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GENERAL NOTICE

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INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

**Radio frequency spectrum band plan covering the
range 3GHz to 70GHz –(SABRE-2)**

In terms of the Section 29 of the Telecommunications Act, the Authority hereby adopts and makes known the frequency band plan contained herein.

Mandla Langa
Chairperson
ICASA

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LIST OF ACRONYMS

Authority	Independent Communications Authority of South Africa (ICASA)
ATU	African Telecommunication Union
BSS	Broadcast Satellite Services
C- band	3.4 – 4.2 GHz
CCIR	International Radio Consultative Committee
CEPT	European Conference of Postal and Telecommunications
CISPR	International Special Committee on Radio Interference
CITEL	Inter-American Commission for Telecommunications
dBm	Decibels, relative to a milliwatt
DTH	Direct to Home
EIRP	Effective Isotropic Radiated Power
ENG	Electronic News Gathering
ERC	European Radiocommunications Committee
E-s	Earth-to-space
FS	Fixed Services
FSS	Fixed Satellite Services
FWA	Fixed Wireless Access
GHz	Gigahertz
GSO	Geostationary Satellite Orbit
HAPS	High Altitude Platform Stations
HDFS	High Density Fixed Service
HDTV	High Definition Television
HIPERLAN	High performance Radio Local Area Network
ICASA	Independent Communications Authority of South Africa
ISM	Industrial, Scientific and Medical
ITU	International Telecommunications Union
ITU-R	International Telecommunications Union - Radiocommunications Sector
Ka Band	18 – 31 GHz
km	Kilometres
Ku Band	10.9 – 17 GHz
LAN	Local Area Network
LMDS	Local Multipoint Distribution services
LPVS	Low Power Video Surveillance
METSAT	Meteorological Satellite
MHz	Megahertz
MMDS	Multipoint Microwave Distribution System
MSS	Mobile Satellite Services
MVDS	Multipoint Video Distribution System
mW	Milliwatts
NIB	Non-Interference Basis
NGSO	Non-Geostationary Satellite Orbit
NF	National Footnote (for the South African Table of Allocations)
OB	Outside Broadcasting
PTMP	Point-to-Multipoint

PTP	Point-to-Point
REC	Recommendation
SABRE 1	South Africa Band Replanning Exercise (20 MHz - 3 GHz including 3.4 - 3.6 GHz)
SABRE 2	South Africa Band Replanning Exercise (3 GHz - 70 GHz excluding 3.4 - 3.6 GHz)
S-DAB	Satellite Digital Audio Broadcasting
s-E	space-to-Earth
SNG	Satellite News Gathering
TICS	Transport Information and Control Systems
TDMA	Time Division Multiple Access
VSAT	Very Small Aperture Terminal
WLL	Wireless Local Loop
WRC	World Radiocommunications Conference

1 INTRODUCTION

This document has been produced by the Independent Communications Authority of South Africa (ICASA), with the assistance of IIT Research Institute (IITRI), LCC International, and Thethani Universal Technologies, as part of the South African Band Replanning Exercise phase 2 (SABRE-2).

The frequency spectrum from 3,4 GHz to 3,6 GHz is excluded from this document as it has been dealt with previously as an extension to the SABRE project completed during 1997. The SABRE 2 project was started during the tenure of SATRA and was continued by its successor, ICASA, when it became operational on 1 July 2000. ICASA is now responsible for those activities assigned to it in the Telecommunications Act, including the provisions of Section 29 dealing with frequency band plans. ICASA is also responsible for control of the broadcasting frequency spectrum as stipulated in Section 29 of the Independent Broadcasting Authority (IBA) Act 153, 1993. The provision in the Telecommunications Act for the Joint Liaison Committee to deal with common frequency spectrum issues between the former IBA and SATRA, has been repealed.

Those parts of the frequency spectrum allocated to broadcasting as primary services would be dealt with in terms of the provisions of the IBA Act whereas the other parts of the frequency spectrum are dealt with in terms of the Telecommunications Act. A broadcast frequency plan is published annually in terms of Section 31 of the IBA Act.

The contents of the SABRE 2 document has also been co-ordinated with the Frequency Spectrum Directorate established within the Department of Communications in terms of Section 37 of the Broadcasting Act, No. 4 of 1999.

A lot of work and consultations has gone into producing this document. The pattern of radio use is not static. It is continuously evolving to reflect the many changes that are taking place in the radio environment; particularly in the field of technology. Spectrum allocations must reflect these changes and the position set out in this publication is therefore subject to continuous review. In view of this, the Authority will from time to time through consultations issue detailed guidelines on the use of the high priority radio frequency bands.

The need for Project SABRE 2 emerged from the requirement to establish a revitalised band plan in the 3 to 70 GHz range, in preparation for various new technologies and services to ensure a more competitive future environment. Key national requirements are addressed and include educational and broadcasting services, basic telephony services in under penetrated areas and ever increasing safety and security needs. A further principal aim of this project was to produce a nationally agreed upon band plan that will both satisfy the future needs of South Africa and offer consistency with international trends.

The first band plan for frequencies between 20MHz and 3GHz that stemmed from Project SABRE was completed during 1997. A final document, Government Gazette No 17983, was issued on 6 May 1997. The SABRE requires that some services, for example, point-to-point links, be moved to frequencies above 3GHz. In addition, the

massive roll-out of wireless local loop (WLL) technologies to under-served areas has resulted in a huge demand for backbone links to be made available. To address these requirements, ICASA initiated the process of replanning of the frequencies above 3GHz. This project, SABRE 2, addressed frequencies between 3GHz and 70GHz. Multiple public processes concerning SABRE 2, in accordance with Section 29 of the Telecommunications Act 103 of 1996 as amended, were completed as part of the project.

2 OBJECTIVE

Develop the SABRE -2 in accordance with mandates provided in the Telecommunications Act 103 of 1996 as amended.

3 APPROACH

The development of SABRE 2 involved a complex set of simultaneous considerations. Figure 1 illustrates the major factors contributing to the development of SABRE 2. Each of these factors is discussed in general and specific terms in the sections that follow. Other issues, such as business incentive and economic growth criteria, are addressed in the context of these factors.

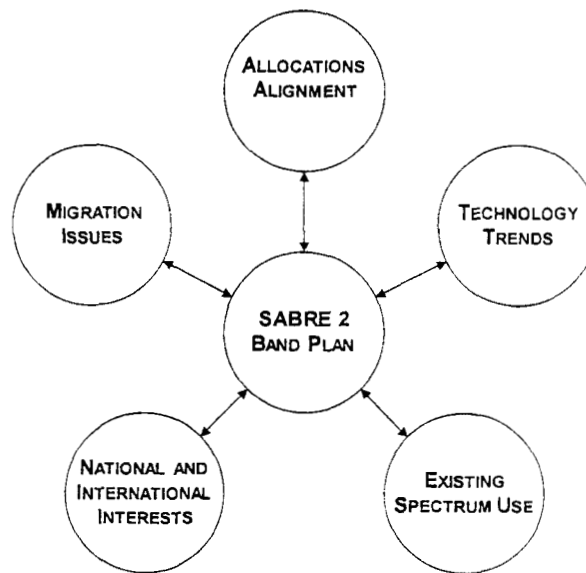


Figure 1. SABRE 2 Influencing Factors.

3.1 Allocation Alignment

The purpose of this section is to identify those factors associated with national and international frequency allocation tables considered in the SABRE 2 effort and to describe the approach taken in integrating these factors into the final SABRE 2. A national band plan, or table of frequency allocations, is the fundamental basis for an effective and efficient use of the radio frequency spectrum. Such a plan provides guidelines for the use of the spectrum by radiocommunications services and is essential for the prevention of radio frequency interference between sharing and adjacent services. Many factors may be considered in the development or revision of a country's national table of frequency allocations. This section addresses the issues of the:

- existing South African national tables prior to SABRE 2,
- international table of frequency allocations as promulgated by the International Telecommunications Union (ITU), and
- allocations of neighbouring nations and/or regional telecommunications bodies.

For each of these three major issues the general approach was to gather as much background material on the subject as could be obtained within the scope of available resources. Sources included but were not necessarily limited to discussions with spectrum management staff, available national and international documentation, frequency assignment data, international and regional spectrum management conferences, and proposals for future international and regional conferences. Once this material was gathered and reviewed, ICASA assessed the degree to which the current South African table of allocations was in alignment with the table of allocations for Radio Region 1 of the ITU. In developing the final proposed national band plan this review and analysis was integrated with the considerations developed during the assessments of the other major factors identified in Figure 1.

It should be noted that there are limitations in scope in the analysis of national and international tables of frequency allocations. These tables allocate portions of spectrum to radiocommunication services and these allocations may be modified by footnotes to the tables themselves. The tables lay the foundations for the orderly use of the spectrum by licensed, unlicensed, and government uses of the spectrum but they do not define the licensing policies and practices, nor do they define the service rules for such services. The details of licensed and unlicensed services are usually defined in a legal and regulatory framework of which a national table of frequency allocations is only one aspect. The legal and regulatory aspects of licensed and unlicensed services were beyond the scope of this task.

3.1.1 Existing South African Allocations

The South African table of allocations at the start of the SABRE 2 task was the basis for the current use of the spectrum by various radiocommunications services. The Consultants performing the SABRE 2 effort sought to gather as much information on these allocations as possible as well as any modifying footnotes or national rules. It was recognised that while modifications to the national table of allocations may be necessary, such changes must be considered in light of incumbent users of the spectrum and any services making development plans based on the existing table. Comments on national allocations were sought from current and planned users of the spectrum.

In assessing possible changes to the national tables, ICASA reviewed existing allocations, assessed the needs of current spectrum users based on frequency assignment data if available as well as comments from users, and addressed planned spectrum uses that were based on the existing national table.

3.1.2 International Allocations

With respect to international allocations the approach was fairly straightforward. ICASA gathered material on the ITU international table of frequency allocations, in particular, the allocations for Region 1. Results of recent World Radio Conferences (WRC) were also reviewed in the context of those activities having a direct bearing on the development of a revised band plan for South Africa. Finally, major activities of regional telecommunications bodies such as the European Conference of Postal and Telecommunications (CEPT) and the Inter-American Commission for Telecommunications (CITEL) were reviewed for suggestions with respect to allocation activity.

3.1.3 Regional Allocations

In general it is desirable for bordering nations to align their national tables of frequency allocations as much as possible. This promotes the use of common technologies and generally makes interference problems easier to address when interactions occur between common radiocommunications services. The Consultants gathered allocation information from other countries. This data was then compared to the South African national tables to identify similarities and differences. The Consultants then assessed differences on a case-by-case basis and made recommendations on how differences should be reconciled, or whether reconciliation was not feasible.

