in which bands, should be made available for dynamic spectrum access over the next 5, 10 and 20 years? What would the costs of freeing up these bands for IMT be? What would the economic benefits of doing so be, in respect of increase consumer surplus, and increased producer surplus?
Comment:

57. What existing licence-exempt frequency bands will see the most evolution in the next five years?
Comment:

58. Are there any IoT applications that will have a large impact on the existing licence-exempt bands? If so, what bands will see the most impact from these applications?
Comment:

59. Will the trend for offering carrier-grade or managed Wi-Fi services continue to increase over the next five years? If so, will this impact congestion in Wi-Fi bands and which bands would be most affected?
Comment:

60. Are there specific frequency bands that will be in higher demand over the next 10 to 20 years and do you expect higher demands for spectrum in these frequency bands in South Africa? Are there any other frequency bands that should be considered for release in the next 10 to 20 years for commercial mobile, fixed, satellite, or licence-exempt that are not discussed above? Provide motivations for your proposal**.**
Comment:

7 APPENDIX A – FREQUENCY BAND ALLOCATION PER SERVICE ALLOCATION.

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
Below 8.3 kHz	0.0083																															
(Not allocated)																																
5.53 5.54																																
8.3-9 kHz	0.0007	1.00																														
METEOROLOGICAL AIDS 5.54A ~~5.54B 5.54C~~					0.0007																											
9-11.3 kHz	0.0023	2.00																														
METEOROLOGICAL AIDS 5.54A					0.0023																											
RADIONAVIGATION						0.0023																										
11.3-14 kHz	0.0027	1.00																														
RADIONAVIGATION						0.0027																										
14-19.95 kHz	0.00595	3.00																														
FIXED			0.00595																													
MARITIME MOBILE 5.57							0.00595																									
STANDARD FREQUENCY AND TIME SIGNAL								0.00595																								
5.56																																
19.95-20.05 kHz	0.0001	1.00																														
STANDARD FREQUENCY AND TIME SIGNAL (20 kHz)								0.0001																								
20.05-70 kHz	0.04995	3.00																														
FIXED			0.04995																													
MARITIME MOBILE 5.57							0.04995																									
STANDARD FREQUENCY AND TIME SIGNAL								0.04995																								
5.56																																
70-72 kHz	0.002	1.00																														
RADIONAVIGATION 5.60						0.002																										
72-84 kHz	0.012	4																														
FIXED			0.012																													
MARITIME MOBILE 5.57							0.012																									
RADIONAVIGATION 5.60						0.012																										
STANDARD FREQUENCY AND TIME SIGNAL								0.012																								
5.56																																
84-86 kHz	0.002	1																														
RADIONAVIGATION 5.60						0.002																										
86-90 kHz	0.004	4																														
FIXED			0.004																													
MARITIME MOBILE 5.57							0.004																									
RADIONAVIGATION						0.004																										
STANDARD FREQUENCY AND TIME SIGNAL								0.004																								
5.56																																
90-110 kHz	0.02	1																														
RADIONAVIGATION 5.62						0.02																										
Fixed																																
5.64																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPOLRATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
110-112 kHz	0.002	3																														
FIXED			0.002																													
MARITIME MOBILE							0.002																									
RADIONAVIGATION						0.002																										
5.64																																
112-115 kHz	0.003	1																														
RADIONAVIGATION 5.60						0.003																										
115-117.6 kHz	0.0026	1																														
RADIONAVIGATION 5.60						0.0026																										
Fixed																																
Maritime mobile																																
5.64																																
117.6-126 kHz	0.0084	3																														
FIXED			0.0084																													
MARITIME MOBILE							0.0084																									
RADIONAVIGATION 5.60						0.0084																										
5.64																																
126-129 kHz	0.003	1																														
RADIONAVIGATION 5.60						0.003																										
129-130 kHz	0.001	3																														
FIXED			0.001																													
MARITIME MOBILE							0.001																									
RADIONAVIGATION 5.60						0.001																										
5.64																																
130-135.7 kHz	0.0057	2																														
FIXED			0.0057																													
MARITIME MOBILE							0.0057																									
5.64																																
135.7-137.8 kHz	0.0021	2																														
FIXED			0.0021																													
MARITIME MOBILE							0.0021																									
Amateur 5.67A																																
5.64																																
137.8-148.5 kHz	0.0107	2																														
FIXED			0.0107																													
MARITIME MOBILE							0.0107																									
5.64																																
148.5-160 kHz	0.0115	1																														
BROADCASTING										0.0115																						
160-200 kHz	0.04	1																														
FIXED			0.04																													
5.68																																
200-255 kHz	0.055	1																														
AERONAUTICAL RADIONAVIGATION												0.055																				
5.7																																
255-283.5 kHz	0.0285	1																														
AERONAUTICAL RADIONAVIGATION												0.0285																				
5.70																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPOLRATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
283.5- 285.3 kHz	0.0018	3																														
AERONAUTICAL RADIONAVIGATION												0.0018																				
MARITIME RADIONAVIGATION (radiobeacons) 5.73									0.0018																							
MARITIME RADIONAVIGATION																																
285.3-285.7 kHz	0.0004	3																														
AERONAUTICAL RADIONAVIGATION												0.0004																				
MARITIME RADIONAVIGATION (other than radiobeacons)									0.0004																							
MARITIME RADIONAVIGATION (radiobeacons) 5.73																																
MARITIME RADIONAVIGATION																																
5.74																																
285.7-315 kHz	0.0293	3																														
AERONAUTICAL RADIONAVIGATION												0.0293																				
MARITIME RADIONAVIGATION (radiobeacons) 5.73									0.0293																							
RADIONAVIGATION						0.0293																										
5.74																																
315-325 kHz	0.01	1																														
AERONAUTICAL RADIONAVIGATION												0.01																				
Maritime radionavigation (radiobeacons) 5.73																																
325-405 kHz	0.08	1																														
AERONAUTICAL RADIONAVIGATION												0.08																				
405-415 kHz	0.01	1																														
RADIONAVIGATION 5.76						0.01																										
415-435 kHz	0.02	2																														
MARITIME MOBILE 5.79							0.02																									
AERONAUTICAL RADIONAVIGATION												0.02																				
~~5.82~~																																
435-472 kHz	0.037	1																														
MARITIME MOBILE 5.79							0.037																									
Aeronautical radionavigation																																
5.82																																
472-479 kHz	0.007	1																														
MARITIME MOBILE 5.79							0.007																									
Amateur 5.80A 5.80B																																
Aeronautical radionavigation																																
5.82																																
479-495 kHz	0.016	1																														
MARITIME MOBILE 5.79 5.79A							0.016																									
Aeronautical radionavigation																																
5.82																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RISAP OR EQUIVALENT
495-505 kHz	0.01	1																														
MARITIME MOBILE 5.82C							0.01																									
505-526.5 kHz	0.0215	2																														
MARITIME MOBILE 5.79 5.79A 5.84							0.0215																									
AERONAUTICAL RADIONAVIGATION												0.0215																				
526.5-1606.5 kHz	1.08	1																														
BROADCASTING										1.08																						
1606.5-1625 kHz	0.0185	4																														
FIXED			0.0185																													
MARITIME MOBILE 5.90							0.0185																									
LAND MOBILE													0.0185																			
RADIODETERMINATION														0.0185																		
5.92																																
1625-1635 kHz	0.01	1																														
RADIOLOCATION				0.01																												
1635-1800 kHz	0.165	4																														
FIXED			0.165																													
MARITIME MOBILE 5.90							0.165																									
LAND MOBILE													0.165																			
RADIODETERMINATION														0.165																		
5.92 5.96																																
1800-1810 kHz	0.01	1																														
RADIOLOCATION				0.01																												
1810-1850 kHz	0.04	1																														
AMATEUR 5.100																0.04																
1850-2000 kHz	0.15	3																														
FIXED			0.15																													
MOBILE except aeronautical mobile															0.15																	
RADIODETERMINATION														0.15																		
5.92 5.96 5.103																																
2000-2025 kHz	0.025	3																														
FIXED			0.025																													
MOBILE except aeronautical mobile (R)															0.025																	
RADIODETERMINATION														0.025																		
5.92 5.103																																
2025-2045 kHz	0.02	3																														
FIXED			0.02																													
MOBILE except aeronautical mobile (R)															0.02																	
Meteorological aids 5.104																																
RADIODETERMINATION														0.02																		
5.92 5.103																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
2045-2160 kHz	0.115	3																														
FIXED			0.115																													
MARITIME MOBILE							0.115																									
LAND MOBILE													0.115																			
RADIODETERMINATION														0.115																		
5.92																																
2160-2170 kHz	0.01	1																														
RADIOLOCATION				0.01																												
2170-2173.5 kHz	0.0035	1																														
MARITIME MOBILE							0.0035																									
2173.5-2190.5 kHz	0.017	1																														
MOBILE (distress and calling)																			0.017													
5.108 5.109 5.110 5.111																																
2190.5-2194 kHz	0.0035	1																														
MARITIME MOBILE							0.0035																									
2194-2300 kHz	0.106	3																														
FIXED			0.106																													
MOBILE except aeronautical mobile (R)															0.106																	
RADIODETERMINATION														0.106																		
5.92 5.103																																
2300-2498 kHz	0.198	3																														
FIXED			0.198																													
MOBILE except aeronautical mobile (R)															0.198																	
BROADCASTING 5.113										0.198																						
5.103																																
2498-2501 kHz	0.003	1																														
STANDARD FREQUENCY AND TIME SIGNAL (2 500 kHz)								0.003																								
2501-2502 kHz	0.001	1																														
STANDARD FREQUENCY AND TIME SIGNAL								0.001																								
Space Research																																
2502-2625 kHz	0.123	3																														
FIXED			0.123																													
MOBILE except aeronautical mobile (R)															0.123																	
RADIODETERMINATION														0.123																		
5.92 5.103																																
2625-2650 kHz	0.025	3																														
MARITIME MOBILE							0.025																									
MARITIME RADIONAVIGATION									0.025																							
RADIODETERMINATION														0.025																		
5.92																																
2650-2850 kHz	0.2	3																														
FIXED			0.2																													
MOBILE except aeronautical mobile (R)															0.2																	
RADIODETERMINATION														0.2																		
5.92 5.103																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
2850-3025 kHz	0.175	1																														
AERONAUTICAL MOBILE (R)																				0.175												
5.111 5.115																																
3025-3155 kHz	0.13	1																														
AERONAUTICAL MOBILE (OR)																				0.13												
3155-3200 kHz	0.045	2																														
FIXED			0.045																													
MOBILE except aeronautical mobile (R)															0.045																	
5.116																																
3200-3230 kHz	0.03	3																														
FIXED			0.03																													
MOBILE except aeronautical mobile (R)															0.03																	
BROADCASTING 5.113										0.03																						
5.116																																
3230-3400 kHz	0.17	3																														
FIXED			0.17																													
MOBILE except aeronautical mobile															0.17																	
BROADCASTING 5.113										0.17																						
5.116																																
3400-3500 kHz	0.1	1																														
AERONAUTICAL MOBILE (R)																				0.1												
3500-3800 kHz	0.3	4																														
AMATEUR																0.3																
FIXED			0.3																													
MOBILE except aeronautical mobile															0.3																	
RADIODETERMINATION														0.3																		
5.92																																
3800-3900 kHz	0.1	3																														
FIXED			0.1																													
AERONAUTICAL MOBILE (OR)																				0.1												
LAND MOBILE													0.1																			
3900-3950 kHz	0.05	2																														
AERONAUTICAL MOBILE (OR)																				0.05												
BROADCASTING 5.123										0.05																						
3950-4000 kHz	0.05	2																														
FIXED			0.05																													
BROADCASTING										0.05																						
4000-4063 kHz	0.063	2																														
FIXED			0.063																													
MARITIME MOBILE 5.127							0.063																									
4063-4123 kHz	0.06	2																														
FIXED			0.06																													
MARITIME MOBILE 5.79A 5.109 5.110 5.130 5.131 5.132 5.128							0.06																									
4123-4130 kHz	0.007	1																														
MARITIME MOBILE 5.79A 5.109 5.110 5.128 5.130 5.131 5.132							0.007																									

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
4130-4438 kHz	0.308	2																														
FIXED			0.308																													
MARITIME MOBILE 5.79A 5.109 5.110 5.130 5.131 5.132							0.308																									
5.128																																
4438-4488 kHz	0.05	2																														
FIXED			0.05																													
MOBILE except aeronautical mobile (R)															0.05																	
Radiolocation 5.132A																																
4488-4650 kHz	0.162	2																														
FIXED			0.162																													
MOBILE except aeronautical mobile (R)															0.162																	
4650-4700 kHz	0.05	1																														
AERONAUTICAL MOBILE (R)																				0.05												
4700-4750 kHz	0.05	1																														
AERONAUTICAL MOBILE (OR)																				0.05												
4750-4850 kHz	0.1	4																														
FIXED			0.1																													
AERONAUTICAL MOBILE (OR)																				0.1												
LAND MOBILE													0.1																			
BROADCASTING 5.113										0.1																						
4850-4995 kHz	0.145	3																														
FIXED			0.145																													
LAND MOBILE													0.145																			
BROADCASTING 5.113										0.145																						
4995-5003 kHz	0.008	1																														
STANDARD FREQUENCY AND TIME SIGNAL (5 000 kHz)								0.008																								
5003-5005 kHz	0.002	1																														
STANDARD FREQUENCY AND TIME SIGNAL								0.002																								
Space research																																
5005-5060 kHz	0.055	2																														
FIXED			0.055																													
BROADCASTING 5.113										0.055																						
5060-5250 kHz	0.19	1																														
FIXED			0.19																													
Mobile except aeronautical mobile																																
5250-5275 kHz	0.025	2																														
FIXED			0.025																													
MOBILE except aeronautical mobile															0.025																	
Radiolocation 5.132A																																
5275-5351.5 kHz	0.0765	2																														
FIXED			0.0765																													
MOBILE except aeronautical mobile															0.0765																	
Amateur NF0																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
5351.5-5366.5 kHz	0.015	2																														
FIXED			0.015																													
MOBILE except aeronautical mobile															0.015																	
Amateur 5.133B NF0																																
5366.5-5450 kHz	0.0835	2																														
FIXED			0.0835																													
MOBILE except aeronautical mobile															0.0835																	
5450-5480 kHz	0.03	3																														
FIXED			0.03																													
AERONAUTICAL MOBILE (OR)																				0.03												
LAND MOBILE													0.03																			
5480-5680 kHz	0.2	1																														
AERONAUTICAL MOBILE (R)																				0.2												
5.111 5.115																																
5680-5730 kHz	0.05	1																														
AERONAUTICAL MOBILE (OR)																				0.05												
5.111 5.115																																
5730-5900 kHz	0.17	2																														
FIXED			0.17																													
LAND MOBILE													0.17																			
5900-5950 kHz	0.05	1																														
BROADCASTING 5.134										0.05																						
Fixed 5.136																																
Land Mobile 5.136																																
5950-6200 kHz	0.25	1																														
BROADCASTING										0.25																						
6200-6213.5 kHz	0.0135	2																														
FIXED			0.0135																													
MARITIME MOBILE 5.109 5.110 5.130 5.132							0.0135																									
5.137																																
6213.5-6220.5 kHz	0.007	1																														
MARITIME MOBILE 5.109 5.110 5.130 5.132							0.007																									
5.137																																
6220.5-6525 kHz	0.3045	2																														
FIXED			0.3045																													
MARITIME MOBILE 5.109 5.110 5.130 5.132							0.3045																									
5.137																																
6525-6685 kHz	0.16	1																														
AERONAUTICAL MOBILE (R)																				0.16												
6685-6765 kHz	0.08	1																														
AERONAUTICAL MOBILE (OR)																				0.08												

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
6765-7000 kHz	0.235	2																														
FIXED			0.235																													
MOBILE except aeronautical mobile (R)															0.235																	
5.138 ~~5.138A~~																																
7000-7100 kHz	0.1	2																														
AMATEUR																0.1																
AMATEUR-SATELLITE																	0.1															
7100-7200 kHz	0.1	1																														
AMATEUR																0.1																
~~5.141C 5.142~~																																
7200-7300 kHz	0.1	1																														
BROADCASTING										0.1																						
7300-7350 kHz	0.05	3																														
BROADCASTING 5.134										0.05																						
FIXED 5.143			0.05																													
LAND MOBILE 5.143 5.143A													0.05																			
5.143B 5.143D																																
7350-7400 kHz	0.05	3																														
BROADCASTING 5.134										0.05																						
FIXED 5.143			0.05																													
LAND MOBILE 5.143 5.143A													0.05																			
5.143B 5.143D																																
7400-7450 kHz	0.05	3																														
BROADCASTING										0.05																						
FIXED			0.05																													
LAND MOBILE													0.05																			
5.143B																																
7450-8100 kHz	0.65	2																														
FIXED			0.65																													
MOBILE except aeronautical mobile (R)															0.65																	
5.144																																
8100-8195 kHz	0.095	2																														
FIXED			0.095																													
MARITIME MOBILE							0.095																									
8195-8815 kHz	0.62	1																														
MARITIME MOBILE 5.109 5.110 5.132 5.145							0.62																									
5.111																																
8815-8965 kHz	0.15	1																														
AERONAUTICAL MOBILE (R)																				0.15												
8965-9040 kHz	0.075	1																														
AERONAUTICAL MOBILE (OR)																				0.075												