3.2 Technology Trends

As identified in Figure 1, telecommunications technology trends are also a major factor influencing the development of a revised national band plan. This review of technology trends culminated in the publication of a Technology Trends Report.

The Consultants incorporated the results of the technology trends effort by reviewing the trends identified in each of the major radiocommunications services addressed. With information available on each of the major radiocommunications services, an assessment was made of the degree to which the South African national table of allocations could accommodate changes in available spectrum required by advances in radiocommunications services. Following this assessment, recommendations were made and incorporated into SABRE 2 to accommodate the pertinent technology trends, provided major disruptions of existing services did not result from such changes. Each radiocommunications service was treated on an individual basis.

3.3 Existing Spectrum Use

Existing spectrum use within South Africa reflects today's telecommunications infrastructure and represents a significant investment in the South African economic growth potential. Above 3 GHz, current spectrum use is characterised by the investments made by telecommunications service providers to supply the backbone networks for service distribution.

The relationship between existing spectrum use and the spectrum required to accommodate the anticipated additional growth associated with new emerging service technologies must be balanced to ensure a non-disruptive evolution of telecommunication services for South Africa.

In the end analysis, it is a question of whether enough spectrum is available to accommodate the planned expansions and new services. To estimate the availability of spectrum, existing South African frequency assignments were used to study current spectrum congestion and identify potential constraints on future spectrum access.

3.4 National and International Interests

As previously stated, the current telecommunications infrastructure between 3 and 70 GHz represents a significant investment by industry. Today's telecommunications infrastructure needs will not remain static. Expansion to accommodate future needs must be planned years in advance. The future of industrial interests and their investments in future infrastructures can be assured through stability in the telecommunications regulatory policy, and the processes that govern any contemplated band reallocations.

To ensure a strong relationship between the interests of industry and the regulatory environment, a number of inquiry and comment cycles were conducted in accordance with the Telecommunications Act 103 of 1996 as amended. All interested parties were solicited to acquire their current use of the spectrum and their requirements for future spectrum access. Responses from the inquiry and comment cycles were carefully considered in development of the Band Plan and its subsequent refinement.

3.5 Migration Issues

The above 3 GHz bands represent a fundamentally different economy than the below 3 GHz band uses. Below 3 GHz, bands are predominately occupied by end user devices. The natural life cycle of these devices is significantly shorter and equipment cost is spread across many end users. Above 3 GHz the cost of backbone infrastructure equipment is borne by one or a few organisations. Band reallocation and spectrum use migration activities have to carefully consider industry's return on investment over pre-planned equipment life cycles. Ideally any additionally identified SABRE 2 band migrations will be voluntary and will occur within the constraints of the infrastructure life cycle.

A number of migration considerations were examined and included in the recommended Band Plan to meet the 'voluntary' migration objective. Previous Government Gazette Notices affecting the 3 – 70 GHz spectrum, current spectrum congestion, fixed link guidance, and ITU and industry standard channelization plans were used as techniques to arrive at the Band Plan recommendations.

4 ANALYSIS AND OBSERVATIONS

4.1 Allocations Alignment

Review of the material gathered by the Consultants showed that for frequencies above 3 GHz, the South African national table of frequency allocations was essentially similar to the international table of allocations for Region 1. While a limited number of national footnotes adapted the table for South African needs, the greater part of the allocated bands and radiocommunications services were aligned with those in Region 1.

To facilitate spectrum planning and to support the introduction of new services it is important that actual spectrum usage reflects national allocation tables. Consultants had access to frequency assignment data for frequency bands above 3 GHz. This data was reviewed and compared with the allocation tables. The review showed that existing spectrum users are in fact, generally aligned with the allocation tables. The data was particularly helpful in identifying spectrum users, parts of the spectrum experiencing the greatest use, and those radiocommunications services principally supporting the existing telecommunications infrastructure in South Africa.

A review of international allocations issues showed that WRC (formerly World Administrative Radio Conferences) over the last decade have made a number of substantive changes to the international table of frequency allocations in Region 1. These changes were made to address such major issues as unified global allocations to the Mobile Satellite Service (MSS), allocations in several frequency ranges to satellite-based broadcasting, allocations to the Fixed Satellite Service (FSS) for broadband services by non-geostationary satellites, accommodation of feeder links for various satellite-based services, and a reduction in non-shared primary spectrum for the Radiolocation Service. It was concluded that the changes to the international table of frequency allocations could be accommodated in the South African band plan with little, if any, impact to incumbent or planned services.

Finally, while this issue is addressed in more detail in the Migration Issues section below, it was observed that several significant changes to licensed services have been proposed and are being accommodated in various nations around the world. In some cases, accommodating new licensed services requires changes to allocated radiocommunications services. However, these changes are taking place primarily below 3 GHz. The major changes in licensed services above 3 GHz will not require a change in allocated radiocommunication services in the South African national table of frequency allocations.

4.2 Technology Trends

The Consultants performed a technology trends assessment as part of the overall SABRE 2 task. This assessment addressed international telecommunications technology trends, trends in South Africa, and a comparison of the results of these two efforts. Major international or national trends that suggested a change in the national table of frequency allocations were considered and incorporated, as appropriate, in SABRE 2.

Several of the major international trends discussed in the technology trends report are summarised here. In MSS there is a major effort to develop world-wide subscriber services similar to personal communications services. While the subscriber links are below 3 GHz and the long-term economic viability of the service is problematic, nevertheless the services are being developed and require feeder links and inter-satellite links at frequencies above 3 GHz. The FSS is experiencing substantial growth as well in most of the frequency bands allocated to FSS. This includes the traditional C-band and Ku-band frequency ranges, as well as comparatively recent developments above 14 GHz where FSS allocations support both geostationary and non-geostationary applications. Another major trend is the development of Broadcast Satellite Services (BSS) to provide direct to consumer video and audio broadcasts. The FSS has long supported the distribution of video and audio broadcast feeds to local studios, but the direct-to-consumer application is also well established and still growing in popularity.

In terms of terrestrial services above 3 GHz, major trends include the transition of fixed backhaul links to digital modulation schemes, the use of high-level modulation methods such as multi-level Quadrature Amplitude Modulation, and the use of compression techniques in end-to-end services. In general these technologies enhance spectral efficiency in Fixed Services (FS). This enhanced spectral efficiency is particularly advantageous as there has been a significant increase in fixed point-to-point operations to support fixed and mobile common carriage as well as private network applications. Another significant trend is the development of WLL systems. Generally, these are fixed point-to-multipoint (PTMP) systems that may serve either individual subscribers and small businesses (around 3.5 GHz) or may provide broadband services usually in business applications (usually at 10 GHz or higher). Ordinarily these are licensed services that fall under FS allocation.

The technology trends report indicates that South Africa is experiencing significant growth in the infrastructure that supports telecommunications development. Above 3 GHz this growth is manifested in such areas as increasing use of fixed point-to-point (PTP) links, development of very small aperture terminal (VSAT) applications, the deployment of a geostationary satellites to serve South Africa and neighbouring countries via the FSS, and the availability of spectrum at 3.5 GHz to develop WLL services. The Consultants detected no major trends in South African spectrum use and planning that could not be accommodated by generally adhering to the ITU Region 1 table of frequency allocations for radiocommunications services.

It should also be noted that it is natural for equipment manufacturers to develop hardware that supports new technologies in those frequency bands allocated to accommodate the appropriate radiocommunication service. Since, in large part, most nations make an effort to align their national tables with the ITU allocations, most telecommunications hardware is designed to operate in frequency bands supported throughout the world. As such, it is advantageous for the South African tables to also track the ITU tables, allowing maximum accommodation of new technologies developed by large scale equipment vendors.

4.3 National and International Interests

In accordance with the requirements stipulated in the Telecommunications Act 103 of 1996 as amended, ICASA and the Consultants developed a series of steps to solicit comments and inputs from industry and concerned parties. The strong response by the telecommunications stakeholders in South Africa reflects a robust industry and anticipated market growth.

Government Gazette Number 19120, 31 July 1998 requested that stakeholders provide comment on ICASA's intent to conduct the SABRE 2 project. This request included inquiry into current and anticipated use of the spectrum between 3 and 70 GHz (excluding 3.4-3.6 GHz). This comment cycle yielded 87 topical comments from 13 groups.

The responses addressed current and planned use of the 3 – 70 GHz (excluding 3.4 - 3.6 GHz) spectrum as well as significant issues relating to the SABRE 2 project. These responses were carefully evaluated and included in the development of a draft Band Plan.

The draft Band Plan was made public in Government Gazette Number 20634 of 16 November 1999, once again requesting that industry and interested parties provide comment. The Consultants received 7 written responses to the Gazette publication. A public hearing was conducted on 25 February 2000, at which the contributors provided additional insight into their recommendations and concerns.

Overall, the responses to the draft SABRE 2 Band Plan included more than 80 topical issues and valuable recommendations regarding the content and format of the Band Plan. In general, these comments were easily accommodated into the band plan and resulted in further refinement of the plan. All submitted responses are maintained on record at ICASA. A sample of the topics received included:

- The Band Plan should have a 10 to 15 year viewpoint.
- Broadcasters also have a universal access obligation.
- Additional information is required to clarify 'migration' and 'target'.
- The table should specify allocation of Service, not operators.
- Adequate spectrum for satellite services could promote universal access and provide internet services in rural areas.
- When specific ITU footnotes must be emphasised or are specifically applicable to South Africa, they should be repeated under the South African Table of Allocations.
- Additional information regarding current spectrum use and future spectrum access requirements.

In addition, a number of topics raised by the responses to the draft Band Plan were related to, but exceeded the scope of, the current SABRE 2 project. However, these issues are central to the successful implementation and maintenance of the 3 – 70 GHz Band Plan. Primary issues in this area include the:

- Need for a national policy on spectrum usage defining efficient spectrum use, sharing criteria, and spectrum pricing

- Advantages and disadvantages of various frequency assignment practices, including the continued use of block assignments

4.4 Migration Issues

Migration into and within the 3-70 GHz (excluding 3.4 - 3.6GHz) spectrum is driven by various factors, including alignment with international and regional allocations, anticipation of emerging technologies, and planned expansions of existing service providers. The development of the Band Plan included consideration of these issues as well as those associated with previously issued Government Gazette Notices. A summary of these notices is provided in Section 4.5.1.

A number of techniques and considerations were used to establish a strategy for encouraging voluntary migration from today's allocations table to the proposed new Band Plan. These techniques and considerations included:

- current spectrum congestion,
- spectrum efficient channel plans,
- preliminary Fixed Link Guidance,
- voluntary band and equipment migration.

Each of these migration enablers and their application to the Band Plan are discussed below.

4.4.1 Previous Government Gazette Notices

Previous Government Gazette Notices were applied to the bands considered during the preparation of this Band Plan. They are summarised in the following Table, along with the primary band affected.

Table 1. Major Government Gazette Notice Affecting SABRE 2.

Government Gazette Notice	Affected Bands	Planning Issues
Gazette Number 16820 (Notice 1790, 17 November 1995)	10.45 - 10.68 GHz 13.4 - 14.0 GHz	Doppler-shift movement detectors Microwave fences
Gazette Number 17983 (Notice 759, 6 May 1997)	3.4 - 3.6 GHz 8.275 - 8.5 GHz	Dedicated WLL and fixed wireless access (FWA) migration destination
Gazette Number 18883 (Notice 740, 30 April 1998)	10.025 - 10.081 GHz 31,000 - 31,056 GHz	Low Power Video Surveillance High Density Fixed Services
Gazette Number 19183 (Notice 1871, 24 August 1998)	10.7 - 11.7 GHz	Broadcasting services, direct to home (DTH), FS/FSS
Gazette Number 19208 (Notice 1928, 31 August 1998)	10.7 - 11.7 GHz	Exclusive assignments
Gazette Number 19343 (Notice 2358, 9 October 1998)	10.95 - 11.2 GHz 11.45 - 11.7 GHz	DTH
Gazette Number 20087 (Notice 939 15 May 1999)	10.0 - 10.45 GHz 31.0 - 31.3 GHz	Motion Sensors
Gazette Number 19120 (Notice 1535 31 July 1998)	37.0 - 39.5 GHz	Fixed Services

4.4.2 Spectrum Efficient Channel Plans

Alignment with ITU Region 1 allocations provides additional benefit by being able to leverage off well-developed and mature channelling plans. Adoption of these channel plans for new assignments and voluntary migration will:

- substantially increase the effective amount of available spectrum
- provide compatibility with compliant manufactured equipment
- provide a basis for regional channel compatibility

The following table summarises the internationally recognised channelling plans included in the National Footnotes of the Band Plan.

Table 2. Adopted Channelling Plans.

Adopted Channel Plan	Bands
CEPT/ERC/REC 14-03 Annex B	3.4 - 3.6 GHz
ITU-R Recommendation F.635 Annex 1.6	3.6 - 4.2 GHz
ITU-R Recommendation F.383	5925 - 6425 MHz
ITU-R Recommendation F.384	6425 - 7110 MHz
ITU-R Recommendation F.385 Annex 3	7110 - 7425 MHz 7425 - 7750 MHz
ITU-R Recommendation F.386 Annex 1	7725 - 8275 MHz
ITU-R Recommendation F.386 Annex 3	8275 - 8500 MHz
CEPT/ERC/REC 12-05 Annex A	10.15 - 10.3 GHz 10.5 - 10.65 GHz
ITU-R Recommendation F.387	10.7 - 11.7 GHz
ITU-R Recommendation F.497	12.75 - 13.25 GHz
ITU-R Recommendation F.636	14.5 - 15.35 GHz
ITU-R Recommendation F.595 Annex 1	17.7 - 19.7 GHz

Adopted Channel Plan	Bands
ITU-R Recommendation F.637 Annex 1	21.2 - 23.6 GHz
CEPT Recommendation T/R 13-02 Annex A	22 - 22.6 GHz 23.0 - 23.6 GHz
CEPT Recommendation T/R 13-02 Annex B	24.5 - 26.5 GHz
ITU-R Recommendation F.749 Annex 1	37.0 - 39.5 GHz

4.4.3 Preliminary Fixed Link Guidance

In lieu of a Fixed Link National Policy, the guidelines listed below should be used as a baseline by ICASA, in implementing voluntary migrations. The following hop length categories, frequency limits and achievable path length distances should be used as a guideline for the voluntary migration consistent with Authority imposed limitations and required co-ordination.

Table 3. Preliminary Fixed Link Guidance.

Hop Length Distance	Frequency Limit (GHz)	Achievable Distance (km)
Long (High Capacity)	<10	>40
Long (Low Capacity)	< 10	>50
Medium (High Capacity)	<15	25 - 40
Medium	<20	10 - 25
Short	<25	5 - 10
Very Short	<40	5

The preliminary fixed link guidance presented in Table 3 will be updated through public proceedings as necessary to address capacity, rain rate, and performance effects on achievable link lengths.

When applying, licensees should provide information such as; power output of the transmitter, frequency range, operating bandwidth, type of modulation, type and directivity of antennas - along with the gains and losses associated with the specific antenna.

For individual licensees requiring narrow bandwidth channels for fixed link operations (1.75 MHz and less in bands where narrowband frequency rasters have not been established), the Authority will issue an appropriate licence for the least rastered bandwidth available. It will be incumbent upon the user to reuse, share and utilise the licensed frequency in a spectrum efficient and effective manner.

4.4.4 Voluntary Band and Equipment Migration

A number of bands were identified during the SABRE 2 project that requires consideration due to anticipated future congestion and reallocation. Three types of migration are recommended; band, equipment, and channels. These migrations are viewed as voluntary because they are expected to occur as part of the natural system life cycle.

Table 4. Primary Migration Bands.

Band	Migration Objective	Target Date
3600 – 4200 MHz	Analogue to digital terrestrial systems	31 December 2005
5925 – 6425 MHz 6425 – 7110 MHz	Analogue to digital systems	31 December 2005
7110 – 7425 MHz 7425 – 7750 MHz	Analogue to digital systems	31 December 2005
7110 – 7425 MHz 7425 – 7750 MHz	Digital systems to channel plan	Not specified
10.7 – 11.7 GHz	Analogue to digital systems	31 December 2005
21.4 – 22 GHz	FS reverts to secondary service 22 – 22.6 GHz // 23.0 – 23.6 GHz, 26 GHz and 38 GHz bands also available	1 April 2007

Operators are expected to identify all migration links, plan their migration, and co-ordinate their schedule with ICASA at least three years before the deadline.

The 21.4 - 22.0 GHz band will revert from Fixed, Mobile and Broadcasting Satellite Services to the Broadcast Satellite Service application in the year 2007. Currently, there is a limited set of licences in the band according to ICASA records. Operators intending to maintain FS links in the 21.4 – 22 GHz band will be accommodated with no protection after 1 April 2007.

Another migration issue is the "opening of the 38 GHz band." Prior to making assignments in this portion of the spectrum, it is recommended that a migration of 20-24 GHz FS assignments be established. The primary criteria for migration would be link distance associated with specific frequency assignments, once the band is released to the public.

5 SUMMARY AND RESOLUTIONS

Appendix A reflects the culmination of the SABRE 2 project considerations and contains the recommended Band Plan. This plan is supported by the South Africa National Footnotes contained in Appendix B. For convenience, all applicable ITU Footnotes are reprinted in Appendix C.

Considerations from the 5 factors (Figure 1) influencing the spectrum in South Africa were merged to arrive to this Band Plan. While conducting the evaluation of these influencing factors and developing the Band Plan, several critical elements were identified as pivotal to the implementation of the Band Plan. These elements are summarised below as resolutions.

5.1 Allocations Alignment

The results of the review of international, regional, and national allocation plans and activities lead to several conclusions and recommendations. The South African national table of frequency allocations has historically adhered, in general, to that of the ITU tables for Region 1. This adherence has worked well in the past and appears to remain a fundamentally sound approach. Regional allocation activity is limited, with the spectrum management community of neighbouring countries awaiting the completion of the South African band plan. The regional interest group, the ATU, is comparatively new and has of yet not fully formed regional allocation policies.

Based on these observations, it was concluded that:

- The South African national table of allocations be aligned with the ITU Region 1 table to the maximum extent possible, as represented by SABRE 2
- The South African spectrum management community track ITU and regional frequency allocation activities
- South Africa should continue to support the activities of the ATU
- The South African band plan be shared with neighbouring countries as soon as possible.

5.2 Technology Trends

The technology trends review revealed several activities that are beneficial to the development of the South African telecommunications infrastructure and the provision of services directly to subscribers. The development of wideband spectrally efficient digital fixed network elements should well serve development in South Africa. Development in WLL technology should help hasten the provision of universal service access in South Africa. Developments in satellite technologies should permit more pervasive and economical data networks such as VSAT systems, and broadcast technologies should promote greater accessibility to the general South African population.

In consideration of the observations made regarding technology trends it is recommended that:

- Since most hardware development for large markets track common frequency allocations, South African allocations should generally track the allocations of the international community, as described above
- Particular attention be paid to those services such as WLL that will enhance universal service access
- Allocations to the satellite services that support infrastructure development be adhered to as much as possible
- Backbone radiocommunications services that support the development of certain licensed services such as mobile telephony also receive allocation support.

5.3 Existing Spectrum Use

Based on an evaluation of the existing frequency assignments on file, a number of summary observations are made.

- Based on the data reported, there is reasonable agreement between the ITU allocations and the frequency assignments.
- Spectrum use and congestion varies significantly by location.
- The most congested bands still have additional channels available.

The ITU encourages Administrations to adopt automated spectrum management systems to ensure future access as spectrum becomes more congested. In line with these ITU guidelines, it is recommended that:

- a National Frequency Assignment Database be established and reflect all South African spectrum use
- all licensed users be required to maintain current and accurate records of their spectrum use including periodic auditing of the technical parameters,
- the National Frequency Assignment Database support detailed analytical inspection of South African spectrum use and strategic spectrum planning,
- frequency assignments be prepared using automated analysis techniques to ensure interference free accommodation of proposed use, compliance with technical standards including channelling plans, and determine optimised selection of the assigned frequencies.

5.4 National and International Interests

The SABRE 2 project was accomplished in accordance with the requirements stipulated in the Telecommunications Act 103 of 1996 as amended. This included a number of stakeholder comment cycles. The strong response by the telecommunications stakeholders in South Africa reflects a robust industry and anticipated market growth.

A number of topics raised by the responses are central to the successful implementation and maintenance of the 3 - 70 GHz (excluding 3.4 - 3.6 GHz) Band Plan. It is recommended that these issues be addressed by appropriate government

departments in conjunction with continued stakeholder dialog. These topics include the:

- Need for a national policy on spectrum usage to define efficient spectrum use, sharing criteria, and spectrum pricing
- Advantages and disadvantages of various frequency assignment practices, including the continued use of block assignments

5.5 Migration Issues

A number of techniques were used during the SABRE 2 project to ensure that there were no forced band migrations. Adoption of these techniques resulted in a voluntary set of migration requirements necessary to accomplish SABRE 2 objectives. These recommended techniques must be incorporated into ICASA's activities to realise SABRE 2. Accordingly, the following mechanisms are adopted for all future assignment requests:

- the use of SABRE 2 identified channelling plans,
- implementation of a Fixed Link Guidance,
- the identification and encouragement of voluntary band, equipment, and channel migration

APPENDIX A: SOUTH AFRICAN TABLE OF ALLOCATIONS

Table of Allocations Notes

The following table presents the band plan for the future use of the radio spectrum in South Africa between 3 GHz and 70 GHz.