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
9040-9305 kHz	0.265	1																														
FIXED			0.265																													
9305-9355 kHz	0.05	1																														
FIXED			0.05																													
Radiolocation 5.145A																																
9355-9400 kHz	0.045	1																														
FIXED			0.045																													
9400-9500 kHz	0.1	2																														
BROADCASTING 5.134										0.1																						
FIXED			0.1																													
5.146																																
9500-9775 kHz	0.275	1																														
BROADCASTING										0.275																						
5.147																																
9775-9900 kHz	0.125	2																														
BROADCASTING										0.125																						
FIXED			0.125																													
5.147																																
9900-9995 kHz	0.095	1																														
FIXED			0.095																													
9995-10003 kHz	0.008	1																														
STANDARD FREQUENCY AND TIME SIGNAL (10 000 kHz)								0.008																								
5.111																																
10003-10005 kHz	0.002	1																														
STANDARD FREQUENCY AND TIME SIGNAL								0.002																								
Space research																																
5.111																																
10005-10100 kHz	0.095	1																														
AERONAUTICAL MOBILE (R)																				0.095												
5.111																																
10100-10150 kHz	0.05	1																														
FIXED			0.05																													
Amateur																																
10150-11175 kHz	1.025	1																														
FIXED			1.025																													
Mobile except aeronautical mobile (R)																																
11175-11275 kHz	0.1	1																														
AERONAUTICAL MOBILE (OR)																				0.1												
11275-11400 kHz	0.125	1																														
AERONAUTICAL MOBILE (R)																				0.125												
11400-11600 kHz	0.2	1																														
FIXED			0.2																													
11600-11650 kHz	0.05	2																														
BROADCASTING 5.134										0.05																						
FIXED			0.05																													
5.146																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPOLRATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
11650-11700 kHz	0.05	2																													
BROADCASTING										0.05																					
FIXED			0.05																												
5.147																															
11700-11975 kHz	0.275	1																													
BROADCASTING										0.275																					
5.147																															
11975-12050 kHz	0.075	2																													
BROADCASTING										0.075																					
FIXED			0.075																												
5.147																															
12050-12100 kHz	0.05	2																													
BROADCASTING 5.134										0.05																					
FIXED			0.05																												
5.146																															
12100-12230 kHz	0.13	1																													
FIXED			0.13																												
12230-13200 kHz	0.97	1																													
MARITIME MOBILE 5.109							0.97																								
5.110 5.132 5.145																															
13200-13260 kHz	0.06	1																													
AERONAUTICAL MOBILE (OR)																				0.06											
13260-13360 kHz	0.1	1																													
AERONAUTICAL MOBILE (R)																				0.1											
13360-13410 kHz	0.05	2																													
FIXED			0.05																												
RADIO ASTRONOMY																								0.05							
5.149																															
13410-13450 kHz	0.04	1																													
FIXED			0.04																												
Mobile except aeronautical mobile (R)																															
13450-13550 kHz	0.1	1																													
FIXED			0.1																												
Mobile except aeronautical mobile (R)																															
Radiolocation 5.132A																															
13550-13570 kHz	0.02	1																													
FIXED			0.02																												
Mobile except aeronautical mobile (R)																															
5.15																															
13570-13600 kHz	0.03	1																													
BROADCASTING 5.134										0.03																					
Fixed																															
Mobile except aeronautical mobile (R)																															
5.151																															

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPOLRATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
13600-13800 kHz	0.2	1																														
BROADCASTING										0.2																						
13800-13870 kHz	0.07	1																														
BROADCASTING 5.134										0.07																						
Fixed																																
Mobile except aeronautical mobile (R)																																
5.151																																
13870-14000 kHz	0.13	1																														
FIXED			0.13																													
Mobile except aeronautical mobile (R)																																
14000-14250 kHz	0.25	2																														
AMATEUR																0.25																
AMATEUR-SATELLITE																	0.25															
14250-14350 kHz	0.1	1																														
AMATEUR																0.1																
14350-14990 kHz	0.64	1																														
FIXED			0.64																													
Mobile except aeronautical mobile (R)																																
14990-15005 kHz	0.015	1																														
STANDARD FREQUENCY AND TIME SIGNAL (15 000 kHz)								0.015																								
5.111																																
15005-15010 kHz	0.005	1																														
STANDARD FREQUENCY AND TIME SIGNAL								0.005																								
Space research																																
15010-15100 kHz	0.09	1																														
AERONAUTICAL MOBILE (OR)																				0.09												
15100-15600 kHz	0.5	1																														
BROADCASTING										0.5																						
15600-15800 kHz	0.2	1																														
BROADCASTING 5.134										0.2																						
5.146																																
15800-16100 kHz	0.3	1																														
FIXED			0.3																													
16100-16200 kHz	0.1	1																														
FIXED			0.1																													
Radiolocation 5.145A																																
16200-16360 kHz	0.16	1																														
FIXED			0.16																													
16360-17410 kHz	1.05	1																														
MARITIME MOBILE 5.109							1.05																									
5.110 5.132 5.145																																
17410-17480 kHz	0.07	1																														
FIXED			0.07																													

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
17480-17550 kHz	0.07	2																													
BROADCASTING 5.134										0.07																					
FIXED			0.07																												
5.146																															
17550-17900 kHz	0.35	1																													
BROADCASTING										0.35																					
17900-17970 kHz	0.07	1																													
AERONAUTICAL MOBILE (R)																				0.07											
17970-18030 kHz	0.06	1																													
AERONAUTICAL MOBILE (OR)																				0.06											
18030-18052 kHz	0.022	1																													
FIXED			0.022																												
18052-18068 kHz	0.016	1																													
FIXED			0.016																												
Space research																															
18068-18168 kHz	0.1	2																													
AMATEUR																0.1															
AMATEUR-SATELLITE																	0.1														
18168-18780 kHz	0.612	1																													
FIXED			0.612																												
Mobile except aeronautical mobile																															
18780-18900 kHz	0.12	1																													
MARITIME MOBILE							0.12																								
18900-19020 kHz	0.12	1																													
BROADCASTING 5.134										0.12																					
FIXED			0.12																												
5.146																															
19020-19680 kHz	0.66	1																													
FIXED			0.66																												
19680-19800 kHz	0.12	1																													
MARITIME MOBILE 5.132							0.12																								
19800-19990 kHz	0.19	1																													
FIXED			0.19																												
19990-19995 kHz	0.005	1																													
STANDARD FREQUENCY AND TIME SIGNAL								0.005																							
Space research																															
5.111																															
19995-20010 kHz	0.015	1																													
STANDARD FREQUENCY AND TIME SIGNAL (20 000 kHz)								0.015																							
5.111																															
20010-21000 kHz	0.99	1																													
FIXED			0.99																												
Mobile																															
21000-21450 kHz	0.45	2																													
AMATEUR																0.45															
AMATEUR-SATELLITE																	0.45														

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
21450-21850 kHz	0.4	1																														
BROADCASTING										0.4																						
21850-21870 kHz	0.02	1																														
FIXED			0.02																													
5.155A																																
21870-21924 kHz	0.054	1																														
FIXED 5.155B			0.054																													
21924-22000 kHz	0.076	1																														
AERONAUTICAL MOBILE (R)																				0.076												
22000-22855 kHz	0.855	1																														
MARITIME MOBILE 5.132							0.855																									
22855-23000 kHz	0.145	1																														
FIXED			0.145																													
23000-23200 kHz	0.2	1																														
FIXED			0.2																													
Mobile except aeronautical mobile (R)																																
23200-23350 kHz	0.15	2																														
FIXED 5.156A			0.15																													
AERONAUTICAL MOBILE (OR)																				0.15												
23350-24000 kHz	0.65	3																														
FIXED			0.65																													
MARITIME MOBILE 5.157							0.65																									
LAND MOBILE													0.65																			
24000-24450 kHz	0.45	2																														76
FIXED			0.45																													
LAND MOBILE													0.45																			
24450-24600 kHz	0.15	2																														
FIXED			0.15																													
LAND MOBILE													0.15																			
Radiolocation 5.132A																																
24600-24890 kHz	0.29	2																														
FIXED			0.29																													
LAND MOBILE													0.29																			
24890-24990 kHz	0.1	2																														
AMATEUR																0.1																
AMATEUR-SATELLITE																	0.1															
24990-25005 kHz	0.015	1																														
STANDARD FREQUENCY AND TIME SIGNAL (25 000 kHz)								0.015																								
25005-25010 kHz	0.005	1																														
STANDARD FREQUENCY AND TIME SIGNAL								0.005																								
Space research																																
25010-25070 kHz	0.06	2																														
FIXED			0.06																													
MOBILE except aeronautical mobile															0.06																	

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPOLRATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
25070-25210 kHz	0.14	1																													
MARITIME MOBILE							0.14																								
25210-25550 kHz	0.34	2																													
FIXED			0.34																												
MOBILE except aeronautical mobile															0.34																
25550-25670 kHz	0.12	1																													
RADIO ASTRONOMY																								0.12							
5.149																															
25670-26100 kHz	0.43	1																													
BROADCASTING										0.43																					
26100-26175 kHz	0.075	1																													
MARITIME MOBILE 5.132							0.075																								
26175-26200 kHz	0.025	2																													
FIXED			0.025																												
MOBILE except aeronautical mobile															0.025																
26200-26350 kHz	0.15	2																													
FIXED			0.15																												
MOBILE except aeronautical mobile															0.15																
Radiolocation 5.132A																															
26350-27500 kHz	1.15	2																													
FIXED			1.15																												
MOBILE except aeronautical mobile															1.15																
5.15																															
27.5-28 MHz	0.5	3																													
METEOROLOGICAL AIDS					0.5																										
FIXED			0.5																												
MOBILE																			0.5												
28-29.7 MHz	1.7	2																													
AMATEUR																1.7															
AMATEUR-SATELLITE																	1.7														
29.7-30.005 MHz	0.305	2																													
FIXED			0.305																												
MOBILE																			0.305												
Amateur NF1																															
30.005-30.01 MHz	0.005	4																													
SPACE OPERATION (satellite identification)																		0.005													
FIXED			0.005																												
MOBILE																			0.005												
SPACE RESEARCH																					0.005										
30.01-37.5 MHz	7.49	2																													
FIXED			7.49																												
MOBILE																			7.49												

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
37.5-38.25 MHz	0.75	2																														
FIXED			0.75																													
MOBILE																			0.75													
Radio astronomy																																
5.149																																
38.25-39 MHz	0.75	2																														
FIXED			0.75																													
MOBILE																			0.75													
39-39.5 MHz	0.5	2																														
FIXED			0.5																													
MOBILE																			0.5													
Radiolocation 5.132A																																
39.5-39.986 MHz	0.486	2																														
FIXED			0.486																													
MOBILE																			0.486													
39.986-40.02 MHz	0.034	2																														
FIXED			0.034																													
MOBILE																			0.034													
Space research																																
40.02-40.98 MHz	0.96	2																														
FIXED			0.96																													
MOBILE																			0.96													
5.15																																
40.98-41.015 MHz	0.035	2																														
FIXED			0.035																													
MOBILE																			0.035													
Space research																																
41.015-42 MHz	0.985	2																														
FIXED			0.985																													
MOBILE																			0.985													
42-42.5 MHz	0.5	2																														
FIXED			0.5																													
MOBILE																			0.5													
Radiolocation 5.132A																																
42.5-44 MHz	1.5	2																														
FIXED			1.5																													
MOBILE																			1.5													
44-47 MHz	3	2																														
FIXED			3																													
MOBILE																			3													
47-50 MHz	3	2																														
BROADCASTING										3																						
LAND MOBILE 5.164													3																			

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
50-54 MHz	4	1																															
AMATEUR 5.169																4																	
54-68 MHz	14	3																															
BROADCASTING										14																							
FIXED 5.171			14																														
MOBILE except aeronautical mobile 5.171															14																		
68-74.8 MHz	6.8	2																															
FIXED			6.8																														
MOBILE except aeronautical mobile															6.8																		
Amateur (70 – 70.3 MHz) NF2																																	
Radio Astronomy (73 – 74.6 MHz)																																	
5.149																																	
74.8-75.2 MHz	0.4	1																															
AERONAUTICAL RADIONAVIGATION												0.4																					
5.18																																	
75.2-87.5 MHz	12.3	2																															GG42286 Notice 124 of 2019
FIXED			12.3																														
MOBILE except aeronautical mobile															12.3																		
87.5-100 MHz	12.5	1																															
BROADCASTING										12.5																							
100-108 MHz	8	1																															
BROADCASTING										8																							
108-112 MHz	4	3																															
AERONAUTICAL RADIONAVIGATION												4																					
AERONAUTICAL MOBILE (R) (ground to air)(ground based TX and associated RX for navigational information for navigational functions)																				4													
5.197A																																	
112-117.975 MHz	5.975	2																															
AERONAUTICAL MOBILE (R)																				5.975													
AERONAUTICAL RADIONAVIGATION												5.975																					
5.197A																																	
117.975-137 MHz	19.025	1																															
AERONAUTICAL MOBILE (R)																				19.025													
5.111 5.200																																	

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
137-137.025 MHz	0.025	4																														
SPACE OPERATION (space-to-Earth) 5.203C																		0.025														
METEOROLOGICAL-SATELLITE (space-to-Earth)					0.025																											
MOBILE-SATELLITE (space-to-Earth) (non-GSO) 5.208A 5.208B 5.209																							0.025									
SPACE RESEARCH (space-to-Earth)																					0.025											
Fixed																																
Mobile except aeronautical mobile (R)																																
5.208																																
137.025-137.175 MHz	0.15	3																														
SPACE OPERATION (space-to-Earth) 5.203C																		0.15														
METEOROLOGICAL-SATELLITE (space-to-Earth)					0.15																											
SPACE RESEARCH (space-to-Earth)																					0.15											
Fixed																																
Mobile-satellite (space-to-Earth) (non-GSO) 5.208A 5.208B 5.209																																
Mobile except aeronautical mobile (R)																																
5.208																																
137.175-137.825 MHz	0.65	4																														
SPACE OPERATION (space-to-Earth) 5.203C 5.209A																		0.65														
METEOROLOGICAL-SATELLITE (space-to-Earth)																																
MOBILE-SATELLITE (space-to-Earth) (non-GSO) 5.208A 5.208B 5.209																							0.65									
SPACE RESEARCH (space-to-Earth)																					0.65											
Fixed																																
Mobile except aeronautical mobile (R)																																
5.208																																
137.825-138 MHz	0.175	3																														
SPACE OPERATION (space-to-Earth) 5.203C																		0.175														
METEOROLOGICAL-SATELLITE (space-to-Earth)																																
SPACE RESEARCH (space-to-Earth)																					0.175											
Fixed																																
Mobile-satellite (space-to-Earth) (non-GSO) 5.208A 5.208B 5.209																																
Mobile except aeronautical mobile (R)																																
5.208																																
138-144 MHz	6	2																														GG41512 Notice 146 of 2018
MOBILE																			6													
FIXED				6																												
5.212																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
144-146 MHz	2	2																														
AMATEUR																2																
AMATEUR-SATELLITE																	2															
146-148 MHz	2	2																														
FIXED			2																													
MOBILE except aeronautical mobile (R)															2																	
148-149.9 MHz	1.9	4																														
FIXED			1.9																													
MOBILE except aeronautical mobile (R)															1.9																	
MOBILE-SATELLITE (Earth-to-space) (non-GSO) 5.209 NF3																							1.9									
SPACE OPERATION (Earth-to-space)																		1.9														
5.218 5.219 5.221																																
149.9-150.05 MHz	0.15	1																														GG41512 Notice 146 of 2018
MOBILE-SATELLITE (Earth-to-space) (non-GSO) 5.209 5.220 NF3																							0.15									
150.05-153 MHz	2.95	3																														GG41512 Notice 146 of 2018
FIXED			2.95																													
MOBILE except aeronautical mobile															2.95																	
RADIO ASTRONOMY																								2.95								
5.149																																
153-154 MHz	1	2																														
FIXED			1																													
MOBILE except aeronautical mobile (R)															1																	
Meteorological aids																																
154-156.4875 MHz	2.4875	2																														
FIXED			2.4875																													
MOBILE except aeronautical mobile (R)															2.4875																	
5.226																																
156.4875-156.5125 MHz	0.025	3																														
MARITIME MOBILE (distress and calling via DSC)							0.025																									
FIXED 5.227			0.025																													
LAND MOBILE 5.227													0.025																			
5.111 5.226																																
156.5125-156.5375 MHz	0.025	1																														
MARITIME MOBILE (distress and calling via DSC)							0.025																									
156.5375-156.5625 MHz	0.025	3																														
FIXED			0.025																													
LAND MOBILE													0.025																			
MARITIME MOBILE (distress and calling via DSC)							0.025																									

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
156.5625-156.7625 MHz	0.2	2																														
FIXED			0.2																													
MOBILE except aeronautical mobile (R)															0.2																	
5.226																																
156.7625-156.7875 MHz	0.025	1																														
MARITIME MOBILE							0.025																									
Mobile-satellite (Earth-to-space)																																
5.111 5.226 5.228																																
156.7875-156.8125 MHz	0.025	1																														
MARITIME MOBILE (distress and calling)							0.025																									
5.111 5.226																																
156.8125-156.8375 MHz	0.025	1																														
MARITIME MOBILE							0.025																									
Mobile-satellite (Earth-to-space)																																
5.111 5.226 5.228																																
156.8375-157.1875 MHz	0.35	2																														
FIXED			0.35																													
MOBILE except aeronautical mobile															0.35																	
5.226																																
157.1875-157.3375 MHz	0.15	2																														
FIXED			0.15																													
MOBILE except aeronautical mobile															0.15																	
Maritime mobile-satellite (Earth-to-space) (non-GSO)																																
Maritime mobile-satellite (space-to-Earth) (non-GSO)																																
5.226																																
157.3375-161.7875 MHz	4.45	2																														
FIXED			4.45																													
MOBILE except aeronautical mobile															4.45																	
5.226																																
161.7875-161.9375 MHz	0.15	2																														
FIXED			0.15																													
MOBILE except aeronautical mobile															0.15																	
Maritime mobile-satellite (Earth-to-space) (non-GSO)																																
Maritime mobile-satellite (space-to-Earth) (non-GSO)																																
5.226																																
161.9375-161.9625 MHz	0.025	2																														
FIXED			0.025																													
MOBILE except aeronautical mobile NF4															0.025																	
Maritime mobile-satellite (Earth-to-space) 5.228AA																																
5.226																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RISAP OR EQUIVALENT
161.9625-161.9875 MHz	0.025	3																														
FIXED			0.025																													
AERONAUTICAL MOBILE																				0.025												
MOBILE except aeronautical mobile NF4															0.025																	
Mobile-satellite (Earth-to-space) 5.228F																																
5.226 5.228A 5.228B																																
161.9875-162.0125 MHz	0.025	2																														
FIXED			0.025																													
MOBILE except aeronautical mobile NF4															0.025																	
Maritime mobile-satellite (Earth-to-space) 5.228AA																																
5.226																																
162.0125-162.0375 MHz	0.025	3																														
FIXED			0.025																													
MOBILE except aeronautical mobile NF4															0.025																	
Mobile-satellite (Earth-to-space) 5.228F																																
AERONAUTICAL MOBILE																				0.025												
5.226 5.228A 5.228B																																
162.0375-174 MHz	11.9625	2																														
FIXED			11.9625																													
MOBILE except aeronautical mobile NF4															11.9625																	
5.226 NF5																																
174-223 MHz	49	1																														
BROADCASTING										49																						
NF5																																
223-230 MHz	7	1																														
BROADCASTING										7																						
Fixed																																
Mobile																																
230-238 MHz	8	1																														
BROADCASTING 5.252										8																						
~~5.254~~																																
238-246 MHz	8	2																														
FIXED			8																													
MOBILE																			8													
Mobile-satellite																																
5.111 5.252 5.254 5.256																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
246-254 MHz	8	1																														
BROADCASTING 5.252										8																						
254-267 MHz	13	2																														
FIXED			13																													
MOBILE																			13													
Mobile-satellite																																
5.111 5.252 5.254 5.256																																
267-272 MHz	5	3																														
FIXED			5																													
MOBILE																			5													
Space operation (space-to-Earth)																																
SPACE OPERATION (telemetry)																		5														
Mobile-satellite																																
5.254 5.257																																
272-273 MHz	1	3																														
SPACE OPERATION (space-to-Earth)																		1														
FIXED			1																													
MOBILE																			1													
Mobile-satellite																																
5.254																																
273-312 MHz	39	2																														
FIXED			39																													
MOBILE																			39													
Mobile-satellite																																
5.254																																
312-315 MHz	3	2																														
FIXED			3																													
MOBILE																			3													
Mobile-satellite (Earth-to-space)																																
Mobile-satellite																																
5.254 5.255																																
315-322 MHz	7	2																														
FIXED			7																													
MOBILE																			7													
Mobile-satellite																																
5.254																																
322-328.6 MHz	6.6	3																														
FIXED			6.6																													
MOBILE																			6.6													
RADIO ASTRONOMY																								6.6								
5.149																																
328.6-335.4 MHz	6.8	1																														
AERONAUTICAL RADIONAVIGATION 5.258												6.8																				