The table is divided into the following columns:

- ITU Region 1 Radio Regulations divide the spectrum into frequency bands with the allocation of Primary and Secondary Services. Services with the names printed in "capitals" (example: FIXED); are called "primary" services; and those with the names printed in "normal characters" (example: Mobile); are called "secondary" services.
- South African (SA) Table of Allocations. The range of frequencies associated with the main allocations (in GHz), once again divided into Primary and Secondary Services.
- Main Service in South Africa. This column indicates the main services to which each band is to be allocated. The service types are defined by the ITU, with the service/services that will have the most widespread utilisation in the future listed. However, this does not imply exclusivity to those frequency bands by any service and serves only as a guideline. National Footnote (*NF*) references are provided in Appendix B.

Limitations of Secondary Services: Secondary services are on a non-interference basis (NIB) to the primary services. Stations of a secondary service:

- (a) shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned or to which frequencies may be assigned at a later date;
 - (b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;
 - (c) can claim protection, however, from harmful interference from stations of the secondary service(s) to which frequencies may be assigned at a later date.
- Applications. This column indicates frequency utilisation for existing or new systems relating to the South African allocations. It is not an all-inclusive list of applications, but a quick reference of spectrum availability for service/equipment applications.
 - Notes and Comments. This column indicates items such as; Government Gazette articles pertinent to specific frequency bands, future requirements in specific bands, and ITU Recommendations, which require implementation.

South African Table of Allocations

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
2 900 - 3 100 MHz RADIONAVIGATION S5.426 Radiolocation S5.425 S5.427	2 900 - 3 100 MHz RADIONAVIGATION S5.426 Radiolocation S5.425 S5.427	RADIONAVIGATION	CIVIL AIRPORTS/DEFENCE AERONAUTICAL INTERROGATORS	
3 100 - 3 300 MHz RADIOLOCATION Earth exploration-satellite (active) Space research (active) S5.149 S5.428	3 100 - 3 300 MHz RADIOLOCATION Earth exploration-satellite (active) Space research (active) S5.149	RADIOLOCATION	GOVERNMENT RADIOLOCATION SPACEBORNE DEVICES	
3 300 - 3 400 MHz RADIOLOCATION S5.149 S5.429 S5.430	3 300 - 3 400 MHz RADIOLOCATION S5.149	RADIOLOCATION	GOVERNMENT RADIOLOCATION	
3 400 - 3 600 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation S5.431	3 400 - 3 600 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation	FIXED	FIXED WIRELESS ACCESS	Government Gazette 17983, Notice 759, 6 May 1997
3 600 - 4 200 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile	3 600 - 4 200 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile	FIXED FIXED-SATELLITE (space-to-Earth) NF 1	PTP Links VSAT/SNG/Satellite PTP links	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
4 200 - 4 400 MHz AERONAUTICAL- RADIONAVIGATION S5.438 S5.439 S5.440	4 200 - 4 400 MHz AERONAUTICAL- RADIONAVIGATION S5.438 S5.440	AERONAUTICAL- RADIONAVIGATION	RADIO ALTIMETERS	
4 400 - 4 500 MHz FIXED MOBILE	4 400 - 4 500 MHz FIXED MOBILE	FIXED NF 3	OB/ENG	
4 500 - 4 800 MHz FIXED FIXED-SATELLITE (space-to- Earth) S5.441 MOBILE	4 500 - 4 800 MHz FIXED FIXED-SATELLITE (space-to- Earth) S5.441 MOBILE	FIXED MOBILE NF 3	GOVERNMENT UTILIZATION	
4 800 - 4 990 MHz FIXED MOBILE S5.442 Radio Astronomy S5.149 S5.339 S5.443	4 800 - 4 990 MHz FIXED MOBILE S5.442 Radio Astronomy S5.149 S5.339	FIXED Radio Astronomy NF 3	GOVERNMENT UTILIZATION Radio Astronomy (4825 - 4835 & 4950 - 4990 MHz)	
4 990 - 5 000 MHz FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space Research (passive) S5.149	4 990 - 5 000 MHz FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space Research (passive) S5.149	FIXED RADIO ASTRONOMY NF 3	GOVERNMENT UTILIZATION RADIO ASTRONOMY (4990 - 5000 MHz)	
5 000 - 5 150 MHz AERONAUTICAL RADIONAVIGATION S5.367 S5.443A S5.443B S5.444 S5.444A	5 000 - 5 150 MHz AERONAUTICAL RADIONAVIGATION S5.367 S5.443A S5.443B S5.444 S5.444A	AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE SERVICE (Earth-to-space)	MICROWAVE LANDING SYSTEMS NGSO MSS feeder links (5091 - 5150 MHz)	FSS operates in this band through footnote

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
5 150 - 5 250 MHz AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE SERVICE (Earth-to-space) S5.447A S5.446 S5.447 S5.447B S5.447C	5 150 - 5 250 MHz AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE SERVICE (Earth-to-space) S5.447A S5.446 S5.447B S5.447C	FIXED-SATELLITE SERVICE (Earth-to-space) NF 4	NGSO MSS feeder links	HIPERLAN (future)
5 250 - 5 255 MHz EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.447D S5.448 S5.448A	5 250 - 5 255 MHz EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.447D S5.448A	NF 4		HIPERLAN (future)
5 255 - 5 350 MHz EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.448 S5.448A	5 255 - 5 350 MHz EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.448A	NF 4		HIPERLAN (future)
5 350 - 5 460 MHz EARTH EXPLORATION- SATELLITE (active) S5.448B AERONAUTICAL- RADIONAVIGATION S5.449 Radiolocation	5 350 - 5 460 MHz EARTH EXPLORATION- SATELLITE (active) S5.448B AERONAUTICAL- RADIONAVIGATION S5.449 Radiolocation			
5 460 - 5 470 MHz RADIONAVIGATION S5.449 Radiolocation	5 460 - 5 470 MHz RADIONAVIGATION S5.449 Radiolocation			
5 470 - 5 650 MHz MARITIME- RADIONAVIGATION Radiolocation S5.450 S5.451 S5.452	5 470 - 5 650 MHz MARITIME- RADIONAVIGATION Radiolocation S5.452	MARITIME- RADIONAVIGATION NF 4	SHIPBORNE AND ASSOCIATED RADARS	HIPERLAN (future)

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
5 650 - 5 725 MHz RADIOLOCATION Amateur Space Research (deep space) S5.282 S5.451 S5.453 S5.454 S5.455	5 650 - 5 725 MHz RADIOLOCATION Amateur Space Research (deep space) S5.282 S5.455	NF 4		HIPERLAN (future)
5 725 - 5 830 MHz FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur S5.150 S5.451 S5.453 S5.455 S5.456	5 725 - 5 830 MHz FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur S5.150	NF 5	ISM (5725 - 5875 MHz) PTP/PTMP wireless LAN	(TICS 5795 - 5805 MHz) (future)
5 830 - 5 850 MHz FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) S5.150 S5.451 S5.453 S5.455 S5.456	5 830 - 5 850 MHz FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) S5.150	NF 5	ISM (5725 - 5875 MHz) PTP/PTMP wireless LAN	
5 850 - 5 925 MHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.150	5 850 - 5 925 MHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.150	FIXED FIXED-SATELLITE (Earth-to-space) NF 5, 6, & 7	PTP links/OB ENG VSAT/SNG/Satellite PTP links ISM (5725 - 5875 MHz) PTP/PTMP wireless LAN	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
5 925 - 6 700 MHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	5 925 - 6 700 MHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	FIXED FIXED-SATELLITE (Earth-to-space) NF 6 & 7	PTP links VSAT/SNG/FSS feeder links	
6 700 - 7 075 MHz FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.441 MOBILE S5.458 S5.458A S5.458B S5.458C	6 700 - 7 075 MHz FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.441 MOBILE S5.458 S5.458A S5.458B S5.458C	FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) NF 7	PTP links S-DAB feeder links (uplinks) NGSO MSS feeder links (downlinks)	
7 075 - 7 250 MHz FIXED MOBILE S5.458 S5.459 S5.460	7 075 - 7 250 MHz FIXED MOBILE S5.458 S5.460	FIXED NF 7	PTP links/OB ENG	
7 250 - 7 300 MHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE S5.461	7 250 - 7 300 MHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE S5.461	FIXED NF 7	PTP links/OB ENG	
7 300 - 7 450 MHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile S5.461	7 300 - 7 450 MHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile S5.461	FIXED MOBILE NF 7	PTP links/OB ENG	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
7 450 - 7 550 MHz FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile SS.461A	7 450 - 7 550 MHz FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile SS.461A	FIXED NF 7	PTP links	
7 550 - 7 750 MHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	7 550 - 7 750 MHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	FIXED NF 7	PTP links/OB ENG	
7 750 - 7 850 MHz FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) SS.461B MOBILE except aeronautical mobile	7 750 - 7 850 MHz FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) SS.461B MOBILE except aeronautical mobile	FIXED NF 7	PTP links	METSAT (future)
7 850 - 7 900 MHz FIXED MOBILE except aeronautical mobile	7 850 - 7 900 MHz FIXED MOBILE except aeronautical mobile	FIXED NF 7	PTP links	
7 900 - 8 025 MHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE SS.461	7 900 - 8 025 MHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE SS.461	FIXED NF 7	PTP links	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
8 025 - 8 175 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.463 S5.462A	8 025 - 8 175 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.463 S5.462A	FIXED NF 7	PTP links	
8 175 - 8 215 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) MOBILE S5.463 S5.462A	8 175 - 8 215 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) MOBILE S5.463 S5.462A	FIXED NF 7	PTP links	
8 215 - 8 400 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.463 S5.462A	8 215 - 8 400 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.463 S5.462A	FIXED NF 7	PTP links	
8 400 - 8 500 MHz FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth) S5.465 S5.466 S5.467	8 400 - 8 500 MHz FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth) S5.465 Earth) S5.465	FIXED NF 7	PTP links	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
8 500 - 8 550 MHz RADIOLOCATION S5.468 S5.469	8 500 - 8 550 MHz RADIOLOCATION			
8 550 - 8 650 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.468 S5.469 S5.469A	8 550 - 8 650 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.469A			
8 650 - 8 750 MHz RADIOLOCATION S5.468 S5.469	8 650 - 8 750 MHz RADIOLOCATION			
8 750 - 8 850 MHz RADIOLOCATION AERONAUTICAL RADIONAVIGATION S5.470 S5.471	8 750 - 8 850 MHz RADIOLOCATION AERONAUTICAL RADIONAVIGATION S5.470			
8 850 - 9 000 MHz RADIOLOCATION MARITIME RADIONAVIGATION S5.472 S5.473	8 850 - 9 000 MHz RADIOLOCATION MARITIME RADIONAVIGATION S5.472			
9 000 - 9 200 MHz AERONAUTICAL-RADIONAVIGATION S5.337 Radiolocation S5.471	9 000 - 9 200 MHz AERONAUTICAL-RADIONAVIGATION S5.337 Radiolocation	AERONAUTICAL-RADIONAVIGATION	APPROACH RADARS	
9 200 - 9 300 MHz RADIOLOCATION MARITIME RADIONAVIGATION S5.472 S5.473 S5.474	9 200 - 9 300 MHz RADIOLOCATION MARITIME RADIONAVIGATION S5.472 S5.474	MARITIME RADIONAVIGATION	HARBOUR RADARS	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
9 300 - 9 500 MHz RADIONAVIGATION S5.476 Radiolocation S5.427 S5.474 S5.475	9 300 - 9 500 MHz RADIONAVIGATION S5.476 Radiolocation S5.427 S5.474 S5.475	RADIONAVIGATION	RADARS	
9 500 - 9 800 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION SPACE RESEARCH (active) S5.476A	9 500 - 9 800 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION SPACE RESEARCH (active) S5.476A	RADIONAVIGATION	MOVEMENT DETECTION RADARS	
9 800 - 10 000 MHz RADIOLOCATION Fixed S5.477 S5.478 S5.479	9 800 - 10 000 MHz RADIOLOCATION Fixed S5.479	RADIOLOCATION	MOVEMENT DETECTION (Low Power)	
10.00 - 10.45 GHz FIXED MOBILE RADIOLOCATION Amateur S5.479	10.00 - 10.45 GHz FIXED MOBILE RADIOLOCATION Amateur S5.479	FIXED RADIOLOCATION NF 8	PTMP (10.15 - 10.3 GHz) and LPVS OB (10.315 - 10.483 GHz) Motion Sensors	Government Gazette 20087 (Notice 939, 15 May 1999) Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)
10.45 - 10.50 GHz RADIOLOCATION Amateur Amateur-Satellite S5.481	10.45 - 10.50 GHz RADIOLOCATION Amateur Amateur-Satellite	RADIOLOCATION	Motion Sensors	Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
10.50 - 10.55 GHz FIXED MOBILE Radiolocation	10.50 - 10.55 GHz FIXED MOBILE Radiolocation	FIXED Radiolocation <i>NF 8</i>	PTMP Motion Sensors	Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)
10.55 - 10.60 GHz FIXED MOBILE except aeronautical mobile Radiolocation	10.55 - 10.60 GHz FIXED MOBILE except aeronautical mobile Radiolocation	FIXED Radiolocation <i>NF 8</i>	PTMP Motion Sensors	Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)
10.6 - 10.68GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation S5.149 S5.482	10.6 - 10.68GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation S5.149 S5.482	FIXED Radiolocation <i>NF 8</i>	PTMP and Low Power wireless WAN's (NIB) Motion Sensors	Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)
10.68 - 10.7 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340 S5.483	10.68 - 10.7 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340			

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
10.7 - 11.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.441 S5.484A (Earth-to-space) S5.484 MOBILE except aeronautical mobile	10.7 - 11.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.441 S5.484A (Earth-to-space) S5.484 MOBILE except aeronautical mobile	FIXED FIXED SATELLITE (space-to-Earth) <i>NF 9 & 10</i>	PTP links VSAT/SNG/DTH (secondary) / BSS feeder links	Government Gazette No. 19343, dated 09 October 1998
11.7 - 12.5 GHz FIXED BROADCASTING BROADCASTING-SATELLITE MOBILE except aeronautical mobile S5.487 S5.487A S5.492	11.7 - 12.5 GHz FIXED BROADCASTING BROADCASTING-SATELLITE MOBILE except aeronautical mobile S5.487 S5.487A S5.492	FIXED	ENG/OB BSS feeder links	
12.5 - 12.75 GHz FIXED-SATELLITE (space-to-Earth) S484A (Earth-to-space) S5.494 S5.495 S5.496	12.5 - 12.75 GHz FIXED-SATELLITE (space-to-Earth) S484A (Earth-to-space) S5.494 S5.495 S5.496	FIXED SATELLITE (space-to-Earth) <i>NF 10</i>	VSAT/SNG/DTH	
12.75 - 13.25 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.441 MOBILE Space Research (deep space) (space-to-Earth)	12.75 - 13.25 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.441 MOBILE Space Research (deep space) (space-to-Earth)	FIXED <i>NF 11</i>	PTP links/ENG OB	
13.25 - 13.4 GHz EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL-RADIONAVIGATION S5.497 SPACE RESEARCH (active) S5.498A S5.499	13.25 - 13.4 GHz EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL-RADIONAVIGATION S5.497 SPACE RESEARCH (active) S5.498A S5.499			

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
13.4 - 13.75 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH S5.501A Standard frequency and time signal satellite (Earth-to-space) S5.499 S5.500 S5.501 S5.501B	13.4 - 13.75 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH S5.501A Standard frequency and time signal satellite (Earth-to-space) S5.501B	RADIOLOCATION	Low Power Microwave Fences (13.4 - 14 GHz) NIB	Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)
13.75 - 14 GHz FIXED-SATELLITE (Earth-to-space) S5.484A RADIOLOCATION Standard frequency and time signal satellite (Earth-to-space) Space research S5.499 S5.500 S5.501 S5.502 S5.503 S5.503A	13.75 - 14 GHz FIXED-SATELLITE (Earth-to-space) S5.484A RADIOLOCATION Standard frequency and time signal satellite (Earth-to-space) Space research S5.502 S5.503 S5.503A	FIXED SATELLITE (Earth-to-space) RADIOLOCATION	VSAT/SNG/FSS feeder links Low Power Microwave Fences (13.4 - 14 GHz) NIB	Government Gazette 16820 (Regulation No. 1790, 17 Nov 1995)
14 - 14.25 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 RADIONAVIGATION S5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space Research S5.505	14 - 14.25 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 RADIONAVIGATION S5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space Research	FIXED SATELLITE (Earth-to-space) NF 10	VSAT/SNG/FSS feeder links	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
14.25 - 14.3 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 RADIONAVIGATION S5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space Research S5.505 S5.508 S5.509	14.25 - 14.3 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 RADIONAVIGATION S5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space Research	FIXED SATELLITE (Earth-to-space) RADIONAVIGATION <i>NF 10</i>	VSAT/SNG/FSS feeder links	
14.3 - 14.4 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile satellite Radionavigation-satellite	14.3 - 14.4 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile satellite Radionavigation-satellite	FIXED SATELLITE (Earth-to-space) <i>NF 10</i>	VSAT/SNG/FSS feeder links	
14.4 - 14.47 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space Research (space-to-Earth)	14.4 - 14.47 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space Research (space-to-Earth)	FIXED SATELLITE (Earth-to-space) <i>NF 10</i>	VSAT/SNG/FSS feeder links	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
14.47 - 14.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 MOBILE except aeronautical-mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radio Astronomy S5.149	14.47 - 14.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.506 MOBILE except aeronautical-mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radio Astronomy S5.149	FIXED SATELLITE (Earth-to-space) NF 10	VSA1/SNG/FSS feeder links	
14.5 - 14.8 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.510 MOBILE Space Research	14.5 - 14.8 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.510 MOBILE Space Research	FIXED NF 12	PTP links/ENG OB BSS feeder links	
14.8 - 15.35 GHz FIXED MOBILE Space Research S5.339	14.8 - 15.35 GHz FIXED MOBILE Space Research S5.339	FIXED NF 12	PTP links/ENG OB	
15.35 - 15.4 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340 S5.511	15.35 - 15.4 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340	EARTH EXPLORATION-SATELLITE (passive)	VILBIRA OBSERVATIONS	
15.4 - 15.43 GHz AERONAUTICAL RADIONAVIGATION S5.511D	15.4 - 15.43 GHz AERONAUTICAL RADIONAVIGATION S5.511D	AERONAUTICAL RADIONAVIGATION	RADIO ALTIMETERS/RADARS	

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
15.43 - 15.63 GHz FIXED-SATELLITE (Earth-to-space) S5.511A AERONAUTICAL RADIONAVIGATION S5.511C	15.43 - 15.63 GHz FIXED-SATELLITE (Earth-to-space) S5.511A AERONAUTICAL RADIONAVIGATION S5.511C	AERONAUTICAL RADIONAVIGATION	RADIO ALTIMETERS/RADARS	
15.63 - 15.70 GHz AERONAUTICAL RADIONAVIGATION S5.511D	15.63 - 15.70 GHz AERONAUTICAL RADIONAVIGATION S5.511D	AERONAUTICAL RADIONAVIGATION	RADIO ALTIMETERS/RADARS	
15.7 - 16.6 GHz RADIOLOCATION S5.512 S5.513	15.7 - 16.6 GHz RADIOLOCATION	RADIOLOCATION	ALTIMETERS / DISTANCE MEASURING EQUIPMENT	
16.6 - 17.1 GHz RADIOLOCATION Space Research (deep space) (Earth-to-space) S5.512 S5.513	16.6 - 17.1 GHz RADIOLOCATION Space Research (deep space) (Earth-to-space) S5.512 S5.513			Low power LANs (future)
17.1 - 17.2 GHz RADIOLOCATION S5.512 S5.513	17.1 - 17.2 GHz RADIOLOCATION	NF 4		HIPERLAN (future)
17.2 - 17.3 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.512 S5.513 S5.513A	17.2 - 17.3 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.513A			
17.3 - 17.7 GHz FIXED-SATELLITE (Earth-to-space) S5.516 Radiolocation S5.514	17.3 - 17.7 GHz FIXED-SATELLITE (Earth-to-space) S5.516 Radiolocation S5.514	FIXED-SATELLITE (Earth-to-space)		HIPERLAN (future)

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17.7 - 18.1 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.484A (Earth-to-space) S5.516 MOBILE	17.7 - 18.1 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.484A (Earth-to-space) S5.516 MOBILE	FIXED FIXED-SATELLITE <i>NF 13</i>	PTP links	BSS feeder links (future)
18.1 - 18.4 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.484A (Earth-to-space) S5.520 MOBILE S5.519 S5.521	18.1 - 18.4 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.484A (Earth-to-space) S5.520 MOBILE S5.519	FIXED FIXED-SATELLITE <i>NF 13</i>	PTP links (17.7 - 19.7 GHz) GSO/FSS	
18.4 - 18.6 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.484A MOBILE	18.4 - 18.6 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.484A MOBILE	FIXED FIXED-SATELLITE <i>NF 13</i>	PTP links GSO/FSS	
18.6 - 18.8 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.522B MOBILE except aeronautical mobile EARTH EXPLORATION-SATELLITE (passive) Space research (passive) S5.522A S5.522C	18.6 - 18.8 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.522B MOBILE except aeronautical mobile Earth exploration-satellite (passive) Space research (passive) S5.522A	FIXED FIXED SATELLITE <i>NF 13</i>	PTP links GSO/FSS	