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
335.4-387 MHz	51.6	2																														GG41512 Notice 148 of 2018
FIXED NF6			51.6																													
MOBILE NF7																			51.6													
Mobile-satellite																																
5.254																																
387-390 MHz	3	2																														GG41512 Notice 148 of 2018
FIXED			3																													
MOBILE NF7																			3													
Mobile-satellite (space-to-Earth)																																
Mobile-satellite																																
5.208A 5.208B 5.254 5.255																																
390-399.9 MHz	9.9	2																														GG41512 Notice 148 of 2018
FIXED			9.9																													
MOBILE NF7																			9.9													
Mobile-satellite																																
5.254																																
399.9-400.05 MHz	0.15	1																														GG41512 Notice 148 of 2018
MOBILE-SATELLITE (Earth-to-space) (non-GSO) 5.209 5.220 5.260A 5.260B																							0.15									
400.05-400.15 MHz	0.1	1																														
STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz)								0.1																								
5.261																																
400.15-401 MHz	0.85	5																														
METEOROLOGICAL AIDS																																
METEOROLOGICAL-SATELLITE (space-to-Earth)					0.85																											
MOBILE-SATELLITE (space-to-Earth)(non-GSO) 5.208A 5.208B 5.209																							0.85									
SPACE RESEARCH (space-to-Earth) 5.263																					0.85											
SPACE RESEARCH (space-to-space)																																
Space operation (space-to-Earth)																																
5.264																																
401-402 MHz	1	4																														
METEOROLOGICAL AIDS																																
SPACE OPERATION (space-to-Earth)																		1														
EARTH EXPLORATION-SATELLITE (Earth-to-space)																											1					
METEOROLOGICAL-SATELLITE (Earth-to-space)					1																											
Fixed																																
Mobile except aeronautical mobile																																
5.264A 5.264B																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
402-403 MHz	1	3																														
METEOROLOGICAL AIDS																																
EARTH EXPLORATION-SATELLITE (Earth-to-space)																											1					
METEOROLOGICAL-SATELLITE (Earth-to-space)					1																											
Fixed																																
Mobile except aeronautical mobile																																
5.264A 5.264B																																
403-406 MHz	3	1																														
METEOROLOGICAL AIDS					3																											
Fixed																																
Mobile except aeronautical mobile																																
5.265																																
406-406.1 MHz	0.1	1																														
MOBILE-SATELLITE (Earth-to-space)																							0.1									
5.265 5.266 5.267																																
406.1-410 MHz	3.9	3																														
FIXED			3.9																													
MOBILE except aeronautical mobile															3.9																	
RADIO ASTRONOMY																								3.9								
5.149 5.265																																
410-420 MHz	10	3																														
FIXED			10																													
MOBILE except aeronautical mobile															10																	
SPACE RESEARCH (space-to-space)																					10											
5.268																																
420-430 MHz	10	2																														
FIXED			10																													
MOBILE except aeronautical mobile															10																	
Radiolocation																																
430-432 MHz	2	2																														
AMATEUR NF8																2																
RADIOLOCATION				2																												
432-435 MHz	3	2																														
AMATEUR NF8																3																
RADIOLOCATION				3																												
Earth exploration-satellite (active)																																
5279A																																
5.138 5.280 5.282																																
435-438 MHz	3	2																														
AMATEUR NF8																3																
RADIOLOCATION				3																												
Amateur-satellite																																
Earth exploration-satellite (active)																																
5279A																																
5.138 5.280 5.282																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
438-440 MHz	2	2																														
AMATEUR NF8																2																
RADIOLOCATION				2																												
440-449.75 MHz	9.75	2																														GG42230 Notice 74 of 2019
FIXED			9.75																													
MOBILE except aeronautical mobile															9.75																	
Radiolocation																																
5.286																																
449.75-450 MHz	0.25	4																														
FIXED			0.25																													
MOBILE except aeronautical mobile															0.25																	
SPACE OPERATION (Earth-to-space)																		0.25														
SPACE RESEARCH (Earth-to-space)																					0.25											
Radiolocation																																
5.286																																
450-450.25 MHz	0.25	4																													0.25	GG38640 Notice 270 of 2015
FIXED			0.25																													
MOBILE 5.286AA NF9																			0.25													
SPACE OPERATION (Earth-to-space)																		0.25														
SPACE RESEARCH (Earth-to-space)																					0.25											
5.209 5.286 5.286A 5.286B 5.286C																																
450.25-455 MHz	4.75	2																													4.75	GG38640 Notice 270 of 2015
FIXED			4.75																													
MOBILE 5.286AA NF9																			4.75													
5.209 5.286 5.286A 5.286B 5.286C																																
455-456 MHz	1	2																													1	GG38640 Notice 270 of 2015
FIXED			1																													
MOBILE 5.286AA NF9																			1													
5.209 5.286A 5.286B 5.286C																																
456-459 MHz	3	2																													3	GG38640 Notice 270 of 2015
FIXED			3																													
MOBILE 5.286AA NF9																			3													
5.287																																
459-460 MHz	1	2																													1	GG38640 Notice 270 of 2015
FIXED			1																													
MOBILE 5.286AA NF9																			1													
5.209 ~~5.271~~ 5.286A 5.286B 5.286C																																
460-470 MHz	10	2																													10	GG38640 Notice 270 of 2015
FIXED			10																													
MOBILE 5.286AA NF9																			10													
Meteorological-satellite (space-to-Earth)																																
Earth exploration-satellite (space-to-Earth)																																
5.287 5.289																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
470-606 MHz	136	1																														GG43341 Notice 284 of 2020
BROADCASTING										136																						
Land mobile																																
5.149 ~~5.311A~~ 5.296 5.304 5.306																																
606-614 MHz	8	2																														GG43341 Notice 284 of 2020
BROADCASTING										8																						
RADIO ASTRONOMY 5.304																								8								
Land mobile																																
5.149 5.296 5.304 5.306																																
614-694 MHz	80	1																														GG43341 Notice 284 of 2020
BROADCASTING										80																						
Land mobile																																
5.149 5.296 5.304 5.306																																
694-790 MHz	96	1																													96	GG42337 Notice 165 of 2019
MOBILE except aeronautical mobile 5.312A 5.317A NF8A NF9															96																	
~~BROADCASTING~~																																
~~5.300 5.311A 5.312~~																																
NF8A NF9																																
~~5.311A~~ 5.312A 5.317A																																
790-862 MHz	72	2																													72	GG42337 Notice 165 of 2019
FIXED			72																													
MOBILE except aeronautical mobile 5.316B 5.317A NF8A NF9															72																	
~~BROADCASTING~~																																
~~5.312 5.319~~ 5.312A 5.317A																																
NF8A																																
862-890 MHz	28	2																													28	
FIXED			28																													
MOBILE except aeronautical mobile 5.317A NF10															28																	
890-942 MHz	52	2																													52	
FIXED			52																													
MOBILE except aeronautical mobile 5.317A NF9 NF10 NF11															52																	
Radiolocation																																
942-960 MHz	18	2																													18	
FIXED			18																												0	
MOBILE except aeronautical mobile 5.317A NF9															18																	

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
960-1087.7 MHz	127.7	2																														
AERONAUTICAL MOBILE (R) 5.327A																				127.7												
AERONAUTICAL RADIONAVIGATION 5.328 5.328AA												127.7																				
1087.7-1093.3 MHz	5.6	3																														
AERONAUTICAL MOBILE (R) 5.327A																				5.6												
AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space)																												5.6				
AERONAUTICAL RADIONAVIGATION 5.328 5.328AA												5.6																				
1093.3-1164 MHz	70.7	2																														
AERONAUTICAL MOBILE (R) 5.327A																				70.7												
AERONAUTICAL RADIONAVIGATION 5.328 5.328AA												70.7																				
1164-1215 MHz	51	2																														
AERONAUTICAL RADIONAVIGATION 5.328												51																				
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space)																								51								
5.328A																																
1215-1240 MHz	25	5																														
EARTH EXPLORATION-SATELLITE (active)																											25					
RADIOLOCATION				25																												
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A																								25								
SPACE RESEARCH (active)																					25											
RADIONAVIGATION						25																										
5.331 5.332																																
1240-1260 MHz	20	5																														
EARTH EXPLORATION-SATELLITE (active)																											20					
RADIOLOCATION				20																												
RADIONAVIGATION						20																										
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A																								20								
SPACE RESEARCH (active)																					20											
Amateur																																
5.282 5.331 5.332 5.335A																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
1260-1270 MHz	10	5																														
EARTH EXPLORATION-SATELLITE (active)																											10					
RADIOLOCATION				10																												
RADIONAVIGATION						10																										
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329A																									10							
SPACE RESEARCH (active)																					10											
Amateur																																
Amateur-Satellite (Earth-to-space)																																
5.331 5.332 5.335A																																
1270-1300 MHz	30	5																														
EARTH EXPLORATION-SATELLITE (active)																											30					
RADIOLOCATION				30																												
RADIONAVIGATION						30																										
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A																									30							
SPACE RESEARCH (active)																					30											
Amateur																																
5.282 5.331 5.332 5.335A																																
1300-1350 MHz	50	3																														
AERONAUTICAL RADIONAVIGATION 5.337												50																				
RADIOLOCATION				50																												
RADIONAVIGATION-SATELLITE (Earth-to-space)																									50							
Radio Astronomy																																
5.149 5.337A																																
1350-1370 MHz	20	3																														RFSAP based on ITU-R F.1242
FIXED NF 14			20																													
MOBILE																			20													
RADIOLOCATION				20																												
Radio Astronomy																																
5.149 5.338 5.338A 5.339																																
1370-1400 MHz	30	3																														RFSAP based on ITU-R F.1242
FIXED			30																													
MOBILE																			30													
RADIOLOCATION				30																												
Earth exploration-satellite (passive)																																
Space research (passive)																																
5.149 5.338 5.338A 5.339																																
1400-1427 MHz	27	3																														
EARTH EXPLORATION-SATELLITE (passive)																											27					
RADIO ASTRONOMY																								27								
SPACE RESEARCH (passive)																					27											
5.340 5.341																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
1427-1429 MHz	2	3																													2	New RFSAP to be developped
SPACE OPERATION (Earth-to-space)																		2														
FIXED NF14			2																													
MOBILE except aeronautical mobile 5.341A															2																	
5.338A 5.341 5.341B 5.341C																																
1429-1452 MHz	23	2																													23	New RFSAP to be developped
FIXED			23																													
MOBILE except aeronautical mobile 5.341A															23																	
5.338A 5.341																																
1452-1492 MHz	40	4																													40	New RFSAP to be developped
FIXED NF14			40																													
MOBILE except aeronautical mobile 5.346															40																	
BROADCASTING										40																						
BROADCASTING-SATELLITE 5.208B											40																					
5.341 5.345 NF12																																
1492-1518 MHz	26	2																													26	New RFSAP to be developped
FIXED			26																													
MOBILE except aeronautical mobile 5.341A															26																	
5.341																																
1518-1525 MHz	7	3																													7	GG42286 Notice 125 of 2019
FIXED			7																													
MOBILE except aeronautical mobile															7																	
MOBILE-SATELLITE (space-to-Earth) 5.348 5.348A 5.351A																							7									
5.341																																
1525-1530 MHz	5	3																														RFSAP based on ITU-R F.1242
SPACE OPERATION																		5														
(space-to-Earth)																																
FIXED			5																													
MOBILE-SATELLITE																							5									
(space-to-Earth) 5.208B 5.351A																																
Earth exploration-satellite																																
Mobile except aeronautical mobile																																
5.341 5.351 5.352A 5.354																																
1530-1535 MHz	5	2																														
SPACE OPERATION (space-to-Earth)																		5														
MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A 5.353A																							5									
Earth exploration-satellite																																
Fixed																																
Mobile except aeronautical mobile																																
5.341 5.351 5.354																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
1535-1544 MHz	9	1																														
MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A																							9									
5.341 5.351 5.353A 5.354 5.356 5.357 5.357A																																
1544-1545 MHz	1	1																														
MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A																							1									
5.341 5.351 5.353A 5.354 5.356 5.357 5.357A																																
1545-1555 MHz	10	2																														
AERONAUTICAL MOBILE (R)																				10												
MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A																							10									
5.341 5.351 5.353A 5.354 5.356 5.357 5.357A																																
1555-1559 MHz	4	1																														
MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A																							4									
5.341 5.351 5.353A 5.354 5.356 5.357 5.357A																																
1559-1610 MHz	51	2																														
AERONAUTICAL RADIONAVIGATION												51																				
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.208B 5.328B 5.329A																									51							
5.341																																
1610-1610.6 MHz	0.6	4																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							0.6									
AERONAUTICAL RADIONAVIGATION												0.6																				
AERONAUTICAL MOBILE-SATELLITE (R)																												0.6				
AERONAUTICAL RADIONAVIGATION-SATELLITE																													0.6			
Radiodetermination-satellite																																
5.341 5.364 5.366 5.367 5.368 5.371 5.372																																
1610.6-1613.8 MHz	3.2	5																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							3.2									
RADIO ASTRONOMY																								3.2								
AERONAUTICAL RADIONAVIGATION												3.2																				
AERONAUTICAL MOBILE-SATELLITE (R)																												3.2				
AERONAUTICAL RADIONAVIGATION-SATELLITE																													3.2			
Radiodetermination-satellite																																
5.149 5.341 5.364 5.366 5.367 5.368 5.371 5.372																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
1613.8-1621.35 MHz	7.55	4																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							7.55									
AERONAUTICAL RADIONAVIGATION												7.55																				
AERONAUTICAL MOBILE-SATELLITE (R)																												7.55				
AERONAUTICAL RADIONAVIGATION-SATELLITE																													7.55			
Mobile-satellite (space-to-Earth) 5.208B																																
Radiodetermination-satellite																																
5.341 5.364 5.365 5.366 5.367 5.368 5.371 5.372																																
1621.35-1626.5 MHz	5.15	5																														
MARITIME MOBILE-SATELLITE (space-to-Earth) 5.373 5.373A																						5.15										
MOBILE-SATELLITE (Earth-to-space) 5.351A																							5.15									
AERONAUTICAL RADIONAVIGATION												5.15																				
AERONAUTICAL MOBILE-SATELLITE (R)																												5.15				
AERONAUTICAL RADIONAVIGATION-SATELLITE																													5.15			
Mobile-satellite (space-to-Earth) except maritime mobile-satellite(space-to-Earth)																																
Radiodetermination-satellite																																
5.208B 5.341 5.364 5.365 5.366 5.367 5.368 5.371 5.372																																
1626.5-1645.5 MHz	19	1																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							19									
5.341 5.351 5.353A 5.354 5.357A 5.374 5.375 5.376																																
1645.5-1646.5 MHz	1	1																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							1									
5.341 5.351 5.353A 5.354 5.357A 5.374 5.375 5.376																																
1646.5-1656.5 MHz	10	2																														
AERONAUTICAL MOBILE (R)																				10												
MOBILE-SATELLITE (Earth-to-space) 5.351A																							10									
5.341 5.351 5.353A 5.354 5.357A 5.374 5.375 5.376																																
1656.5-1660 MHz	3.5	1																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							3.5									
5.341 5.351 5.353A 5.354 5.357A 5.374 5.375 5.376																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
1660-1660.5 MHz	0.5	2																														
MOBILE-SATELLITE (Earth-to-space) 5.351A																							0.5									
RADIO ASTRONOMY																								0.5								
5.149 5.341 5.351 5.354 5.376A																																
1660.5-1668 MHz	7.5	2																														
RADIO ASTRONOMY																								7.5								
SPACE RESEARCH (passive)																					7.5											
Fixed																																
Mobile except aeronautical mobile																																
5.149 5.341 5.379A																																
1668-1668.4 MHz	0.4	3																													0.4	
MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.379C																							0.4									
RADIO ASTRONOMY																								0.4								
SPACE RESEARCH (passive)																					0.4											
Fixed																																
Mobile except aeronautical mobile																																
5.149 5.341 5.379A																																
1668.4-1670 MHz	1.6	5																													1.6	
METEOROLOGICAL AIDS					1.6																											
FIXED			1.6																													
MOBILE except aeronautical mobile															1.6																	
MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.379C																							1.6									
RADIO ASTRONOMY																								1.6								
5.149 5.341 5.379D 5.379E																																
1670-1675 MHz	5	5																													5	
METEOROLOGICAL AIDS					5																											
FIXED			5																													
METEOROLOGICAL-SATELLITE (space-to-Earth)					5																											
MOBILE																			5													
MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B																							5									
5.341 5.379D 5.379E 5.380A																																
1675-1690 MHz	15	4																														
METEOROLOGICAL AIDS					15																											
FIXED			15																													
METEOROLOGICAL-SATELLITE (space-to-Earth)					15																											
MOBILE except aeronautical mobile															15																	
5.341																																
1690-1700 MHz	10	2																														
METEOROLOGICAL AIDS					10																											
METEOROLOGICAL-SATELLITE (space-to-Earth)					10																											
Fixed																																
Mobile except aeronautical mobile																																
Earth exploration-satellite (space-to-Earth)																																
5.289 5.341																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
1700-1710 MHz	10	3																														
FIXED			10																													
METEOROLOGICAL-SATELLITE (space-to-Earth)					10																											
MOBILE except aeronautical mobile															10																	
Earth exploration-satellite (space-to-Earth)																																
5.289 5.341																																
1710-1718.8 MHz	8.8	2																													8.8	New RFSAP to be developped
FIXED			8.8																													
MOBILE 5.384A 5.388A NF9																			8.8													
5.149 5.341 5.385 5.388 5.388B																																
1718.8-1722.2 MHz	3.4	2																													3.4	New RFSAP to be developped
FIXED			3.4																													
MOBILE 5.384A 5.388A NF9																			3.4													
Radio astronomy																																
5.149 5.341 5.385 5.388 5.388B																																
1722.2-1885 MHz	162.8	2																													162.8	New RFSAP to be developped
FIXED			162.8																													
MOBILE 5.384A 5.388A NF9																			162.8													
5.149 5.341 5.385 5.388 5.388B																																
1885-1930 MHz	45	2																													45	New RFSAP to be developped
FIXED			45																													
MOBILE 5.384A 5.388A NF9																			45													
5.149 5.341 5.385 5.388 5.388B																																
1930-1970 MHz	40	2																													40	New RFSAP to be developped
FIXED			40																													
MOBILE 5.388A NF9																			40													
5.388 5.388B																																
1970-1980 MHz	10	2																													10	New RFSAP to be developped
FIXED			10																													
MOBILE 5.388A NF9																			10													
5.388 5.388B																																
1980-2010 MHz	30	3																													30	New RFSAP to be developped
FIXED			30																													
MOBILE																			30													
MOBILE-SATELLITE (Earth-to-space) 5.351A																							30									
5.388 5.389A 5.389F NF13																																
2010-2025 MHz	15	2																													15	New RFSAP to be developped
FIXED			15																													
MOBILE 5.388A NF9																			15													
5.388 5.388B																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
2025-2110 MHz	85	5																														GG42230 Notice 75 of 2019
SPACE OPERATION (Earth-to-space) (space-to-space)																		85														
EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space)																											85					
FIXED NF14			85																													
MOBILE 5.391																			85													
SPACE RESEARCH (Earth-to-space) (space-to-space)																					85											
5.392																																
2110-2120 MHz	10	3																													10	New RFSAP to be developped
FIXED			10																													
MOBILE 5.388A NF9																			10													
SPACE RESEARCH (deep space) (Earth to-space)																					10											
5.388 5.388B																																
2120-2160 MHz	40	2																													40	New RFSAP to be developped
FIXED			40																													
MOBILE 5.388A NF9																			40													
5.388 5.388B																																
2160-2170 MHz	10	2																													10	New RFSAP to be developped
FIXED			10																													
MOBILE 5.388A NF9																			10													
5.388 5.388B																																
2170-2200 MHz	30	3																													30	New RFSAP to be developped
FIXED			30																													
MOBILE																			30													
MOBILE-SATELLITE (space-to-Earth) 5.351A																							30									
5.388 5.389A 5.389F NF13																																
2200-2290 MHz	90	5																														GG42230 Notice 75 of 2019
SPACE OPERATION (space-to-Earth) (space-to-space)																		90														
EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space)																											90					
FIXED NF14			90																													
MOBILE 5.391																			90													
SPACE RESEARCH (space-to-Earth) (space-to-space)																					90											
5.392																																
2290-2300 MHz	10	3																														GG41512 Notice 145 of 2018
FIXED			10																													
MOBILE except aeronautical mobile															10																	
SPACE RESEARCH (deep space) (space-to-Earth)																					10											