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18.8 - 19.3 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.523A MOBILE	18.8 - 19.3 GHz FIXED FIXED-SATELLITE (space-to-Earth) S5.523A MOBILE	FIXED FIXED-SATELLITE <i>NF 13</i>	PTP links NGSO/FSS	NGSO FSS (18.8 - 19.3 GHz) (future)
19.3 - 19.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) S5.523B S5.523C S5.523D S5.523E MOBILE	19.3 - 19.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) S5.523B S5.523C S5.523D S5.523E MOBILE	FIXED FIXED-SATELLITE <i>NF 13</i>	PTP links	NGSO MSS (19.3 - 19.7 GHz) (future) NGSO/MSS feeder links (future)
19.7 - 20.1 GHz FIXED-SATELLITE (space-to-Earth) S5.484A Mobile-Satellite (space-to-Earth) S5.524	19.7 - 20.1 GHz FIXED-SATELLITE (space-to-Earth) S5.484A Mobile-Satellite (space-to-Earth)	FIXED-SATELLITE	GSO/FSS	
20.1 - 20.2 GHz FIXED-SATELLITE (space-to-Earth) S5.484A MOBILE-SATELLITE (space-to-Earth) S5.524 S5.525 S5.526 S5.527 S5.528	20.1 - 20.2 GHz FIXED-SATELLITE (space-to-Earth) S5.484A MOBILE-SATELLITE (space-to-Earth) S5.525 S5.526 S5.527 S5.528	FIXED-SATELLITE	GSO/FSS	
20.2 - 21.2 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) S5.524	20.2 - 21.2 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth)			

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21.2 - 21.4 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive)	21.2 - 21.4 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive)	FIXED <i>NF 14</i>	PTP links	
21.4 - 22 GHz FIXED MOBILE BROADCASTING-SATELLITE S5.530	21.4 - 22 GHz FIXED MOBILE BROADCASTING-SATELLITE S5.530	FIXED <i>NF 14</i>	PTP links	HDTV (future)
22 - 22.21 GHz FIXED MOBILE except aeronautical mobile S5.149	22 - 22.21 GHz FIXED MOBILE except aeronautical mobile S5.149	FIXED <i>NF 14</i>	PTP links	
22.21 - 22.5 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) S5.149 S5.532	22.21 - 22.5 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) S5.149 S5.532	FIXED <i>NF 14</i>	PTP links	
22.5 - 22.55 GHz FIXED MOBILE	22.5 - 22.55 GHz FIXED MOBILE	FIXED <i>NF 14</i>	PTP links	

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22.55 - 23.55 GHz FIXED INTER-SATELLITE MOBILE S5.149	22.55 - 23.55 GHz FIXED INTER-SATELLITE MOBILE S5.149	FIXED <i>NF 14</i>	PTP links	
23.55 - 23.6 GHz FIXED MOBILE	23.55 - 23.6 GHz FIXED MOBILE	FIXED <i>NF 14</i>	PTP links	
23.6 - 24 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340	23.6 - 24 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340			
24 - 24.05 GHz AMATEUR AMATEUR-SATELLITE S5.150	24 - 24.05 GHz AMATEUR AMATEUR-SATELLITE S5.150			ISM (24 - 24.25 GHz)
24.05 - 24.25 GHz RADIOLOCATION Amateur Earth exploration-satellite (active) S5.150	24.05 - 24.25 GHz RADIOLOCATION Amateur Earth exploration-satellite (active) S5.150			
24.25 - 24.45 GHz FIXED	24.25 - 24.45 GHz FIXED			ISM (24 - 24.25 GHz)
				Licensed video surveillance (future) ENG/OB (future)

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24.45 - 24.65 GHz FIXED INTER-SATELLITE	24.45 - 24.65 GHz FIXED INTER-SATELLITE	FIXED NF 15		Broadband PTP and PTMP systems (future)
24.65 - 24.75 GHz FIXED INTER-SATELLITE	24.65 - 24.75 GHz FIXED INTER-SATELLITE	FIXED NF 15		Broadband PTP and PTMP systems (future)
24.75 - 25.25 GHz FIXED	24.75 - 25.25 GHz FIXED	FIXED NF 15		Broadband PTP and PTMP systems (future)
25.25 - 25.5 GHz FIXED INTER-SATELLITE S5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25 - 25.5 GHz FIXED INTER-SATELLITE S5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	FIXED NF 15		Broadband PTP and PTMP systems (future)
25.5 - 27.0 GHz EARTH EXPLORATION - SATELLITE (space-to-Earth) S5.536A S5.536B FIXED INTER-SATELLITE S5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.5 - 27.0 GHz EARTH EXPLORATION - SATELLITE (space-to-Earth) S5.536A FIXED INTER-SATELLITE S5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	FIXED NF 15		Broadband PTP and PTMP systems (future)

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27 - 27.5 GHz FIXED INTER-SATELLITE S5.536 MOBILE	27 - 27.5 GHz FIXED INTER-SATELLITE S5.536 MOBILE	FIXED		
27.5 - 28.5 GHz FIXED S5.537A FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE S5.538 S5.540	27.5 - 28.5 GHz FIXED S5.537A FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE S5.538 S5.540	NF 16		LMDS (27.5 - 28.35 GHz) (future) FSS/BSS feeder links (28.35 - 28.6 GHz) (future)
28.5 - 29.1 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.523A S5.539 MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540	28.5 - 29.1 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.523A S5.539 MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540			NGSO FSS (28.6 - 29.1 GHz) (future) and FSS/BSS feeder links (28.35 - 28.6 GHz) (future)
29.1 - 29.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.523C S5.523E S5.535A S5.539 S5.541A MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540	29.1 - 29.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.523C S5.523E S5.535A S5.539 S5.541A MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540	NF 16		LMDS (29.1 - 29.25 GHz) (future) FSS/BSS feeder links (29.25 - 30 GHz) (future)

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29.5 - 29.9 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 Earth exploration-satellite (Earth-to-space) S5.541 Mobile-satellite (Earth-to-space) S5.540 S5.542	29.5 - 29.9 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 Earth exploration-satellite (Earth-to-space) S5.541 Mobile-satellite (Earth-to-space) S5.540			FSS/BSS feeder links (29.25 - 30 GHz) (future)
29.9 - 30 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) S5.541 S5.543 S5.525 S5.526 S5.527 S5.538 S5.540 S5.542	29.9 - 30 GHz FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) S5.541 S5.543 S5.525 S5.526 S5.527 S5.538 S5.540			FSS/BSS feeder links (29.25 - 30 GHz) (future)
30.0 - 31.0 GHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) S5.542	30.0 - 31.0 GHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth)			
31 - 31.3 GHz FIXED S5.543A MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research S5.544 S5.545 S5.149	31 - 31.3 GHz FIXED MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research S5.544 S5.149	FIXED	LPVS (31.0 - 31.056 GHz) HAPS (31.1 - 31.3 GHz)	Government Gazette 20087 (Notice 939, 15 May 1999) LPVS expansion in the band 31.056 - 31.3 GHz (future)

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31.3 - 31.5 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340	31.3 - 31.5 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340			
31.5 - 31.8 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile S5.149 S5.546	31.5 - 31.8 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile S5.149	Fixed	HPVS (31.5 - 31.8 GHz)	
31.8 - 32.0 GHz FIXED S5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.547B S5.548	31.8 - 32.0 GHz FIXED S5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.548			HDFS (31.8 - 33.4 GHz) (future)
32.0 - 32.3 GHz FIXED S5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.547C S5.548	32.0 - 32.3 GHz FIXED S5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.548			HDFS (31.8 - 33.4 GHz) (future)
32.3 - 33.0 GHz FIXED S5.547A INTER-SATELLITE RADIONAVIGATION S5.547 S5.547D S5.548	32.3 - 33.0 GHz FIXED S5.547A INTER-SATELLITE RADIONAVIGATION S5.547 S5.548			HDFS (31.8 - 33.4 GHz) (future)

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33.0 - 33.4 GHz FIXED S5.547A RADIONAVIGATION S5.547 S5.547E	33.0 - 33.4 GHz FIXED S5.547A RADIONAVIGATION S5.547			HDFS (31.8 - 33.4 GHz) (future)
33.4 - 34.2 GHz RADIOLOCATION S5.549	33.4 - 34.2 GHz RADIOLOCATION			
34.2 - 34.7 GHz RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) S5.549	34.2 - 34.7 GHz RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space)			
34.7 - 35.2 GHz RADIOLOCATION Space Research S5.549	34.7 - 35.2 GHz RADIOLOCATION Space Research			
35.2 - 35.5 GHz METEROLOGICAL AIDS RADIOLOCATION S5.549	35.2 - 35.5 GHz METEROLOGICAL AIDS RADIOLOCATION			
35.5 - 36.0 GHz METEROLOGICAL AIDS EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.549 S5.551A	35.5 - 36.0 GHz METEROLOGICAL AIDS EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) S5.551A			

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36.0 - 37.0 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) S5.149	36.0 - 37.0 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) S5.149	RADIO ASTRONOMY (36.43 - 36.5)		
37.0 - 37.5 GHz FIXED MOBILE SPACE RESEARCH (space-to-Earth) S5.547	37.0 - 37.5 GHz FIXED MOBILE SPACE RESEARCH (space-to-Earth) S5.547	FIXED <i>NF 17</i>	PTP links	HDFS (37 - 40 GHz)
37.5 - 38 GHz FIXED FIXED - SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) S5.551AA S5.547	37.5 - 38 GHz FIXED FIXED - SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) S5.551AA S5.547	FIXED <i>NF 17</i>	PTP links	HDFS (37 - 40 GHz)
38.0 - 39.5 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) S5.551AA S5.547	38.0 - 39.5 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) S5.551AA S5.547	FIXED <i>NF 17</i>	PTP links	HDFS (37 - 40 GHz)

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39.5 - 40.0 GHz FIXED	39.5 - 40.0 GHz FIXED			
FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) S5.551AA S5.547	FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) S5.551AA S5.547			HDFS (37 - 40 GHz) High Density application in the FSS (39.5 - 40 GHz)
40 - 40.5 GHz EARTH EXPLORATION SATELLITE (Earth-to-space) FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth)	40 - 40.5 GHz EARTH EXPLORATION SATELLITE (Earth-to-space) FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth)			

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40.5 - 41 GHz FIXED	40.5 - 41 GHz FIXED			MWS/MVDS (future) HDFS (40.5 - 43.5 GHz) High Density application in the FSS (40.5 - 42 GHz) (future)
FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile S5.547	FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile S5.547			
41 - 42.5 GHz FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile S5.547 S5.551A S5.551G	41 - 42.5 GHz FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile S5.547 S5.551G			MWS/MVDS (future) HDFS (40.5 - 43.5 GHz) BSS feeder links (future)
42.5 - 43.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE except aeronautical mobile RADIO ASTRONOMY S5.149 S5.547	42.5 - 43.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE except aeronautical mobile RADIO ASTRONOMY S5.149 S5.547			MWS/MVDS (future) HDFS (40.5 - 43.5 GHz) BSS feeder links (future)
43.5 - 47.0 GHz MOBILE S5.553 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.554	43.5 - 47.0 GHz MOBILE S5.553 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.554			

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47.0 - 47.2 GHz AMATEUR AMATEUR-SATELLITE	47.0 - 47.2 GHz AMATEUR AMATEUR-SATELLITE			
47.2 - 50.2 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE S5.149 S5.340 S5.552A S5.555	47.2 - 50.2 GHz FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE S5.149 S5.340 S5.552A S5.555			HAPS (47.2 - 47.5 & 47.9 - 48.2 GHz(future) BSS feeder links (future)
50.2 - 50.4 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) S5.340 S5.555A	50.2 - 50.4 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) S5.340 S5.555A			
50.4 - 51.4 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Mobile-Satellite (Earth-to-space)	50.4 - 51.4 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Mobile-Satellite (Earth-to-space)			
51.4 - 52.6 GHz FIXED MOBILE S5.547 S5.556	51.4 - 52.6 GHz FIXED MOBILE S5.547 S5.556			HDPS (51.4 - 52.6 GHz) (future)
52.6 - 54.25 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) S5.340 S5.556	52.6 - 54.25 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) S5.340 S5.556			

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54.25 - 55.78 GHz EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE S5.556A SPACE RESEARCH (passive) S5.556B	54.25 - 58.2 GHz EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE S5.556A SPACE RESEARCH (passive)			
55.78 - 56.9 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED S5.557A INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	55.78 - 56.9 GHz EARTH EXPLORATION-SATELLITE (passive) S5.557A FIXED S5.557A INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547			HDFS (55.78 - 59 GHz) (future)
56.9 - 57.0 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.558A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	56.9 - 57.0 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.558A MOBILE S5.558 SPACE RESEARCH (passive) S5.547			HDFS (55.78 - 59 GHz) (future)
57.0 - 58.2 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	57.0 - 58.2 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547			HDFS (55.78 - 59 GHz) (future)

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58.2 - 59.0 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) S5.547 S5.556	58.2 - 59.0 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) S5.547 S5.556			HDPS (55.78 - 59 GHz) (future)
59.0 - 59.3 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 RADIOLOCATION S5.559	59.0 - 59.3 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 RADIOLOCATION S5.559			
59.3 - 64.0 GHz FIXED INTER-SATELLITE MOBILE S5.558 RADIOLOCATION S5.559 S5.138	59.3 - 64.0 GHz FIXED INTER-SATELLITE MOBILE S5.558 RADIOLOCATION S5.559 S5.138	MOBILE		TRANSPORTATION APPLICATIONS ISM (61 - 61.5 GHz) (future)
64.0 - 65.0 GHz FIXED INTER-SATELLITE MOBILE except aeronautical mobile S5.547 S5.556	64.0 - 65.0 GHz FIXED INTER-SATELLITE MOBILE except aeronautical mobile S5.547 S5.556			HDPS (64 - 66 GHz) (future)

ITU Region 1 Radio Regulations	S.A. Table of Allocations	Main Service in South Africa	Applications	Notes and Comments
65.0 - 66.0 GHz EARTH EXPLORATION-SATELLITE FIXED INTER-SATELLITE MOBILE except aeronautical mobile SPACE RESEARCH S5.547	65.0 - 66.0 GHz EARTH EXPLORATION-SATELLITE FIXED INTER-SATELLITE MOBILE except aeronautical mobile SPACE RESEARCH S5.547			HDFS (64 - 66 GHz)
66.0 - 71.0 GHz INTER-SATELLITE MOBILE S5.553 S5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.554	66.0 - 71.0 GHz INTER-SATELLITE MOBILE S5.553 S5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.554			

APPENDIX B: SOUTH AFRICAN NATIONAL FOOTNOTES

This appendix provides the South African National Footnotes that supplement the South African Table of Allocations. In certain instances of band congestion or complex sharing between Services, channel plans, applications, and technical standards are identified as applicable to specific spectrum use in South Africa. For all other bands, the Authority will establish the technical criteria for frequency assignments commensurate with international practises and South African objectives.

NF 1

The band 3400 – 3600 MHz is allocated exclusively in South Africa to wireless local loop (WLL) (or fixed wireless access (FWA)) under the Fixed Service (FS) in accordance with Government Gazette No. 17983 (Notice 759, dated 6 May 1997). The use of this band is intended to be in line with technology developments in Europe, using point-to-point (PTP) and point-to-multipoint (PTMP) topologies. Both narrowband and broadband radio access systems are considered for this band.

CEPT/ERC/REC 14-03 Annex B is the recommended channelization arrangement for this band.

Due to the national use of this band for WLL or FWA the application of Fixed Satellite Service (FSS) shall not be allowed in agreement with Government Gazette 17983 (Notice 759, dated 6 May 1997).

Migration:

Migration requirements in this band are as stipulated in Government Gazette No. 17983 (Notice 759, dated 6 May 1997).

NF 2

The band 3600 – 4200 MHz is used on a national basis for high capacity, core network telecommunication services under the FS using PTP topologies over long hop lengths.

The current channelization arrangement for the band 3600 – 4200 MHz is International Telecommunications Union – Radiocommunications Sector (ITU-R) Recommendation F.382. The new channelization arrangement for this band is ITU-R Recommendation F.635 Annex 1.6.

This band is shared with FSS (space-to-Earth) on a strictly co-ordinated basis (see NF 6).

Migration:

Analogue terrestrial systems operating under ITU-R Recommendation F.382 should be replaced by digital systems complying with ITU-R F.635 Annex 1.6. This replacement should proceed according to the natural lifetime replacement of equipment, but all analogue systems should be replaced by 31 December 2005.

NF 3

The band 4400 – 5000 MHz is allocated to electronic news gathering (ENG)/ outside broadcasting (OB) services under the FS. The band 4400 – 4500 MHz is block allocated to ENG/OB whereas the band 4500 – 5000 MHz will be shared with Government Services.

NF 4

The band 5150 – 5350 MHz is allocated to High Performance Radio Local Area Network (HIPERLAN) in line with European developments and is limited to 200 milliwatts (mW) mean Effective radiated power relative to an isotropic antenna (EIRP) for indoor use only.¹

¹ Subject to finalisation of this portion of the spectrum for this allocation.

The band 5470 – 5725 MHz is allocated to HIPERLAN in line with European developments and is limited to 1 W mean EIRP for both indoor and outdoor use¹

For outdoor linking of HIPERLAN systems the band 17.1 – 17.3 GHz can also be used.

Non-geostationary satellite orbit (NGSO) Mobile Satellite Services (MSS) feeder links in the band 5150 – 5250 MHz shall be protected from harmful interference from indoor HIPERLAN systems.

NF 5

The band 5725 – 5875 MHz is designated as an ISM band (S5.150). Industrial, Scientific and Medical Apparatus (ISM) equipment operating in this band shall observe International Special Committee on Radio Interference (CISPR) 11 and its amendments.

Radiocommunication services will be allowed to operate in accordance with S5.150 in this band, using PTP and PTMP topologies. New radiocommunication systems to be introduced in an ISM band shall not cause harmful interference to other radiocommunication systems already deployed.

NF 6

The band 3625 – 4200 MHz, part of the C-band, is used extensively for FSS (space-to-Earth) applications. This band is also shared with FS (see NF 2).

The band 5850 – 6425 MHz, part of the C-band, is used extensively for FSS (Earth-to-space) applications. This band is also shared with FS (see NF 7).

The C-band is also used for satellite news gathering (SNG) operations. The use of this band for SNG applications will require frequency co-ordination on a case-by-case basis allowing sufficient time for this exercise. In order to avoid the interference problems associated with C-band SNG operations, it is highly recommended that SNG operations in South Africa use the Ku-band as far as possible (see NF 10).

For reasons of efficient spectrum use by all services in the C-band, as well as environmental ethics the deployment of large earth station antennas (greater than 2.4 metres diameter) should be concentrated at selected suitable sites, in order to avoid interference between the services sharing the spectrum. This approach would additionally ensure increased reliability of these services. These selected sites are known internationally as "Teleports".

NF 7

6 GHz ENG/OB

The band 5850 – 5925 MHz is allocated for temporary deployments (ENG/OB) under the FS. This band is also used for FSS (Earth-to-space) (see NF 6).

5925 – 6425 MHz (Lower 6 GHz band)

This band is used on a national basis for high capacity, core network telecommunication services under the FS using a PTP topology over long hop lengths.

The channelization arrangement for this band is ITU-R Recommendation F.383.

This band is shared with FSS (Earth-to-space) (see NF 6).

6425 – 7110 MHz (Upper 6 GHz band)

This band is used on a national basis for high capacity, core network telecommunication services under the FS using a PTP topology over long hop lengths.

The channelization arrangement for this band is ITU-R Recommendation F.384.

This band is shared between FS, NGSO MSS (space-to-Earth) feeder links and geo-stationary satellite orbit (GSO) FSS (Earth-to-space) systems under a strictly controlled and co-ordinated basis.

7110 – 7425 MHz (Lower 7 GHz band)

This band is used on a national basis for medium to high capacity telecommunication services under the FS using a PTP topology over long hop lengths.

Analogue systems utilise the channelization arrangement according to International Radio Consultative Committee (CCIR) Report 934 Annex V. The channelization arrangement for new systems in this band is ITU-R Recommendation F.385 Annex 3.

7425 – 7750 MHz (Upper 7 GHz band)

This band is used on a national basis for medium to high capacity telecommunication services under the FS using a PTP topology over long hop lengths.

Analogue systems utilise the channelization arrangement according to CCIR Report 934 Annex V. The channelization arrangement for this band is ITU-R Recommendation F.385 Annex 3.

7725 – 8275 MHz (Lower 8 GHz band)

This band is used on a national basis for high capacity telecommunication services under the FS using a PTP topology, mainly for core networks over long hop lengths.