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
2300-2400 MHz	100	2																													100	GG38640 Notice 276 of 2015
FIXED			100																													
MOBILE 5.384A NF9																			100													
Amateur																																
Radiolocation																																
5.150 5.282 5.395																																
2400-2450 MHz	50	2																													50	
FIXED			50																													
MOBILE 5.384A NF9																			50													
Amateur																																
Amateur-satellite																																
Radiolocation																																
5.150 5.282 5.395																																
2450-2483.5 MHz	33.5	2																														
FIXED			33.5																													
MOBILE																			33.5													
Radiolocation																																
5.150																																
2483.5-2500 MHz	16.5	5																														
FIXED			16.5																													
MOBILE																			16.5													
MOBILE-SATELLITE (space-to-Earth) 5.351A																							16.5									
RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398														16.5																		
Radiolocation																																
5.150 5.399 5.401 5.402																																
2500-2520 MHz	20	2																													20	GG43341 Notice 285 of 2020
FIXED 5.410			20																													
MOBILE except aeronautical mobile 5.384A NF9															20																	
2520-2640 MHz	120	3																													120	GG43341 Notice 285 of 2020
FIXED 5.410			120																													
MOBILE except aeronautical mobile 5.384A NF9															120																	
BROADCASTING-SATELLITE 5.413 5.416											120																					
5.339 5.418B 5.418C																																
2640-2655 MHz	15	3																													15	GG43341 Notice 285 of 2020
FIXED 5.410			15																													
MOBILE except aeronautical mobile 5.384A NF9															15																	
BROADCASTING-SATELLITE 5.413 5.416											15																					
Earth exploration-satellite (passive)																																
Space research (passive)																																
5.339 5.418B 5.418C																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
2655-2670 MHz	15	3																														GG43341 Notice 285 of 2020
FIXED 5.410			15																												15	
MOBILE except aeronautical mobile 5.384A NF9															15																	
BROADCASTING-SATELLITE 5.208B 5.413 5.416											15																					
Earth exploration-satellite (passive)																																
Radio astronomy																																
Space research (passive)																																
5.149																																
2670-2690 MHz	20	2																														GG43341 Notice 285 of 2020
FIXED 5.410			20																												20	
MOBILE except aeronautical mobile 5.384A															20																	
Earth exploration-satellite (passive)																																
Radio astronomy																																
Space research (passive)																																
5.149																																
2690-2700 MHz	10	3																														
EARTH EXPLORATION-SATELLITE (passive)																											10					
RADIO ASTRONOMY																								10								
SPACE RESEARCH (passive)																					10											
5.340																																
2700-2900 MHz	200	2																														
AERONAUTICAL RADIONAVIGATION 5.337												200																				
METEOROLOGICAL AIDS					200																											
Radiolocation																																
5.423																																
2900-3100 MHz	200	3																														
RADIOLOCATION 5.424A				200																												
RADIONAVIGATION except aeronautical radionavigation 5.426						200																										
AERONAUTICAL RADIONAVIGATION 5.337												200																				
5.425 5.427																																
3100-3300 MHz	200	1																														
RADIOLOCATION				200																												
Earth exploration-satellite (active)																																
Space research (active)																																
5.149																																
3300-3400 MHz	100	2																														New RFSAP to be developped
RADIOLOCATION				100																											100	
MOBILE except aeronautical mobile															100																	
5.149 5.429A 5.429B																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
3400-3600 MHz	200	3																													200	GG38640 Notice 278 of 2015
FIXED			200																													
FIXED-SATELLITE (space-to-Earth																										200						
MOBILE except aeronautical mobile 5.430A NF9															200																	
Radiolocation																																
3600-4200 MHz	600	2																														RFSAP based on ITU-R F.635-6
FIXED			600																													
FIXED-SATELLITE (space-to-Earth)																										600						
Mobile																																
4200-4204 MHz	4	3																														
AERONAUTICAL MOBILE (R) 5.436																				4												
AERONAUTICAL RADIONAVIGATION 5.438												4																				
STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (4 202 MHz) (space-to-Earth)								4																								
Earth exploration-satellite (passive)																																
Space research (passive)																																
5.437 5.440																																
4204-4400 MHz	196	2																														
AERONAUTICAL MOBILE (R) 5.436																				196												
AERONAUTICAL RADIONAVIGATION 5.438												196																				
Earth exploration-satellite (passive)																																
Space research (passive)																																
5.437 5.440																																
4400-4500 MHz	100	2																														
FIXED NF14			100																													
MOBILE																			100													
4500-4800 MHz	300	3																													300	New RFSAP to be developped
FIXED NF14			300																													
FIXED-SATELLITE (space-to-Earth) 5.441																										300						
MOBILE																			300													
NF15																																
4800-4825 MHz	25	2																														
FIXED NF14			25																													
MOBILE 5.441B																			25													
Radio astronomy																																
NF15																																
4825-4835 MHz	10	2																													10	New RFSAP to be developped
FIXED NF14			10																													
MOBILE except aeronautical mobile															10																	
Radio astronomy																																
5.149 5.441B																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
4835-4950 MHz	115	2																													115	New RFSAP to be developped
FIXED NF14			115																													
MOBILE 5.441B																			115													
Radio astronomy																																
4950-4990 MHz	40	2																													40	New RFSAP to be developped
FIXED NF14			40																													
MOBILE except aeronautical mobile															40																	
Earth exploration-satellite (passive)																																
Radio astronomy																																
Space research (passive)																																
5.149 5.339 5.441B																																
4990-5000 MHz	10	3																														
FIXED NF14			10																													
MOBILE except aeronautical mobile															10																	
RADIO ASTRONOMY																								10								
Space research (passive)																																
5.149 NF15																																
5000-5010 MHz	10	3																														
AERONAUTICAL MOBILE-SATELLITE (R) 5.443AA																												10				
AERONAUTICAL RADIONAVIGATION												10																				
RADIONAVIGATION-SATELLITE (Earth-to-space)																									10							
5010-5030 MHz	20	3																														
AERONAUTICAL MOBILE-SATELLITE (R) 5.443AA																												20				
AERONAUTICAL RADIONAVIGATION												20																				
RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.443B																									20							
5030-5091 MHz	61	3																														
AERONAUTICAL MOBILE-SATELLITE (R) 5.443D																												61				
AERONAUTICAL RADIONAVIGATION												61																				
AERONAUTICAL MOBILE (R) 5.443C																				61												
5.444																																
5091-5150 MHz	59	5																														
FIXED-SATELLITE (Earth-to-space) 5.444A																										59						
AERONAUTICAL MOBILE 5.444B																				59												
AERONAUTICAL MOBILE (telemetry)																				59												
AERONAUTICAL MOBILE-SATELLITE (R) 5.443AA																												59				
AERONAUTICAL RADIONAVIGATION												59																				
5.444																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
5150-5216 MHz	66	5																														
AERONAUTICAL RADIONAVIGATION												66																				
FIXED-SATELLITE (Earth-to-space) 5.447A																										66						
FIXED-SATELLITE (space-to-Earth)																										66						
MOBILE except aeronautical mobile 5.446A 5.446B															66																	
AERONAUTICAL MOBILE (telemetry)																				66												
Radiodetermination-satellite (space-to-Earth)																																
5.446 5.446C 5.447B 5.447C																																
5216-5250 MHz	34	4																														
AERONAUTICAL MOBILE (telemetry) (air to ground)																				34												
AERONAUTICAL RADIONAVIGATION												34																				
FIXED-SATELLITE (Earth-to-space) 5.447A																										34						
MOBILE except aeronautical mobile 5.446A 5.446B															34																	
5.446 5.446C 5.447B 5.447C																																
5250-5255 MHz	5	4																														
EARTH EXPLORATION-SATELLITE (active)																											5					
RADIOLOCATION				5																												
SPACE RESEARCH 5.447D																					5											
MOBILE except aeronautical mobile 5.446A 5.447F															5																	
Space research																																
5.448A																																
5255-5350 MHz	95	4																														
EARTH EXPLORATION-SATELLITE (active)																											95					
RADIOLOCATION				95																												
SPACE RESEARCH (active)																					95											
MOBILE except aeronautical mobile 5.446A 5.447F															95																	
5.448A																																
5350-5460 MHz	110	4																														
EARTH EXPLORATION-SATELLITE (active) 5.448B																											110					
SPACE RESEARCH (active) 5.448C																					110											
AERONAUTICAL RADIONAVIGATION 5.449												110																				
RADIOLOCATION 5.448D				110																												

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
5460-5470 MHz	10	5																														
AERONAUTICAL RADIONAVIGATION 5.449												10																				
EARTH EXPLORATION-SATELLITE (active)																											10					
SPACE RESEARCH (active)																					10											
RADIOLOCATION 5.448D				10																												
RADIONAVIGATION except aeronautical radionavigation						10																										
5.448B																																
5470-5570 MHz	100	5																														
MARITIME RADIONAVIGATION									100																							
MOBILE except aeronautical mobile 5.446A 5.450A															100																	
EARTH EXPLORATION-SATELLITE (active)																											100					
SPACE RESEARCH (active)																					100											
RADIOLOCATION 5.450B				100																												
5.448B																																
5570-5600 MHz	30	3																														
MARITIME RADIONAVIGATION									30																							
MOBILE except aeronautical mobile 5.446A 5.450A															30																	
RADIOLOCATION 5.450B				30																												
5.452																																
5600-5650 MHz	50	4																														
MARITIME RADIONAVIGATION									50																							
METEOROLOGICAL AIDS					50																											
MOBILE except aeronautical mobile 5.446A 5.450A															50																	
RADIOLOCATION 5.450B				50																												
5.452																																
5650-5670 MHz	20	2																														
RADIOLOCATION				20																												
MOBILE except aeronautical mobile 5.446A 5.450A															20																	
Amateur																																
Amateur-satellite (Earth-to-space)																																
Space research (deep space)																																
5.282 5.453																																
5670-5725 MHz	55	2																														
RADIOLOCATION				55																												
MOBILE except aeronautical mobile 5.446A 5.450A															55																	
Amateur																																
Space research (deep space)																																
5.282 5.453																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
5725-5830 MHz	105	2																														
FIXED-SATELLITE (Earth-to-space)																										105						
RADIOLOCATION				105																												
Amateur																																
Fixed NF16																																
5.150 5.453																																
5830-5850 MHz	20	2																														
Fixed NF16																																
FIXED-SATELLITE (Earth-to-space)																										20						
RADIOLOCATION				20																												
Amateur																																
Amateur-satellite (space-to-Earth)																																
5.150 5.453																																
5850-5925 MHz	75	3																														
FIXED			75																													
FIXED-SATELLITE (Earth-to-space)																										75						
MOBILE																			75													
5.15																																
5925-6425 MHz	500	3																														RFAP based on ITU-R F.383-9
FIXED 5.457 NF14			500																													
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B																										500						
MOBILE																			500													
5.149 5.440 5.458																																
6425-6429 MHz	4	4																														
FIXED 5.457 NF14			4																													
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B																										4						
MOBILE																			4													
STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (6 427 MHz) (space-to-Earth)								4																								
5.149 5.440 5.458																																
6429-6700 MHz	271	3																														RFSAP based on ITU-R F.384-7
FIXED 5.457 NF14			271																													
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B																										271						
MOBILE																			271													
5.458																																
6700-7075 MHz	375	3																														RFSAP based on ITU-R F.384-7
FIXED NF14			375																													
FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441																										375						
MOBILE																			375													
5.458 5.458A 5.458B																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
7075-7145 MHz	70	2																														RFSAP based on ITU-R F.385-7
FIXED NF14			70																													
MOBILE																			70													
5.458																																
7145-7190 MHz	45	3																														RFSAP based on ITU-R F.385-7
FIXED			45																													
MOBILE																			45													
SPACE RESEARCH (deep space) (Earth to-space)																					45											
5.458 ~~5.459~~																																
7190-7235 MHz	45	4																														RFSAP based on ITU-R F.385-7
EARTH EXPLORATION-SATELLITE (Earth-to-space) 5.460A 5.460B																											45					
FIXED NF14			45																													
MOBILE																			45													
SPACE RESEARCH (except deep space) (Earth-to-space) 5.460																					45											
5.458																																
7235-7250 MHz	15	3																														RFSAP based on ITU-R F.385-7
EARTH EXPLORATION-SATELLITE (Earth-to-space) 5.460A																											15					
FIXED NF14			15																													
MOBILE																			15													
5.458																																
7250-7300 MHz	50	4																														RFSAP based on ITU-R F.385-7
FIXED NF14			50																													
FIXED-SATELLITE (space-to-Earth)																										50						
MOBILE																			50													
MOBILE-SATELLITE (space-to-Earth)																							50									
5.461																																
7300-7375 MHz	75	4																														RFSAP based on ITU-R F.385-7
FIXED			75																													
FIXED-SATELLITE (space-to-Earth)																										75						
MOBILE except aeronautical mobile															75																	
MOBILE-SATELLITE (space-to-Earth)																							75									
5.461																																
7375-7450 MHz	75	4																														RFSAP based on ITU-R F.385-7
FIXED NF14			75																													
FIXED-SATELLITE (space-to-Earth)																										75						
MOBILE except aeronautical mobile															75																	
MARITIME MOBILE-SATELLITE (space-to-Earth) (GSO) 5.461AA 5.461AB																						75										

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
7450-7550 MHz	100	5																														RFSAP based on ITU-R F.385-7
FIXED NF14			100																													
FIXED-SATELLITE (space-to-Earth)																										100						
METEOROLOGICAL-SATELLITE (GSO) (space-to-Earth)					100																											
MOBILE except aeronautical mobile															100																	
MARITIME MOBILE-SATELLITE (space-to-Earth) (GSO) 5.461AA 5.461AB																						100										
5.461A																																
7550-7750 MHz	200	4																														RFSAP based on ITU-R F.385-7
FIXED NF14			200																													
FIXED-SATELLITE (space-to-Earth)																										200						
MOBILE except aeronautical mobile															200																	
MARITIME MOBILE-SATELLITE (space-to-Earth)																						200										
~~5.461AA 5.461AB~~																																
7750-7900 MHz	150	3																														RFSAP based on ITU-R F.386-9
FIXED NF14			150																													
METEOROLOGICAL-SATELLITE(non-GSO) (space-to-Earth) 5.461B					150																											
MOBILE except aeronautical mobile															150																	
7900-8025 MHz	125	4																														RFSAP based on ITU-R F.386-9
FIXED NF14			125																													
FIXED-SATELLITE (Earth-to-space)																										125						
MOBILE																			125													
MOBILE-SATELLITE (Earth-to-space)																							125									
5.461																																
8025-8175 MHz	150	5																														RFSAP based on ITU-R F.386-9
EARTH EXPLORATION-SATELLITE (space-to-Earth)																											150					
FIXED NF14			150																													
FIXED-SATELLITE (Earth-to-space)																										150						
MOBILE except aeronautical mobile															150																	
AERONAUTICAL MOBILE (ground to air)																				150												
5.462A 5.463																																
8175-8215 MHz	40	6																														RFSAP based on ITU-R F.386-9
EARTH EXPLORATION-SATELLITE (space-to-Earth)																											40					
FIXED NF14			40																													
FIXED-SATELLITE (Earth-to-space)																										40						
METEOROLOGICAL-SATELLITE (Earth-to-space)					40																											
AERONAUTICAL MOBILE																				40												
MOBILE except aeronautical mobile															40																	
5.462A 5.463																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
8215-8400 MHz	185	5																														RFSAP based on ITU-R F.386-8
EARTH EXPLORATION-SATELLITE (space-to-Earth)																											185					
FIXED NF14			185																													
FIXED-SATELLITE (Earth-to-space)																										185						
AERONAUTICAL MOBILE																				185												
MOBILE except aeronautical mobile															185																	
5.462A 5.463																																
8400-8450 MHz	50	3																														RFSAP based on ITU-R F.386-8
FIXED NF14			50																													
MOBILE except aeronautical mobile															50																	
SPACE RESEARCH(deep space) (space-to-Earth) 5.465																					50											
8450-8500 MHz	50	3																														RFSAP based on ITU-R F.386-8
FIXED NF14			50																													
MOBILE except aeronautical mobile															50																	
SPACE RESEARCH (space-to-Earth)																					50											
8500-8550 MHz	50	1																														
RADIOLOCATION				50																												
8550-8650 MHz	100	3																														
EARTH EXPLORATION-SATELLITE (active)																											100					
RADIOLOCATION				100																												
SPACE RESEARCH (active)																					100											
5.469A																																
8650-8750 MHz	100	1																														
RADIOLOCATION				100																												
8750-8850 MHz	100	2																														
RADIOLOCATION				100																												
AERONAUTICAL RADIONAVIGATION 5.470												100																				
8850-9000 MHz	150	2																														
RADIOLOCATION				150																												
MARITIME RADIONAVIGATION 5.472									150																							
9000-9200 MHz	200	2																														
AERONAUTICAL RADIONAVIGATION 5.337												200																				
RADIOLOCATION				200																												
5.473A																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
9200-9225 MHz	25	3																													
EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C																															
RADIOLOCATION				25																							25				
MARITIME RADIONAVIGATION 5.472									25																						
5.474 5.474D																															
9225-9300 MHz	75	3																													
EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C																															
RADIOLOCATION				75																							75				
MARITIME RADIONAVIGATION									75																						
5.474 5.474D																															
9300-9320 MHz	20	5																													
RADIONAVIGATION except aeronautical radionavigation						20																									
EARTH EXPLORATION-SATELLITE (active)																											20				
SPACE RESEARCH (active)																					20										
RADIOLOCATION				20																											
AERONAUTICAL RADIONAVIGATION												20																			
5.427 5.474 5.475 5.475A 5.475B 5.476A																															
9320-9500 MHz	180	5																													
RADIONAVIGATION except aeronautical radionavigation						180																									
EARTH EXPLORATION-SATELLITE (active)																											180				
SPACE RESEARCH (active)																					180										
RADIOLOCATION				180																											
AERONAUTICAL RADIONAVIGATION												180																			
5.427 5.474 5.475 5.475A 5.475B 5.476A																															
9500-9800 MHz	300	4																													
EARTH EXPLORATION-SATELLITE (active)																											300				
RADIOLOCATION				300																											
RADIONAVIGATION						300																									
SPACE RESEARCH (active)																					300										
5.476A																															
9800-9900 MHz	100	1																													
RADIOLOCATION				100																											
Earth exploration-satellite (active)																															
Space research (active)																															
Fixed																															
5.478A 5.478B																															

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
9900-9975 MHz	75	2																														
EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5474C																											75					
RADIOLOCATION				75																												
Fixed																																
5.474D 5.479																																
9975-10000 MHz	25	2																														
EARTH EXPLORATION-SATELLITE (active)																											25					
5.474A 5.474B 5.474C																																
RADIOLOCATION				25																												
Fixed																																
Meteorological-satellite																																
5.474D 5.479																																
10-10.025 GHz	25	4																														
EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C																											25					
FIXED NF14			25																													
MOBILE																			25													
RADIOLOCATION				25																												
Amateur																																
Meteorological-satellite																																
5.474D 5.479																																
10.025-10.4 GHz	375	4																														RFSAP based on ITU-R F.1568
EARTH EXPLORATION-SATELLITE (active) 5.474A 5.474B 5.474C																											375					
FIXED NF14			375																													
MOBILE																			375													
RADIOLOCATION				375																												
Amateur																																
5.474D 5.479																																
10.4-10.45 GHz	50	3																														RFSAP based on ITU-R F.1568
FIXED NF14			50																													
MOBILE																			50													
RADIOLOCATION				50																												
Amateur																																
10.45-10.5 GHz	50	1																														
RADIOLOCATION				50																												
Amateur																																
Amateur-satellite																																
10.5-10.55 GHz	50	2																														RFSAP based on ITU-R F.1568
FIXED NF14			50																													
MOBILE																			50													
Radiolocation																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
10.55-10.6 GHz	50	2																														RFSAP based on ITU-R F.1568
FIXED NF14			50																													
MOBILE except aeronautical mobile															50																	
Radiolocation																																
10.6-10.68 GHz	80	5																														RFSAP based on ITU-R F.1568
EARTH EXPLORATION-SATELLITE (passive)																											80					
FIXED NF14			80																													
MOBILE except aeronautical mobile															80																	
RADIO ASTRONOMY																								80								
SPACE RESEARCH (passive)																					80											
Radiolocation																																
5.149 5.482 5.482A																																
10.68-10.7 GHz	20	3																														
EARTH EXPLORATION-SATELLITE (passive)																											20					
RADIO ASTRONOMY																								20								
SPACE RESEARCH (passive)																					20											
5.34																																
10.7-10.95 GHz	250	3																														RFSAP based on ITU-R F.387
FIXED			250																													
FIXED-SATELLITE																										250						
(space-to-Earth) 5.441																																
(Earth-to-space) 5.484																																
MOBILE except aeronautical mobile															250																	
10.95-11.2 GHz	250	3																														RFSAP based on ITU-R F.387
FIXED			250																													
FIXED-SATELLITE																										250						
(space-to-Earth) 5.484A 5.484B																																
(Earth-to-space) 5.484																																
MOBILE except aeronautical mobile															250																	
11.2-11.45 GHz	250	3																														RFSAP based on ITU-R F.387
FIXED			250																													
FIXED-SATELLITE																										250						
(space-to-Earth) 5.441																																
(Earth-to-space) 5.484																																
MOBILE except aeronautical mobile															250																	
11.45-11.7 GHz	250	3																														RFSAP based on ITU-R F.387
FIXED NF14			250																													
FIXED-SATELLITE																										250						
(space-to-Earth) 5.484A 5.484B																																
(Earth-to-space) 5.484																																
MOBILE except aeronautical mobile															250																	

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
11.7-12.5 GHz	800	5																														
FIXED			800																													
MOBILE except aeronautical mobile															800																	
BROADCASTING										800																						
BROADCASTING-SATELLITE 5.492											800																					
FIXED-SATELLITE (non-GSO) (space-to-Earth)																										800						
5.487 5.487A																																
12.5-12.75 GHz	250	1																														
FIXED-SATELLITE																										250						
(space-to-Earth) 5.484A 5.484B																																
(Earth-to-space)																																
5.495																																
12.75-13.25 GHz	500	3																														RFSAP based on ITU-R F.497
FIXED NF14			500																													
FIXED-SATELLITE (Earth-to-space) 5.441																										500						
MOBILE																			500													
Space research (deep space) (space-to-Earth)																																
13.25-13.4 GHz	150	3																														
EARTH EXPLORATION-SATELLITE (active)																											150					
AERONAUTICAL RADIONAVIGATION 5.497												150																				
SPACE RESEARCH (active)																					150											
5.498A																																
13.4-13.65 GHz	250	5																														
EARTH EXPLORATION-SATELLITE (active)																											250					
FIXED-SATELLITE (GSO) (space-to-Earth) 5.499A 5.499B																										250						
RADIOLOCATION				250																												
SPACE RESEARCH 5.499C 5.499D																					250											
SPACE RESEARCH (space-to-Earth)																																
SPACE RESEARCH (space-to-space)																																
Standard frequency and time signal-satellite (Earth-to-space)																																
Space research																																
5.499E 5.501B																																
5.499 5.499E 5.500 5.501 5.501B																																
13.65-13.75 GHz	100	3																														
EARTH EXPLORATION-SATELLITE (active)																											100					
RADIOLOCATION				100																												
SPACE RESEARCH 5.501A																					100											
Space research																																
Standard frequency and time signal-satellite (Earth-to-space)																																
5.501B																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
13.75-14 GHz	250	2																														
FIXED-SATELLITE (Earth-to-space) 5.484A																										250						
RADIOLOCATION				250																												
Earth exploration-satellite																																
Standard frequency and time signal-satellite (Earth-to-space)																																
Space research																																
5.502 5.503																																
14-14.25 GHz	250	2																														
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.484B 5.506 5.506B NF17																										250						
RADIONAVIGATION 5.504						250																										
Mobile-satellite (Earth-to-space) 5.504B 5.504C 5.506A																																
Space research																																
5.504A																																
14.25-14.3 GHz	50	2																														
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.484B 5.506 5.506B NF17																										50						
RADIONAVIGATION 5.504						50																										
Mobile-satellite (Earth-to-space) 5.504B 5.506A																																
Space research																																
5.504A 5.508A																																
14.3-14.4 GHz	100	2																														
FIXED			100																													
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.484B 5.506 5.506B NF17																										100						
MOBILE except aeronautical mobile															100																	
Mobile-satellite (Earth-to-space) 5.504B 5.506A ~~5.508A~~-5.509A																																
Radionavigation-satellite																																
5.504A																																
14.4-14.47 GHz	70	2																														
FIXED			70																													
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.484B 5.506 5.506B NF17																										70						
MOBILE except aeronautical mobile															70																	
Mobile-satellite (Earth-to-space) 5.504B 5.506A ~~5.508A~~-5.509A																																
Space research (space-to-Earth)																																
5.504A																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	**BANDWIDTH IN MHz**	**NUMBER OF PRIMARY SERVICES**	**FIXED**	**RADIOLOCATION**	**METEOROLOGICAL AIDS**	**RADIONAVIGATION**	**MARITIME MOBILE**	**STANDARD FREQUENCY AND TIME SIGNAL**	**MARITIME RADIONAVIGATION**	**BROADCASTING**	**BROADCASTING-SATELLITE**	**AERONAUTICAL RADIONAVIGATION**	**LAND MOBILE**	**RADIODETERMINATION**	**MOBILE except aeronautical mobile**	**AMATEUR**	**AMATEUR-SATELLITE**	**SPACE OPERATION**	**MOBILE**	**AERONAUTICAL MOBILE**	**SPACE RESEARCH**	**MARITIME MOBILE-SATELLITE**	**MOBILE-SATELLITE**	**RADIO ASTRONOMY**	**RADIONAVIGATION-SATELLITE**	**FIXED-SATELLITE**	**EARTH EXPLORATION-SATELLITE**	**AERONAUTICAL MOBILE-SATELLITE**	**AERONAUTICAL RADIONAVIGATION-SATELLITE**	**INTER-SATELLITE**	**IMT**	**RFSAP OR EQUIVALENT**
14.47-14.5 GHz	30	2																														
FIXED			30																													
FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B NF17																										30						
MOBILE except aeronautical mobile															30																	
Mobile-satellite (Earth-to-space) 5.504B 5.506A ~~5.508A 5.509A~~																																
Radio astronomy																																
5.149 5.504A																																
14.5-14.75 GHz	250	4																														RFSAP based on ITU-R F.636
FIXED			250																													
FIXED-SATELLITE (Earth-to-space) 5.510																										250						
MOBILE																			250													
SPACE RESEARCH (Earth-to-space)																					250											
Space research 5.509G																																
5.509B 5.509C 5.509D 5.509E 5.509F																																
14.75-14.8 GHz	50	4																														RFSAP based on ITU-R F.636
FIXED NF14			50																													
FIXED-SATELLITE (Earth-to-space) 5.510																										50						
MOBILE																			50													
SPACE RESEARCH (Earth-to-space)																					50											
Space research 5.509G																																
14.8-15.2 GHz	400	2																														RFSAP based on ITU-R F.636
FIXED NF14			400																													
MOBILE																			400													
Space research																																
5.339																																
15.2-15.35 GHz	150	2																														RFSAP based on ITU-R F.636
FIXED			150																													
MOBILE																			150													
Earth exploration-satellite (passive)																																
Space research																																
Space research (passive)																																
5.339																																
15.35-15.4 GHz	50	3																														
EARTH EXPLORATION-SATELLITE (passive)																											50					
RADIO ASTRONOMY																								50								
SPACE RESEARCH (passive)																					50											
5.34																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
15.4-15.43 GHz	30	2																														
RADIOLOCATION 5.511E 5.511F				30																												
AERONAUTICAL RADIONAVIGATION												30																				
15.43-15.63 GHz	200	3																														
FIXED-SATELLITE (Earth-to-space) 5.511A																									200							
RADIOLOCATION 5.511E 5.511F				200																												
AERONAUTICAL RADIONAVIGATION												200																				
5.511C																																
15.63-15.7 GHz	70	2																														
RADIOLOCATION 5.511E 5.511F				70																												
AERONAUTICAL RADIONAVIGATION												70																				
15.7-16.6 GHz	900	1																														
RADIOLOCATION				900																												
16.6-17.1 GHz	500	1																														
RADIOLOCATION				500																												
Space research (deep space) (Earth-to-space)																																
17.1-17.2 GHz	100	1																														
RADIOLOCATION				100																												
17.2-17.3 GHz	100	3																														
EARTH EXPLORATION-SATELLITE (active)																											100					
RADIOLOCATION				100																												
SPACE RESEARCH (active)																					100											
5.513A																																
17.3-17.7 GHz	400	1																														
FIXED-SATELLITE																										400						
(Earth-to-space) 5.516																																
(space-to-Earth) 5.516A 5.516B																																
(non-GSO) (Earth-to-space)																																
Radiolocation																																
17.7-18.1 GHz	400	3																														
FIXED NF14			400																													RFSAP based on ITU-R F595
FIXED-SATELLITE																										400						
(space-to-Earth) 5.484A 5.517A																																
(Earth-to-space) 5.516																																
(non-GSO) (Earth-to-space)																																
MOBILE																			400													

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
18.1-18.4 GHz	300	4																														RFSAP based on ITU-R F595
FIXED NF14			300																													
FIXED-SATELLITE																										300						
(space-to-Earth) 5.484A 5.516B 5.517A																																
(Earth-to-space) 5.520																																
MOBILE																			300													
METEOROLOGICAL-SATELLITE (GSO) (space-to-Earth)					300																											
5.519																																
18.4-18.6 GHz	200	3																														RFSAP based on ITU-R F595
FIXED NF14			200																													
FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A																										200						
MOBILE																			200													
18.6-18.8 GHz	200	4																														RFSAP based on ITU-R F595
EARTH EXPLORATION-SATELLITE (passive)																											200					
FIXED NF14			200																													
FIXED-SATELLITE																										200						
(space-to-Earth) 5.517A 5.522B																																
(GSO) (space-to-Earth)																																
MOBILE except aeronautical mobile															200																	
Space research (passive)																																
5.522A 5.522C																																
18.8-19.3 GHz	500	3																														
FIXED NF14			500																													RFSAP based on ITU-R F595
FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A																										500						
MOBILE																			500													
19.3-19.6 GHz	300	3																														RFSAP based on ITU-R F595
FIXED NF14			300																													
FIXED-SATELLITE (space-to-Earth) 5.517A 5.523B 5.523C 5.523D 5.523E																										300						
(Earth-to-space) 5.523B 5.523C 5.523D 5.523E																																
MOBILE																			300													
19.6-19.7 GHz	100	3																														RFSAP based on ITU-R F595
FIXED NF14			100																													
FIXED-SATELLITE (space-to-Earth) 5.523C 5.523D 5.523E																										100						
(Earth-to-space) 5.523C 5.523D 5.523E																																
MOBILE																			100													
19.7-20.1 GHz	400	1																														
FIXED-SATELLITE																										400						
(space-to-Earth) 5.484A 5.484B 5.516B 5.527A																																
Mobile-satellite (space-to-Earth)																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
20.1-20.2 GHz	100	2																														
FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A																									100							
MOBILE-SATELLITE (space-to-Earth)																							100									
5.525 5.526 5.527 5.528																																
20.2-21.2 GHz	1000	2																														
FIXED-SATELLITE (space-to-Earth)																										1000						
MOBILE-SATELLITE (space-to-Earth)																							1000									
Standard frequency and time signal-satellite (space-to-Earth)																																
21.2-21.4 GHz	200	4																														RFSAP based on ITU-R F637
EARTH EXPLORATION-SATELLITE (passive)																											200					
FIXED NF14			200																													
MOBILE																			200													
SPACE RESEARCH (passive)																					200											
21.4-22 GHz	600	3																														RFSAP based on ITU-R F637
FIXED NF14			600																													
MOBILE																			600													
BROADCASTING-SATELLITE 5.208B											600																					
5.530A 5.530B ~~5.530D~~																																
22-22.21 GHz	210	2																														RFSAP based on ITU-R F637
FIXED NF14			210																													
MOBILE except aeronautical mobile															210																	
5.149																																
22.21-22.5 GHz	290	5																														RFSAP based on ITU-R F637
EARTH EXPLORATION-SATELLITE (passive)																											290					
FIXED NF14			290																													
MOBILE except aeronautical mobile															290																	
RADIO ASTRONOMY																								290								
SPACE RESEARCH (passive)																					290											
5.149 5.532																																
22.5-22.55 GHz	50	2																														RFSAP based on ITU-R F637
FIXED NF14			50																													
MOBILE																			50													
22.55-23.15 GHz	600	4																														RFSAP based on ITU-R F637
FIXED NF14			600																													
INTER-SATELLITE 5.338A																														600		
MOBILE																			600													
SPACE RESEARCH (Earth-to-space) 5.532A																					600											
5.149																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
23.15-23.55 GHz	400	3																														RFSAP based on ITU-R F637
FIXED NF14			400																													
INTER-SATELLITE 5.338A																														400		
MOBILE																			400													
23.55-23.6 GHz	50	2																														RFSAP based on ITU-R F637
FIXED NF14			50																													
MOBILE																			50													
23.6-24 GHz	400	3																														
EARTH EXPLORATION-SATELLITE (passive)																											400					
RADIO ASTRONOMY																								400								
SPACE RESEARCH (passive)																					400											
5.34																																
24-24.05 GHz	50	2																														
AMATEUR																50																
AMATEUR-SATELLITE																	50															
5.15																																
24.05-24.25 GHz	200	1																														
RADIOLOCATION				200																												
Amateur																																
Earth exploration-satellite (active)																																
5.15																																
24.25-24.45 GHz	200	2																													200	RFSAP based on ITU-R F748
FIXED			200																													
MOBILE except aeronautical mobile 5.338A 5.532AB															200																	
24.45-24.65 GHz	200	3																													200	RFSAP based on ITU-R F748
FIXED NF14			200																													
INTER-SATELLITE																														200		
MOBILE except aeronautical mobile 5.338A 5.532AB															200																	
24.65-24.75 GHz	100	4																													100	RFSAP based on ITU-R F748
FIXED NF14			100																													
FIXED-SATELLITE (Earth-to-space) 5.532B																										100						
INTER-SATELLITE																														100		
MOBILE except aeronautical mobile 5.338A 5.532AB															100																	
24.75-25.25 GHz	500	3																													500	RFSAP based on ITU-R F748
FIXED NF14			500																												0	
FIXED-SATELLITE (Earth-to-space) 5.532B																										500						
MOBILE except aeronautical mobile 5.338A 5.532AB															500																	

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
25.25-25.5 GHz	250	5																													250	RFSAP based on ITU-R F748
FIXED NF14			250																													
INTER-SATELLITE (Earth exploration-satellite applications) 5.536																														250		
INTER-SATELLITE (space research applications)																																
INTER-SATELLITE (transmissions of data originating from industrial and medical activities in space)																																
MOBILE 5.338A 5.532AB																			250													
Standard frequency and time signal-satellite (Earth-to-space)																																
25.5-27 GHz	1500	5																													1500	RFSAP based on ITU-R F748
EARTH EXPLORATION-SATELLITE (space-to Earth) 5.536B																											1500					
FIXED NF14			1500																													
INTER-SATELLITE (Earth exploration-satellite applications) 5.536																														1500		
INTER-SATELLITE (space research applications)																																
INTER-SATELLITE (transmissions of data originating from industrial and medical activities in space)																																
MOBILE 5.338A 5.532AB																			1500													
SPACE RESEARCH (space-to-Earth) 5.536C																					1500											
Standard frequency and time signal-satellite (Earth-to-space)																																
5.536A																																
27-27.5 GHz	500	3																													500	
FIXED			500																													
INTER-SATELLITE (Earth exploration-satellite applications) 5.536																																
INTER-SATELLITE (space research applications)																														500		
INTER-SATELLITE (transmissions of data originating from industrial and medical activities in space)																																
MOBILE 5.338A 5.532AB																			500													
27.5-27.501 GHz	1	3																														RFSAP based on ITU-R F748
FIXED 5.537A NF14 NF18			1																													
FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539																										1						
FIXED-SATELLITE (space-to-Earth)																																
MOBILE																			1													
5.538 5.540																																
27.501-27.82 GHz	319	3																														RFSAP based on ITU-R F748
FIXED 5.537A NF14 NF18			319																													
FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517 A 5.539																										319						
MOBILE																			319													
Fixed-satellite (space-to-Earth)																																
5.538 5.540																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
27.82-28.45 GHz	630	3																													
FIXED 5.537A NF14 NF18			630																												RFSAP based on ITU-R F748
FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539																										630					
MOBILE																			630												
Fixed-satellite (space-to-Earth)																															
5.538 5.540																															
28.45-28.5 GHz	50	3																													RFSAP based on ITU-R F748
FIXED 5.537A NF14 NF18			50																												
FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517 5.539																										50					
MOBILE																			50												
Fixed-satellite (space-to-Earth)																															
5.538 5.540																															
28.5-28.94 GHz	440	3																													RFSAP based on ITU-R F748
FIXED NF14			440																												
FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539																										440					
MOBILE																			440												
Earth exploration-satellite (Earth-to-space) 5.541																															
Fixed-satellite (space-to-Earth)																															
5.54																															
28.94-29.1 GHz	160	3																													
FIXED NF14			160																												
FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539																										160					
MOBILE																			160												
Earth exploration-satellite (Earth-to-space) 5.541																															
Fixed-satellite (space-to-Earth)																															
5.54																															
29.1-29.46 GHz	360	3																													
FIXED NF14 NF18			360																												
FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A																										360					
FIXED-SATELLITE (GSO) (Earth-to-space)																															
MOBILE																			360												
Earth exploration-satellite (Earth-to-space) 5.541																															
Fixed-satellite (space-to-Earth)																															
5.54																															

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
29.46-29.5 GHz	40	3																														
FIXED NF14 NF18			40																													
FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A																										40						
FIXED-SATELLITE (GSO) (Earth-to-space)																																
MOBILE																			40													
Earth exploration-satellite (Earth-to-space) 5.541																																
Fixed-satellite (space-to-Earth)																																
5.54																																
29.5-29.9 GHz	400	1																														
FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539																										400						
Earth exploration-satellite (Earth-to-space) 5.541																																
Fixed-satellite (space-to-Earth)																																
Mobile-satellite (Earth-to-space)																																
5.540																																
29.9-29.95 GHz	50	2																														
FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539																										50						
MOBILE-SATELLITE (Earth-to-space)																							50									
Earth exploration-satellite (Earth-to-space) 5.541 5.543																																
Fixed-satellite (space-to-Earth)																																
5.525 5.526 5.527 5.538 5.540																																
29.95-29.999 GHz	49	2																														
FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539																										49						
MOBILE-SATELLITE (Earth-to-space)																							49									
Earth exploration-satellite (Earth-to-space) 5.541 5.543																																
Earth exploration-satellite (space-to-space)																																
Fixed-satellite (space-to-Earth)																																
5.525 5.526 5.527 5.538 5.540																																
29.999-30 GHz	1	2																														
FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539																										1						
FIXED-SATELLITE (space-to-Earth)																																
MOBILE-SATELLITE (Earth-to-space)																							1									
Earth exploration-satellite (Earth-to-space) 5.541 5.543																																
Earth exploration-satellite (space-to-space)																																
5.525 5.526 5.527 5.538 5.540																																
30-31 GHz	1000	2																														
FIXED-SATELLITE (Earth-to-space) 5.338A																										1000						
MOBILE-SATELLITE (Earth-to-space)																							1000									
Standard frequency and time signal-satellite (space-to-Earth)																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
31-31.3 GHz	300	2																														
FIXED 5.338A 5.543B NF18			300																													
MOBILE																			300													
Standard frequency and time signal-satellite (space-to-Earth)																																
Space research 5.544 ~~5.545~~																																
5.149																																
31.3-31.5 GHz	200	3																														
EARTH EXPLORATION-SATELLITE (passive)																											200					
RADIO ASTRONOMY																								200								
SPACE RESEARCH (passive)																					200											
5.34																																
31.5-31.8 GHz	300	5																														
EARTH EXPLORATION-SATELLITE (passive)																											300					
RADIO ASTRONOMY																								300								
SPACE RESEARCH (passive)																					300											
FIXED 5.546			300																													
MOBILE except aeronautical mobile 5.546															300																	
5.149																																
31.8-32 GHz	200	3																														RFSAP based on ITU-R F.1520
FIXED 5.547A NF14			200																													
RADIONAVIGATION						200																										
SPACE RESEARCH (deep space) (space-to-Earth)																					200											
5.547 5.548																																
32-32.3 GHz	300	3																														RFSAP based on ITU-R F.1520
FIXED 5.547A NF14			300																													
RADIONAVIGATION						300																										
SPACE RESEARCH (deep space) (space-to-Earth)																					300											
5.547 5.548																																
32.3-33 GHz	700	3																														RFSAP based on ITU-R F.1520
FIXED 5.547A NF14			700																													
INTER-SATELLITE																														700		
RADIONAVIGATION						700																										
5.547 5.548																																
33-33.4 GHz	400	2																														RFSAP based on ITU-R F.1520
FIXED 5.547A NF14			400																													
RADIONAVIGATION						400																										
5.547																																
33.4-34.2 GHz	800	1																														
RADIOLOCATION				800																												
34.2-34.7 GHz	500	2																														
RADIOLOCATION				500																												
SPACE RESEARCH (deep space) (Earth to-space)																					500											

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
34.7-35.2 GHz	500	1																														
RADIOLOCATION				500																												
Space research ~~5.550~~																																
35.2-35.5 GHz	300	2																														
METEOROLOGICAL AIDS					300																											
RADIOLOCATION				300																												
35.5-36 GHz	500	4																														
METEOROLOGICAL AIDS					500																											
EARTH EXPLORATION-SATELLITE (active)																											500					
RADIOLOCATION				500																												
SPACE RESEARCH (active)																					500											
5.549A																																
36-37 GHz	1000	4																														
EARTH EXPLORATION-SATELLITE (passive)																											1000					
FIXED			1000																													
MOBILE																			1000													
SPACE RESEARCH (passive)																					1000											
5.149 5.550A																																
37-37.5 GHz	500	3																													500	RFSAP based on ITU-R F.749
FIXED NF14			500																													
MOBILE except aeronautical mobile 5.550B															500																	
SPACE RESEARCH (space-to-Earth)																					500											
5.547																																
37.5-38 GHz	500	4																													500	RFSAP based on ITU-R F.749
FIXED NF14			500																													
FIXED-SATELLITE (space-to-Earth) 5.550C																										500						
MOBILE except aeronautical mobile 5.550B															500																	
SPACE RESEARCH (space-to-Earth)																					500											
Earth exploration-satellite (space-to-Earth)																																
5.547																																
38-39.5 GHz	1500	3																													1500	RFSAP based on ITU-R F.749
FIXED 5.550D NF14			1500																													
FIXED-SATELLITE (space-to-Earth) 5.550C																										1500						
MOBILE 5.550B																			1500													
Earth exploration-satellite (space-to-Earth)																																
5.547																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
39.5-40 GHz	500	4																													500	
FIXED			500																													
FIXED-SATELLITE (space-to-Earth) 5.516B 5.550C																										500						
MOBILE 5.550B																			500													
MOBILE-SATELLITE (space-to-Earth)																							500									
Earth exploration-satellite (space-to-Earth)																																
5.547 5.550E																																
40-40.5 GHz	500	6																													500	
EARTH EXPLORATION-SATELLITE (Earth-to-space)																											500					
FIXED			500																													
FIXED-SATELLITE (space-to-Earth) 5.516B 5.550C																										500						
MOBILE 5.550B																			500													
MOBILE-SATELLITE (space-to-Earth)																							500									
SPACE RESEARCH (Earth-to-space)																					500											
Earth exploration-satellite (space-to-Earth)																																
5.550E																																
40.5-41 GHz	500	5																													500	
FIXED NF14			500																													
FIXED-SATELLITE (space-to-Earth) 5.550C																										500						
LAND MOBILE 5.550B													500																			
BROADCASTING										500																						
BROADCASTING-SATELLITE											500																					
Mobile																																
Aeronautical Mobile																																
Maritime Mobile																																
5.547																																
41-42.5 GHz	1500	5																													1500	
FIXED NF14			1500																													
FIXED-SATELLITE (space-to-Earth) 5.516B 5.550C																										1500						
LAND MOBILE 5.550B													1500																			
BROADCASTING										1500																						
BROADCASTING-SATELLITE											1500																					
Aeronautical mobile																																
Maritime mobile																																
5.547 ~~5.551F~~ 5.551H 5.551I																																
42.5-43.5 GHz	1000	4																													1000	
FIXED NF14			1000																													
FIXED-SATELLITE (Earth-to-space) 5.552																										1000						
MOBILE except aeronautical mobile 5.550B															1000																	
RADIO ASTRONOMY																								1000								
5.149 5.547 ~~5.551H~~																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
43.5-45.5 GHz	2000	4																														
MOBILE 5.553 5.553A																			2000													
MOBILE-SATELLITE																							2000									
RADIONAVIGATION						2000																										
RADIONAVIGATION-SATELLITE																									2000							
5.554																																
45.5-47 GHz	1500	4																													1500	
MOBILE 5.553 5.553A																			1500													
MOBILE-SATELLITE																							1500									
RADIONAVIGATION						1500																										
RADIONAVIGATION-SATELLITE																									1500							
5.554																																
47-47.2 GHz	200	2																														
AMATEUR																200																
AMATEUR-SATELLITE																	200															
47.2-47.5 GHz	300	3																													300	
FIXED			300																													
FIXED-SATELLITE (Earth-to-space) 5.550C 5.552																										300						
MOBILE 5.553B																			300													
5.552A																																
47.5-47.9 GHz	400	3																													400	
FIXED			400																													
FIXED-SATELLITE																										400						
(Earth-to-space) 5.550C 5.552																																
(GSO) (space-to-Earth) 5.516B 5.554A																																
MOBILE 5.553B																			400													
47.9-48.2 GHz	300	3																													300	
FIXED			300																													
FIXED-SATELLITE (Earth-to-space) 5.550C 5.552																										300						
MOBILE 5.553B																			300													
5.552A																																
48.2-48.54 GHz	340	3																														
FIXED			340																													
FIXED-SATELLITE																										340						
(Earth-to-space) 5.550C 5.552																																
(GSO) (space-to-Earth) 5.516B																																
5.554A 5.555B																																
MOBILE																			340													
48.54-48.94 GHz	400	3																														
FIXED			400																													
FIXED-SATELLITE (Earth-to-space) 5.550C 5.552																										400						
MOBILE																			400													
5.149 5.340 5.555																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
48.94-49.04 GHz	100	4																													
FIXED			100																												
FIXED-SATELLITE																										100					
(Earth-to-space) 5.550C 5.552																															
MOBILE																			100												
RADIO ASTRONOMY																								100							
5.149 5.340 5.555																															
49.04-49.44 GHz	400	3																													
FIXED			400																												
FIXED-SATELLITE																										400					
(Earth-to-space) 5.550C 5.552																															
MOBILE																			400												
5.149 5.340 5.555																															
49.44-50.2 GHz	760	3																													
FIXED			760																												
FIXED-SATELLITE																										760					
(Earth-to-space) 5.338A 5.550C 5.552																															
(GSO) (space-to-Earth) 5.516B																															
5.554A 5.555B																															
MOBILE																			760												
50.2-50.4 GHz	200	2																													
EARTH EXPLORATION-SATELLITE (passive)																											200				
SPACE RESEARCH (passive)																					200										
5.34																															
50.4-51.4 GHz	1000	3																													
FIXED			1000																												
FIXED-SATELLITE (Earth-to-space) 5.338A 5.550C																										1000					
MOBILE																			1000												
Mobile-satellite (Earth-to-space)																															
51.4-52.4 GHz	1000	3																													
FIXED 5.338A			1000																												
FIXED-SATELLITE (GSO)(Earth-to-space) 5.555C																										1000					
MOBILE																			1000												
5.547 5.556																															
52.4-52.6 GHz	200	2																													
FIXED 5.338A			200																												
MOBILE																			200												
5.547 5.556																															
52.6-54.25 GHz	1650	2																													
EARTH EXPLORATION-SATELLITE (passive)																											1650				
SPACE RESEARCH (passive)																					1650										
5.340 5.556																															

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
54.25-55.78 GHz	1530	3																														
EARTH EXPLORATION-SATELLITE (passive)																											1530					
INTER-SATELLITE (GSO) 5.556A																														1530		
SPACE RESEARCH (passive)																					1530											
55.78-56.9 GHz	1120	5																														
EARTH EXPLORATION-SATELLITE (passive)																											1120					
FIXED 5.557A NF14			1120																													
INTER-SATELLITE (GSO) 5.556A																														1120		
MOBILE 5.558																			1120													
SPACE RESEARCH (passive)																					1120											
5.547																																
56.9-57 GHz	100	5																														
EARTH EXPLORATION-SATELLITE (passive)																											100					
FIXED NF14			100																													
INTER-SATELLITE 5.558A																														100		
INTER-SATELLITE (non-GSO)																																
MOBILE 5.558																			100													
SPACE RESEARCH (passive)																					100											
5.547																																
57-58.2 GHz	1200	5																														
EARTH EXPLORATION-SATELLITE (passive)																											1200					
FIXED NF14			1200																													
INTER-SATELLITE (GSO) 5.556A																														1200		
MOBILE 5.558																			1200													
SPACE RESEARCH (passive)																					1200											
5.547																																
58.2-59 GHz	800	4																														
EARTH EXPLORATION-SATELLITE (passive)																											800					
FIXED NF14			800																													
MOBILE																			800													
SPACE RESEARCH (passive)																					800											
5.547 5.556																																
59-59.3 GHz	300	6																														
EARTH EXPLORATION-SATELLITE (passive)																											300					
FIXED			300																													
INTER-SATELLITE (GSO) 5.556A																														300		
MOBILE 5.558																			300													
RADIOLOCATION 5.559				300																												
SPACE RESEARCH (passive)																					300											
59.3-64 GHz	4700	4																														
FIXED			4700																													
INTER-SATELLITE																														4700		
MOBILE 5.558																			4700													
RADIOLOCATION 5.559				4700																												
5.138																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
64-65 GHz	1000	3																														
FIXED			1000																													
INTER-SATELLITE																														1000		
MOBILE except aeronautical mobile															1000																	
5.547 5.556																																
65-66 GHz	1000	5																														
EARTH EXPLORATION-SATELLITE																											1000					
FIXED			1000																													
INTER-SATELLITE																														1000		
MOBILE except aeronautical mobile															1000																	
SPACE RESEARCH																					1000											
5.547																																
66-71 GHz	5000	5																													5000	
INTER-SATELLITE																														5000	0	
MOBILE 5.553 5.558 5.559AA																			5000													
MOBILE-SATELLITE																							5000									
RADIONAVIGATION						5000																										
RADIONAVIGATION-SATELLITE																									5000							
5.554																																
71-74 GHz	3000	4																														
FIXED NF14			3000																													
FIXED-SATELLITE (space-to-Earth)																										3000						
MOBILE																			3000													
MOBILE-SATELLITE (space-to-Earth)																							3000									
74-76 GHz	2000	5																														
FIXED NF14			2000																													
FIXED-SATELLITE (space-to-Earth)																										2000						
MOBILE																			2000													
BROADCASTING										2000																						
BROADCASTING-SATELLITE											2000																					
Space research (space-to-Earth)																																
5.561																																
76-77.5 GHz	1500	2																														
RADIO ASTRONOMY																								1500								
RADIOLOCATION				1500																												
Amateur																																
Amateur-satellite																																
Space research (space-to-Earth)																																
5.149																																
77.5-78 GHz	500	3																														
AMATEUR																500																
AMATEUR-SATELLITE																	500															
RADIOLOCATION 5.559B				500																												
Radio astronomy																																
Space research (space-to-Earth)																																
5.149																																
78-79 GHz	1000	1																														
RADIOLOCATION				1000																												
Amateur																																
Amateur-satellite																																
Radio astronomy																																
Space research (space-to-Earth)																																
5.149 5.560																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
79-81 GHz	2000	2																														
RADIO ASTRONOMY																								2000								
RADIOLOCATION				2000																												
Amateur																																
Amateur-satellite																																
Space research (space-to-Earth)																																
5.149																																
81-81.5 GHz	500	5																														
FIXED 5.338A NF14			500																													
FIXED-SATELLITE (Earth-to-space)																										500						
MOBILE																			500													
MOBILE-SATELLITE (Earth-to-space)																							500									
RADIO ASTRONOMY																								500								
Amateur																																
Amateur-satellite																																
Space research (space-to-Earth)																																
5.149 5.561A																																
81.5-84 GHz	2500	5																														
FIXED 5.338A NF14			2500																													
FIXED-SATELLITE (Earth-to-space)																										2500						
MOBILE																			2500													
MOBILE-SATELLITE (Earth-to-space)																							2500									
RADIO ASTRONOMY																								2500								
Space research (space-to-Earth)																																
5.149 5.561A																																
84-86 GHz	2000	4																														
FIXED 5.338A NF14			2000																													
FIXED-SATELLITE (Earth-to-space) 5.561B																										2000						
MOBILE																			2000													
RADIO ASTRONOMY																								2000								
5.149																																
86-92 GHz	6000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											6000					
RADIO ASTRONOMY																								6000								
SPACE RESEARCH (passive)																					6000											
5.34																																
92-94 GHz	2000	4																														
FIXED 5.338A NF14			2000																													
MOBILE																			2000													
RADIO ASTRONOMY																								2000								
RADIOLOCATION				2000																												
5.149																																
94-94.1 GHz	100	3																														
EARTH EXPLORATION-SATELLITE (active)																											100					
RADIOLOCATION				100																												
SPACE RESEARCH (active)																					100											
Radio astronomy																																
5.562 5.562A																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
94.1-95 GHz	900	4																														
FIXED NF14			900																													
MOBILE																			900													
RADIO ASTRONOMY																								900								
RADIOLOCATION				900																												
5.149																																
95-100 GHz	5000	6																														
FIXED			5000																													
MOBILE																			5000													
RADIO ASTRONOMY																								5000								
RADIOLOCATION				5000																												
RADIONAVIGATION						5000																										
RADIONAVIGATION-SATELLITE																									5000							
5.149 5.554																																
100-102 GHz	2000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											2000					
RADIO ASTRONOMY																								2000								
SPACE RESEARCH (passive)																					2000											
5.340 5.341																																
102-105 GHz	3000	3																														
FIXED			3000																													
MOBILE																			3000													
RADIO ASTRONOMY																								3000								
5.149 5.341																																
105-109.5 GHz	4500	4																														
FIXED			4500																													
MOBILE																			4500													
RADIO ASTRONOMY																								4500								
SPACE RESEARCH (passive) 5.562B																					4500											
5.149 5.341																																
109.5-111.8 GHz	2300	3																														
EARTH EXPLORATION-SATELLITE (passive)																											2300					
RADIO ASTRONOMY																								2300								
SPACE RESEARCH (passive)																					2300											
5.340 5.341																																
111.8-114.25 GHz	2450	4																														
FIXED			2450																													
MOBILE																			2450													
RADIO ASTRONOMY																								2450								
SPACE RESEARCH (passive) 5.562B																					2450											
5.149 5.341																																
114.25-116 GHz	1750	3																														
EARTH EXPLORATION-SATELLITE (passive)																											1750					
RADIO ASTRONOMY																								1750								
SPACE RESEARCH (passive)																					1750											
5.340 5.341																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
116-119.98 GHz	3980	3																														
EARTH EXPLORATION-SATELLITE (passive)																											3980					
INTER-SATELLITE (GSO) 5.562C																														3980		
SPACE RESEARCH (passive)																					3980											
5.341																																
119.98-122.25 GHz	2270	3																														
EARTH EXPLORATION-SATELLITE (passive)																											2270					
INTER-SATELLITE 5.562C																														2270		
SPACE RESEARCH (passive)																					2270											
5.138 5.341																																
122.25-123 GHz	750	3																														
FIXED			750																													
INTER-SATELLITE																														750		
MOBILE 5.558																			750													
Amateur																																
5.138																																
123-130 GHz	7000	4																														
FIXED-SATELLITE (space-to-Earth)																										7000						
MOBILE-SATELLITE (space-to-Earth)																							7000									
RADIONAVIGATION						7000																										
RADIONAVIGATION-SATELLITE																									7000							
Radio astronomy 5.562D																																
5.149 5.554																																
130-133.5 GHz	3500	4																														
FIXED			3500																													
INTER-SATELLITE																														3500		
MOBILE 5.558																			3500													
RADIO ASTRONOMY																								3500								
5.149 5.562A																																
133.5-134 GHz	500	5																														
EARTH EXPLORATION-SATELLITE (active) 5.562E																											500					
FIXED			500																													
INTER-SATELLITE																														500		
MOBILE 5.558																			500													
RADIO ASTRONOMY																								500								
5.149 5.562A																																
134-136 GHz	2000	2																														
AMATEUR																2000																
AMATEUR-SATELLITE																	2000															
Radio astronomy																																
136-141 GHz	5000	2																														
RADIO ASTRONOMY																								2000								
RADIOLOCATION				5000																												
Amateur																																
Amateur-satellite																																
5.149																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
141-148.5 GHz	7500	4																														
FIXED			7500																													
MOBILE																			7500													
RADIO ASTRONOMY																								7500								
RADIOLOCATION				7500																												
5.149																																
148.5-151.5 GHz	3000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											3000					
RADIO ASTRONOMY																								3000								
SPACE RESEARCH (passive)																					3000											
5.34																																
151.5-155.5 GHz	4000	4																														
FIXED			4000																													
MOBILE																			4000													
RADIO ASTRONOMY																								4000								
RADIOLOCATION				4000																												
5.149																																
155.5-158.5 GHz	3000	5																														
EARTH EXPLORATION-SATELLITE (passive)																											3000					
FIXED			3000																													
MOBILE																			3000													
RADIO ASTRONOMY																								3000								
SPACE RESEARCH (passive) 5.562B																					3000											
5.149 ~~5.562F 5.562G~~																																
158.5-164 GHz	5500	4																														
FIXED			5500																													
FIXED-SATELLITE (space-to-Earth)																										5500						
MOBILE																			5500													
MOBILE-SATELLITE (space-to-Earth)																							5500									
164-167 GHz	3000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											3000					
RADIO ASTRONOMY																								3000								
SPACE RESEARCH (passive)																					3000											
5.34																																
167-174.5 GHz	7500	4																														
FIXED			7500																													
FIXED-SATELLITE (space-to-Earth)																										7500						
INTER-SATELLITE																														7500		
MOBILE 5.558																			7500													
5.149 5.562D																																
174.5-174.8 GHz	300	3																														
FIXED			300																													
INTER-SATELLITE																														300		
MOBILE 5.558																			300													
174.8-182 GHz	7200	3																														
EARTH EXPLORATION-SATELLITE (passive)																											7200					
INTER-SATELLITE (GSO) 5.562H																														7200		
SPACE RESEARCH (passive)																					7200											

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
182-185 GHz	3000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											3000					
RADIO ASTRONOMY																								3000								
SPACE RESEARCH (passive)																					3000											
5.34																																
185-190 GHz	5000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											5000					
INTER-SATELLITE (GSO) 5.562H																														5000		
SPACE RESEARCH (passive)																					5000											
190-191.8 GHz	1800	2																														
EARTH EXPLORATION-SATELLITE (passive)																											1800					
SPACE RESEARCH (passive)																					1800											
5.34																																
191.8-200 GHz	8200	6																														
FIXED			8200																													
INTER-SATELLITE																														8200		
MOBILE 5.558																			8200													
MOBILE-SATELLITE																							8200									
RADIONAVIGATION						8200																										
RADIONAVIGATION-SATELLITE																									8200							
5.149 5.341 5.554																																
200-209 GHz	9000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											9000					
RADIO ASTRONOMY																							9000									
SPACE RESEARCH (passive)																					9000											
5.340 5.341 5.563A																																
209-217 GHz	8000	4																														
FIXED			8000																													
FIXED-SATELLITE (Earth-to-space)																										8000						
MOBILE																			8000													
RADIO ASTRONOMY																							8000									
5.149 5.341																																
217-226 GHz	9000	5																														
FIXED			9000																													
FIXED-SATELLITE (Earth-to-space)																										9000						
MOBILE																			9000													
RADIO ASTRONOMY																							9000									
SPACE RESEARCH (passive) 5.562B																					9000											
5.149 5.341																																
226-231.5 GHz	5500	3																														
EARTH EXPLORATION-SATELLITE (passive)																											5500					
RADIO ASTRONOMY																							5500									
SPACE RESEARCH (passive)																					5500											
5.34																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RFSAP OR EQUIVALENT
231.5-232 GHz	500	2																														
FIXED			500																500													
MOBILE																																
Radiolocation																																
232-235 GHz	3000	3																														
FIXED			3000																													
FIXED-SATELLITE (space-to-Earth)																										3000						
MOBILE																			3000													
Radiolocation																																
235-237.9 GHz	2900	3																														
EARTH EXPLORATION-SATELLITE (passive)																											2900					
FIXED-SATELLITE (space-to-Earth)																										2900						
SPACE RESEARCH (passive)																					2900											
5.563A 5.563B																																
237.9-238 GHz	100	4																														
EARTH EXPLORATION-SATELLITE (active)																											100					
EARTH EXPLORATION-SATELLITE (passive)																																
FIXED-SATELLITE (space-to-Earth)																										100						
SPACE RESEARCH (active)																					100											
SPACE RESEARCH (passive)																																
5.563A 5.563B																																
238-240 GHz	2000	6																														
FIXED			2000																													
FIXED-SATELLITE (space-to-Earth)																										2000						
MOBILE																			2000													
RADIOLOCATION				2000																												
RADIONAVIGATION						2000																										
RADIONAVIGATION-SATELLITE																									2000							
240-241 GHz	1000	3																														
FIXED			1000																													
MOBILE																			1000													
RADIOLOCATION				1000																												
241-248 GHz	7000	2																														
RADIO ASTRONOMY																								7000								
RADIOLOCATION				7000																												
Amateur																																
Amateur-satellite																																
5.138 5.149																																
248-250 GHz	2000	2																														
AMATEUR																2000																
AMATEUR-SATELLITE																	2000															
Radio astronomy																																
5.149																																

DRAFT NRFP 2021 INFORMATION			TOTAL BANDWIDTH FOR ALL SERVICE ALLOCATIONS PER FREQUENCY BAND IN MHZ.																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
SOUTH AFRICAN ALLOCATIONS AND FOOTNOTES	BANDWIDTH IN MHz	NUMBER OF PRIMARY SERVICES	FIXED	RADIOLOCATION	METEOROLOGICAL AIDS	RADIONAVIGATION	MARITIME MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	MARITIME RADIONAVIGATION	BROADCASTING	BROADCASTING-SATELLITE	AERONAUTICAL RADIONAVIGATION	LAND MOBILE	RADIODETERMINATION	MOBILE except aeronautical mobile	AMATEUR	AMATEUR-SATELLITE	SPACE OPERATION	MOBILE	AERONAUTICAL MOBILE	SPACE RESEARCH	MARITIME MOBILE-SATELLITE	MOBILE-SATELLITE	RADIO ASTRONOMY	RADIONAVIGATION-SATELLITE	FIXED-SATELLITE	EARTH EXPLORATION-SATELLITE	AERONAUTICAL MOBILE-SATELLITE	AERONAUTICAL RADIONAVIGATION-SATELLITE	INTER-SATELLITE	IMT	RESAP OR EQUIVALENT
250-252 GHz	2000	3																														
EARTH EXPLORATION-SATELLITE (passive)																											2000					
RADIO ASTRONOMY																								2000								
SPACE RESEARCH (passive)																					2000											
5.340 5.563A																																
252-265 GHz	13000	6																														
FIXED			13000																													
MOBILE																			13000													
MOBILE-SATELLITE (Earth-to-space)																							13000									
RADIO ASTRONOMY																								13000								
RADIONAVIGATION						13000																										
RADIONAVIGATION-SATELLITE																									13000							
5.149 5.554																																
265-275 GHz	10000	4																														
FIXED			10000																													
FIXED-SATELLITE (Earth-to-space)																										10000						
MOBILE																			10000													
RADIO ASTRONOMY																								10000								
5.149 5.563A																																
275-1000 GHz	725000																															
(Not allocated) 5.565																																
5.564A																																
1000-3000 GHz	2000000																															
(Not allocated) 5.565																																
5.564A																																
TOTAL MHz	3000000		159535.622	53095	1718.128	46395.1043	6.1518	8.256	430.06	5179.3	5590	2309.9	2005.6	17.748	10709.689	4769.2	4754.7	197.41	153760.9	1109.476	97737	380.15	83329	102422	43967	91725	80394	172.1	16.5	59400	19151	

8 APPENDIX B: TERMS, DEFINITIONS AND ACRONYMS

8.1 TERMS AND DEFINITIONS

These definitions are for the purposes of the NRFP and do not necessarily apply elsewhere.

adaptive system:	A radiocommunication system which varies its radio characteristics according to channel quality.
administration	Any governmental department or service responsible for discharging the obligations undertaken in the Constitution of the International Telecommunication Union, in the Convention of the International Telecommunication Union and in the Administrative Regulations (CS 1002).
allocation (of a frequency band)	Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned.
allotment (of a radio frequency or radio frequency channel)	Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space radiocommunication service in one or more identified countries or geographical areas and under specified conditions.
assignment (of a radio frequency or radio frequency channel)	Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.
aeronautical earth station:	An earth station in the fixed-satellite service, or, in some cases, in the aeronautical mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the aeronautical mobile-satellite service.
aeronautical mobile (OR)** service:	An *aeronautical mobile service* intended for communications, including those relating to flight coordination, primarily outside national or international civil air routes.
aeronautical mobile (R)* service:	An *aeronautical mobile service* reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes.
aeronautical mobile service:	A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate;

** (OR): off-route.

* (R): route.

	emergency position-indicating radiobeacon stations may also participate in this service on designated distress and emergency frequencies.
aeronautical mobile satellite (OR)** service:	An *aeronautical mobile-satellite service* intended for communications, including those relating to flight coordination, primarily outside national and international civil air routes.
aeronautical mobile satellite (R)* service:	An *aeronautical mobile-satellite service* reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes.
aeronautical mobile-satellite service:	A mobile-satellite service in which mobile earth stations are located on board aircraft; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.
aeronautical radionavigation service:	A *radionavigation service* intended for the benefit and for the safe operation of aircraft.
aeronautical radionavigation-satellite service:	A radionavigation-satellite service in which earth stations are located on board aircraft.
aeronautical station:	A land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea.
aircraft earth station:	A mobile earth station in the aeronautical mobile-satellite service located on board an aircraft.
aircraft station:	A mobile station in the aeronautical mobile service, other than a survival craft station, located on board an aircraft.
amateur service:	A *radiocommunication service* for the purpose of self-training, intercommunication and technical investigations carried out by amateurs; that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.
amateur station:	A station in the amateur service.
amateur-satellite service:	A radiocommunication service using space stations on earth satellites for the same purposes as those of the amateur service.
base earth station:	An *earth station* in the *fixed-satellite service* or, in some cases, in the *land mobile-satellite service,* located at a specified fixed point or within a specified area on land to provide a *feeder link* for the *land mobile-satellite service*.
base station:	A land station in the land mobile service.

broadcasting service:	A *radiocommunication service* in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, *television* transmissions or other types of transmission (CS).
broadcasting station:	A station in the broadcasting service.
broadcasting-satellite service:	A *radiocommunication service* in which signals transmitted or retransmitted by *space stations* are intended for direct reception by the general public. In the broadcasting-satellite service, the term "direct reception" shall encompass both *individual reception* and *community reception*.
coast earth station:	An earth station in the fixed-satellite service or, in some cases, in the maritime mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the maritime mobile-satellite service.
coast station:	A land station in the maritime mobile service.
Coordinated Universal Time (UTC):	Time scale, based on the second (SI), as described in Resolution 655 (WRC-15). (WRC-15). For most practical purposes associated with the Radio Regulations, UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT.
Earth exploration-satellite service:	A *radiocommunication service* between *earth stations* and one or more *space stations*, which may include links between *space stations*, in which: – information relating to the characteristics of the Earth and its natural phenomena, including data relating to the state of the environment, is obtained from *active sensors* or *passive sensors* on Earth *satellites*. – similar information is collected from airborne or Earth-based platforms; – such information may be distributed to earth stations within the system concerned; – platform interrogation may be included. This service may also include *feeder links* necessary for its operation.
earth station:	A *station* located either on the Earth's surface or within the major portion of the Earth's atmosphere and intended for communication: – with one or more *space stations*; or – with one or more *stations* of the same kind by means of one or more reflecting *satellites* or other objects in space.
emergency position-indicating radiobeacon station:	A *station* in the *mobile service* the *emissions* of which are intended to facilitate search and rescue operations.

experimental station:	A *station* utilizing *radio waves* in experiments with a view to the development of science or technique. This definition does not include *amateur stations.*
facsimile	A form of telegraphy for the transmission of fixed images, with or without half-tones, with a view to their reproduction in a permanent form.
feeder link:	A radio link from an *earth station* at a given location to a *space station*, or vice versa, conveying information for a *space radiocommunication service* other than for the *fixed-satellite service*. The given location may be at a specified fixed point, or at any fixed point within specified areas.
fixed service:	A *radiocommunication service* between specified fixed points.
fixed station:	A station in the fixed service.
fixed-satellite service:	A *radiocommunication service* between *earth stations* at given positions, when one or more *satellites* are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases, this service includes satellite-to-satellite links, which may also be operated in the *inter-satellite service*; the fixed-satellite service may also include *feeder links* for other *space radiocommunication services*.
frequency-shift telegraphy	Telegraphy by frequency modulation in which the telegraph signal shifts the frequency of the carrier between predetermined values.
high altitude platform station:	A station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth.
industrial, scientific and medical (ISM) applications (of radio frequency energy):	Operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of *telecommunications*.
instrument landing system (ILS):	A *radionavigation* system which provides aircraft with horizontal and vertical guidance just before and during landing and, at certain fixed points, indicates the distance to the reference point of landing.
instrument landing system glide path:	A system of vertical guidance embodied in the *instrument landing system* which indicates the vertical deviation of the aircraft from its optimum path of descent.
instrument landing system localizer:	A system of horizontal guidance embodied in the *instrument landing system* which indicates the horizontal deviation of the aircraft from its optimum path of descent along the axis of the runway.
inter-satellite service:	A *radiocommunication service* providing links between artificial *satellites*.
land earth station:	An *earth station* in the *fixed-satellite service* or, in some cases, in the *mobile-satellite service,* located at a specified fixed point or within a specified area on land to provide a *feeder link* for the *mobile-satellite service*.
land mobile earth station:	A *mobile earth station* in the *land mobile-satellite service* capable of surface movement within the geographical limits of a country or continent.

land mobile service:	A mobile service between base stations and land mobile stations, or between land mobile stations.
land mobile station:	A *mobile station* in the *land mobile service* capable of surface movement within the geographical limits of a country or continent.
land mobile-satellite service:	A mobile-satellite service in which mobile earth stations are located on land.
land station:	A *station* in the *mobile service* not intended to be used while in motion.
maritime mobile service:	A mobile service between coast stations and ship stations, or between ship stations, or between associated on-board communication stations; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.
maritime mobile-satellite service:	A mobile-satellite service in which mobile earth stations are located on board ships; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.
maritime radionavigation service:	A *radionavigation service* intended for the benefit and for the safe operation of ships.
maritime radionavigation-satellite service:	A radionavigation-satellite service in which earth stations are located on board ships.
marker beacon:	A transmitter in the *aeronautical radionavigation service* which radiates vertically a distinctive pattern for providing position information to aircraft.
meteorological aids service:	A *radiocommunication service* used for meteorological, including hydrological, observations and exploration.
meteorological aids land station: meteorological aids mobile station: meteorological-satellite service: meteorological aids land station: meteorological aids mobile station: meteorological-satellite service:	A station in the meteorological aids service not intended to be used while in motion.
meteorological aids mobile station:	A station in the meteorological aids service intended to be used while in motion or during halts at unspecified points.
meteorological-satellite service:	An earth exploration-satellite service for meteorological purposes.
mobile earth station:	An *earth station* in the *mobile-satellite service* intended to be used while in motion or during halts at unspecified points.
mobile service:	A radiocommunication service between mobile and land stations, or between mobile stations (CV).
mobile station:	A *station* in the *mobile service* intended to be used while in motion or during halts at unspecified points.
mobile-satellite service:	A radiocommunication service: – between *mobile earth stations* and one or more *space stations*, or between *space stations* used by this service; or

	– between *mobile earth stations* by means of one or more *space stations*. This service may also include *feeder links* necessary for its operation.
multi-satellite link:	A radio link between a transmitting *earth station* and a receiving *earth station* through two or more *satellites*, without any intermediate *earth station*. A multi-satellite link comprises one up-link, one or more satellite-to-satellite links and one down-link.
on-board communication station:	A low-powered *mobile station* in the *maritime mobile service* intended for use for internal communications on board a ship, or between a ship and its lifeboats and life-rafts during lifeboat drills or operations, or for communication within a group of vessels being towed or pushed, as well as for line handling and mooring instructions.
port operations service:	A *maritime mobile service* in or near a port, between *coast stations* and *ship stations*, or between *ship stations*, in which messages are restricted to those relating to the operational handling, the movement and the safety of ships and, in emergency, to the safety of persons. Messages which are of a *public correspondence* nature shall be excluded from this service.
port station:	A coast station in the port operations service.
primary radar:	A *radiodetermination* system based on the comparison of reference signals with radio signals reflected from the position to be determined.
public correspondence	Any *telecommunication* which the offices and *stations* must, by reason of their being at the disposal of the public, accept for transmission (CS).
radar beacon (racon):	A transmitter-receiver associated with a fixed navigational mark which, when triggered by a *radar,* automatically returns a distinctive signal which can appear on the display of the triggering *radar,* providing range, bearing and identification information.
radar:	A *radiodetermination* system based on the comparison of reference signals with radio signals reflected, or retransmitted, from the position to be determined.
radio	A general term applied to the use of radio waves.
radio altimeter:	*Radionavigation* equipment, on board an aircraft or *spacecraft,* used to determine the height of the aircraft or the *spacecraft* above the Earth's surface or another surface.
radio astronomy	Astronomy based on the reception of *radio waves* of cosmic origin.
radio astronomy service:	A service involving the use of *radio astronomy*.
radio astronomy station:	A station in the radio astronomy service.
radio astronomy:	Astronomy based on the reception of *radio waves* of cosmic origin.
radio direction-finding station:	A radiodetermination station using radio direction-finding.
radio direction-finding:	*Radiodetermination* using the reception of *radio waves* for the purpose of determining the direction of a *station* or object.
radiobeacon station:	A *station* in the *radionavigation service* the *emissions* of which are intended to enable a *mobile station* to determine its bearing or direction in relation to the radiobeacon station.
radiocommunication	Telecommunication by means of radio waves (CS) (CV).

radiocommunication service:	A service as defined in this Section involving the transmission, *emission* and/or reception of *radio waves* for specific *telecommunication* purposes. In these Regulations, unless otherwise stated, any radiocommunication service relates to *terrestrial radiocommunication*.
radiodetermination:	The determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of *radio waves*.
radiodetermination service:	A radiocommunication service for the purpose of radiodetermination.
radiodetermination Station:	A station in the radiodetermination service.
radiodetermination-satellite service:	A radiocommunication service for the purpose of radiodetermination involving the use of one or more space stations. This service may also include *feeder links* necessary for its own operation.
radio direction-finding	*Radiodetermination* using the reception of *radio waves* for the purpose of determining the direction of a *station* or object.
radiolocation land station:	A *station* in the *radiolocation service* not intended to be used while in motion.
radiolocation mobile station:	A *station* in the *radiolocation service* intended to be used while in motion or during halts at unspecified points.
radiolocation:	*Radiodetermination* used for purposes other than those of *radionavigation*.
radiolocation service:	A radiodetermination service for the purpose of radiolocation.
radiolocation-satellite service:	A radiodetermination-satellite service used for the purpose of radiolocation. This service may also include the *feeder links* necessary for its operation.
radionavigation	Radiodetermination used for the purposes of navigation, including obstruction warning.
radionavigation land station:	A *station* in the *radionavigation service* not intended to be used while in motion.
radionavigation mobile station:	A *station* in the *radionavigation service* intended to be used while in motion or during halts at unspecified points.
radionavigation service:	A radiodetermination service for the purpose of radionavigation.
radionavigation:	*Radiodetermination* used for the purposes of navigation, including obstruction warning.
radionavigation-satellite service:	A radiodetermination-satellite service used for the purpose of radionavigation. This service may also include *feeder links* necessary for its operation.
radiosonde:	An automatic radio transmitter in the *meteorological aids service* usually carried on an aircraft, free balloon, kite or parachute, and which transmits meteorological data.
radiotelegram	A telegram, originating in or intended for a mobile station or a mobile earth station transmitted on all or part of its route over the radiocommunication channels of the mobile service or of the mobile-satellite service.
radiotelex call	A telex call, originating in or intended for a mobile station or a mobile earth station, transmitted on all or part of its route over the radiocommunication channels of the mobile service or the mobile-satellite service.
radio waves or hertzian	Electromagnetic waves of frequencies arbitrarily lower than 3 000 GHz,

waves	propagated in space without artificial guide
safety service:	Any *radiocommunication service* used permanently or temporarily for the safeguarding of human life and property.
satellite emergency position-indicating radiobeacon:	An *earth station* in the *mobile-satellite service* the *emissions* of which are intended to facilitate search and rescue operations.
satellite link:	A radio link between a transmitting *earth station* and a receiving *earth station* through one *satellite*. A satellite link comprises one up-link and one down-link.
satellite network:	A *satellite system* or a part of a *satellite system*, consisting of only one *satellite* and the cooperating *earth stations*.
satellite system:	A *space system* using one or more artificial earth *satellites*.
secondary radar:	A *radiodetermination* system based on the comparison of reference signals with radio signals retransmitted from the position to be determined.
ship earth station:	A mobile earth station in the maritime mobile-satellite service located on board ship.
ship movement service:	A *safety service* in the *maritime mobile service* other than a *port operations service*, between *coast stations* and *ship stations*, or between *ship stations*, in which messages are restricted to those relating to the movement of ships. Messages which are of a *public correspondence* nature shall be excluded from this service.
ship station:	A *mobile station* in the *maritime mobile service* located on board a vessel which is not permanently moored, other than a *survival craft station*.
ship's emergency transmitter:	A ship's transmitter to be used exclusively on a distress frequency for distress, urgency or safety purposes.
space operation service:	A radiocommunication service concerned exclusively with the operation of spacecraft, in particular space tracking, space telemetry and space telecommand. These functions will normally be provided within the service in which the *space station* is operating.
space radiocommunication	Any *radiocommunication* involving the use of one or more *space stations* or the use of one or more *reflecting satellites* or other objects in space.
space research service:	A *radiocommunication service* in which *spacecraft* or other objects in space are used for scientific or technological research purposes.
space station:	A *station* located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the Earth's atmosphere.
space system:	Any group of cooperating *earth stations* and/or *space stations* employing *space radiocommunication* for specific purposes.
special service:	A *radiocommunication service*, not otherwise defined in this Section, carried on exclusively for specific needs of general utility, and not open to *public correspondence*.
standard frequency and time signal service:	A *radiocommunication service* for scientific, technical and other purposes, providing the transmission of specified frequencies, time signals, or both, of stated high precision, intended for general reception.
standard frequency and time signal station:	A station in the standard frequency and time signal service.
standard frequency and time signal-satellite service:	A radiocommunication service using space stations on earth satellites for the same purposes as those of the standard frequency and time signal service.

	This service may also include *feeder links* necessary for its operation.
station:	One or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a *radiocommunication service*, or the *radio astronomy service*. Each station shall be classified by the service in which it operates permanently or temporarily.
survival craft station:	A *mobile station* in the *maritime mobile service* or the *aeronautical mobile service* intended solely for survival purposes and located on any lifeboat, life-raft or other survival equipment.
telecommunication	Any transmission, emission or reception of signs, signals, writings, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems (CS).
telegraphy	A form of telecommunication in which the transmitted information is intended to be recorded on arrival as a graphic document; the transmitted information may sometimes be presented in an alternative form or may be stored for subsequent use (CS 1016).
telephony	A form of telecommunication primarily intended for the exchange of information in the form of speech (CS 1017).
telegram	Written matter intended to be transmitted by telegraphy for delivery to the addressee. This term also includes radiotelegrams unless otherwise specified (CS). In this definition the term telegraphy has the same general meaning as defined in the Convention.
terrestrial radiocommunication	Any radiocommunication other than space radiocommunication or radio astronomy
terrestrial station:	A station effecting terrestrial radiocommunication. In these Regulations, unless otherwise stated, any *station* is a terrestrial station.

8.2 ACRONYMS

AAA	Astronomy Advantage Area
AGAA	Astronomy Geographic Advantage Act, 2007 (Act No. 21 of 2007)
AI	Artificial Intelligence
ASDE	Airports Surface Detection Equipment
ATC/CGC	Auxiliary Terrestrial Component /Complimentary Ground Component
ATU	African Telecommunications Union
BEREC	Body of European Regulators for Electronic Communications
BFWA	Broadband Fixed Wireless Access
BSS	Broadcast Satellite Service
BTX	Base Transmit
C-band	Frequency range between about 4 and 6 GHz
CRASA	Communications Regulators' Association of Southern Africa
CSP	Communication Service Providers
CT2	Second generation cordless telephones operating to specification MPT1334.
dBW	Decibels relative to one Watt of power.
DECT	Digital European Cordless Telecommunication system. ERC Decision ERC/DEC/ (94)03 refers.
DF	Duplex Frequency
DFI	Digital Financial Inclusion
DSC	Digital Selective Calling
DSSS	Direct Sequence Spread Spectrum
ECA	Electronic Communications Act No 36 of 2005
ENG	Electronic News Gathering
ENG/OB	Electronic News Gathering / Outside Broadcasting
EPIRB	Emergency Position Indicating Radio Beacon
FDDA	Field Disturbance and Doppler Apparatus
FM	Frequency Modulation
FSS	Fixed Satellite Service
FWA	Fixed Wireless Access
GLONASS	Global Navigation Satellite System
GMDSS	Global Maritime Distress and Safety System.
GPRS	General Packet Radio Service
GPS	Global Positioning System - a satellite radio navigation system.
GSM	Global System for Mobile communications. Originally Groupe Spécial Mobile. See ERC Decision ERC/DEC/ (94)01
GSM 900	GSM using 900 MHz frequencies
GSMA	GSM Association
GSM-R	GSM Railways
GSO	Geostationary Orbit
HAP	High Altitude Platform
HDFS	High Density Fixed Service
HDFSS	High Density Fixed Satellite Service
HF	High Frequency (3 to 30 MHz)
ICAO	International Civil Aviation Organisation
ILS	Instrument Landing System-aeronautical radio navigation system.
IMO	International Maritime Organisation
IMT	International Mobile Telecommunications
IoT	Internet of Things
ISM	Industrial, Scientific and Medical. The use of radio for non-communication purposes such as microwave heating etc.
ITU	International Telecommunication Union.

Ka-band	Part of the frequency band between about 18 and 30 GHz
Ku-band	Part of the frequency band between about 12 and 18 GHz
L-band	Frequency band around 1.5 GHz
LEO	Low Earth Orbit satellite
LF	Low Frequency (30 to 300 kHz)
LMDS	Local Multipoint Distribution Services
LPVS	Low Power Video Surveillance
LTE	Long Term Evolution
MF	Medium Frequency (300 to 3000 kHz)
MMS	Maritime Mobile Service
MNO	Mobile Network Operator
MoU	Memorandum of Understanding
MPT	Mobile Public Trunking
MSS	Mobile Satellite Service
NGSO	Non-geostationary Satellite Orbit
NRFP	National Radio Frequency Plan
OB	Outside Broadcast.
PAMR	Public Access Mobile Radio.
PMR	Private Mobile Radio.
PPDR	Public Protection and Disaster Relief
PSTN	Public Switched Telephone Network
RFID	Radio Frequency Identification systems
RFSAP	Radio Frequency Spectrum Assignment Plan
RLAN	Radio Local Area Network
RNSS	Radio Navigation Satellite Service
RR	Radio Regulation of the International Telecommunication Union
RTT	Road Transport Telematics
SAB	Services Ancillary to Broadcasting
SABRE	South African Band Replanning Exercise
SADC	Southern African Development Community
SAP	Services Ancillary to Programme-making
S-DAB	Satellite Digital Audio Broadcasting
SHF	Super High Frequency (3 to 30 GHz)
SKA	Square Kilometre Array
SNG	Satellite News Gathering
SRDs	Short Range Devices, formerly referred to as Low Power Devices (LPDs).
T-DAB	Terrestrial Digital Audio Broadcasting.
TDD	Time Division Duplex
UHF	Ultra-High Frequency (300 to 3000 MHz)
UAV	Unmanned Aerial Vehicle
VHF	Very High Frequency (30 to 300 MHz)
VLF	Very Low Frequency (3 to 30 kHz)
VOR	Very high frequency Omnidirectional Range (aeronautical radionavigation system).
VSAT	Very Small Aperture Terminal
WAS	Wireless Access Services
WARC	World Administrative Radio Conference. The last WARC was held in 1992. WARCs are now superseded by WRCs.
WLAN	Wireless Local Area Network
WRC	World Radiocommunication Conference.