The channelization arrangement for this band is ITU-R Recommendation F.386 Annex 1.

8275 – 8500 MHz (Upper 8 GHz band)

This band is used on a national basis for low to medium capacity telecommunication services under the FS using a PTP topology over long hop lengths. As per national agreement users will have access to this band using the concept of one or two reserved channels. As other services are introduced into this band appropriate sharing and co-ordination procedures will be established.

The channelization arrangement for this band is ITU-R Recommendation F.386 Annex 3.

Migration:

Analogue systems operating as per ITU-R Recommendation F.383 in the band 5925 – 6425 MHz and as per ITU-R Recommendation F.384 in the band 6425 – 7110 MHz should be replaced by digital systems. This replacement should proceed according to the natural lifetime replacement of equipment, but all analogue systems should be replaced by 31 December 2005.

Analogue systems operating as per CCIR Report 934 Annex V in the Lower 7 and Upper 7 GHz bands should be replaced by digital systems by 31 December 2005.

Digital systems operating in the Lower 7 and Upper 7 bands in accordance with CCIR Report 934 Annex V should migrate to the channelization arrangement in accordance with ITU-R Recommendation 385 Annex 3. This replacement should proceed according to the natural lifetime replacement of equipment.

The band 8275 – 8500 MHz serves as one of the preferred destination band for those systems, having to migrate from the bands 1710 – 1785 MHz and 1805 – 2025 MHz in accordance with Government Gazette 17983 (Notice 759 dated 6 May 1997).

NF 8

The band 10.15 – 10.3 GHz paired with 10.5 – 10.65 GHz (the 10 GHz band) is used for FS systems of PTP and PTMP topologies.

The channelization arrangement according to CEPT/ERC/REC 12-05 Annex A applies.

NF 9

The band 10.7 – 11.7 GHz is used on a national basis for high capacity, core network and access network telecommunication services under the FS using a PTP topology over medium hop lengths.

The channelization arrangement for the band 10.7 – 11.7 GHz is ITU-R Recommendation F.387.

The bands 10.95 – 11.2 GHz and 11.45 – 11.7 GHz are also shared with FSS (space-to-Earth) (see NF 10).

Migration:

Analogue systems operating in this band should be replaced by digital systems. This replacement should proceed according to the natural lifetime replacement of equipment, but all analogue systems should be replaced by 31 December 2005.

NF 10

The band 14.0 – 14.5 GHz, part of the Ku-band, is used extensively for FSS (Earth-to-space) applications.

The bands 10.95 – 11.2 GHz, 11.45 – 11.7 GHz and 12.5 – 12.75 GHz, part of the Ku-band, is used extensively for FSS (space-to-Earth) applications. The bands 10.95 – 11.2 GHz and 11.45 – 11.7 GHz are also shared with FS (see NF 9).

The Ku-band is the preferred band for SNG operations.

For reasons of efficient spectrum use by all services in the Ku-band, as well as environmental ethics, the deployment of large earth station antennas (greater than 1.8 metres diameter) should be concentrated at selected suitable sites, in order to avoid interference between the services sharing the spectrum. This approach would additionally ensure increased reliability of these services. These selected sites are known in most parts of the world as "Teleports".

Space segments from a range of satellites are currently available, while additional space segments will become available for use by South African operators.

In accordance with Government Gazette 19343 (Notice 2358, dated 9 October 1998), the sub-bands 10.95 – 11.2 GHz and 11.45 – 11.7 GHz are also available for direct-to-home (DTH) applications on a secondary basis.

NF 11

The band 12.75 – 13.25 GHz is used on a national basis for low, medium and high capacity access and core networks under the FS using a PTP topology, over medium hop lengths, subject to rainfall.

The channelization arrangement for the band 12.75 – 13.25 GHz is ITU-R Recommendation F.497.

NF 12

The band 14.5 – 15.35 GHz is used on a national basis for low and medium capacity access networks under the FS using a PTP topology, over medium hop lengths, subject to rainfall.

The channelization arrangement for the band 14.5 – 15.35 GHz is ITU-R Recommendation F.636.

ITU-R Recommendation F.636 is the ITU recommended channelization arrangement for systems operating in this band satisfying the capacity requirements.

NF 13

The band 17.7 – 19.7 GHz is used on a national basis for low, medium and high capacity access networks under the FS using a PTP topology, over short hop lengths, subject to rainfall.

The channelization arrangement for the band 17.7 – 19.7 GHz is ITU-R Recommendation F.595 Annex 1.

NF 14

The band 21.2 – 23.6 GHz is used on a national basis for low, medium and high capacity access networks under the FS using a PTP topology, over short hop lengths, subject to rainfall.

The current channelization arrangement for the band 21.2 – 23.6 GHz is ITU-R Recommendation F.637 Annex 1. As part of ITU-R Recommendation F.637 Annex 1 the band 21.2 – 23.6 GHz is subdivided into ten sub-bands. In a unique South African approach the ten sub-bands channelization arrangement was further specified as follows:

Sub-band	Go: Band edges (GHz)	Return: Band edges (GHz)	Subdivision
1	21.224 - 21.336	22.456 - 22.568	13 x 7 MHz + 6 x 3.5 MHz
2	21.336 - 21.448	22.568 - 22.680	13 x 7 MHz + 6 x 3.5 MHz
3	21.448 - 21.560	22.680 - 22.792	13 x 7 MHz + 6 x 3.5 MHz
4	21.560 - 21.672	22.792 - 22.904	13 x 7 MHz + 6 x 3.5 MHz
5	21.672 - 21.784	22.904 - 23.016	8 x 14 MHz
6	21.784 - 21.896	23.016 - 23.128	8 x 14 MHz
7	21.896 - 22.008	23.128 - 23.240	4 x 28 MHz (4 x 28 MHz or 3 x 28 MHz and 8 x 3.5 MHz)
8	22.008 - 22.120	23.240 - 23.352	4 x 28 MHz
9	22.120 - 22.232	23.352 - 23.464	1 x 112 MHz (16 x 7 MHz or 8 x 14 MHz)
10	22.232 - 22.344	23.464 - 23.576	1 x 112 MHz

European Conference of Postal and Telecommunications (CEPT) Recommendation T/R 13-02 Annex A provides the channelization arrangement for the band 22 – 22.6 GHz paired with 23.0 – 23.6 GHz (part of current 23 GHz band, which is not affected by HDTV).

The band 21.4 – 22 GHz is allocated to the Broadcast Satellite Services (BSS) high definition television (HDTV) from 1 April 2007 on a primary basis. FS will operate in this part of the spectrum after 1 April 2007 on a secondary basis.

Migration:

Systems operating under the FS in the band, 21.4 – 22 GHz can continue to do so on a secondary basis after 1 April 2007 from which date this band is allocated to the BSS HDTV on a primary basis. Where required, FS systems may have to migrate to the band, 22 – 22.6 GHz paired with 23.0 – 23.6 GHz, which is not affected by the new allocation or, where possible systems can also migrate to the 26 GHz and 38 GHz bands.

NF 15

The band 24.5 – 26.5 GHz is allocated to low, medium and high capacities under the FS using PTP and PTMP topologies over short hop lengths, subject to rainfall.

The channelization arrangement for the band 24.5 – 26.5 GHz is in accordance with CEPT Recommendation T/R 13-02 Annex B.

NF 16

The bands 27.5 – 28.35 GHz (base station to subscriber) and 29.1 – 29.25 GHz (subscriber to base station) are allocated to broadband service - local multipoint distribution services (LMDS) under the FS using a PTMP topology over short hop lengths, subject to rainfall.

NF 17

The band 37.0 – 39.5 GHz is allocated to low, medium and high capacity PTP systems under the FS over very short hop lengths, subject to rainfall.

The channelization arrangement for the band 37.0 – 39.5 GHz is in accordance with ITU-R Recommendation F.749 Annex 1.

APPENDIX C: RELEVANT ITU FOOTNOTES

S5.138

The following bands:

6765-6795 kHz	(centre frequency 6 780 kHz),
433.05-434.79 MHz	(centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in No. S5.280,
61-61.5 GHz	(centre frequency 61.25 GHz),
122-123 GHz	(centre frequency 122.5 GHz), and
244-246 GHz	(centre frequency 245 GHz)

are designated for industrial, scientific and medical (ISM) applications. The use of these frequency bands for ISM applications shall be subject to special authorisation by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.

S5.149

In making assignments to stations of other services to which the bands:

13 360-13 410 kHz,	6650-6 675.2 MHz,	111.8-114.25 GHz,
25 550-25 670 kHz,	10.6-10.68 GHz,	128.33-128.59 GHz
37.5-38.25 MHz,	14.47-14.5 GHz,	129.23-129.49 GHz
73-74.6 MHz in Regions 1 and 3,	22.01-22.21 GHz,	130-134 GHz
150.05-153 MHz in Region 1,	22.21-22.5 GHz,	136-148.5 GHz
322-328.6 MHz,	22.81-22.86 GHz,	151.5-158.5 GHz
406.1-410 MHz,	23.07-23.12 GHz,	168.59-168.93 GHz
608-614 MHz in Regions 1 and 3,	31.2-31.3 GHz,	171.11-171.45 GHz
1 330-1 400 MHz,	31.5-31.8 GHz in Regions 1 and 3,	172.31-172.65 GHz
1 610.6-1 613.8 MHz,	36.43-36.5 GHz,	173.52-173.85 GHz
1 660-1 670 MHz,	42.5-43.5 GHz,	195.75-196.15 GHz
1 718.8-1 722.2 MHz,	42.77-42.87 GHz,	209-226 GHz
2 655-2 690 MHz,	43.07-43.17 GHz,	241-250 GHz
3 260-3 267 MHz,	43.37-43.47 GHz,	252-275 GHz
3 332-3 339 MHz,	48.94-49.04 GHz,	
3 345.8-3 352.5 MHz,	76-86 GHz,	
4 825-4 835 MHz,	92-94 GHz,	
4 950-4 990 MHz,	94.1-100 GHz,	
4 990-5 000 MHz,	102-109.5 GHz,	

are allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos.S4.5 and S4.6 and Article S29).

S5.150

The following bands:

13 553-13 567 kHz	(centre frequency 13 560 kHz),
26 957-27 283 kHz	(centre frequency 27 120 kHz),
40.66-40.70 MHz	(centre frequency 40.68 MHz),
902-928 MHz in Region 2	(centre frequency 915 MHz),

2 400-2 500 MHz (centre frequency 2 450 MHz),
 5 725-5 875 MHz (centre frequency 5 800 MHz), and
 24-24.25 GHz (centre frequency 24.125 GHz)

are also designated for industrial, scientific and medical (ISM) applications. Radiocommunication services operating within these bands must accept harmful interference which may be caused by these applications. ISM equipment operating in these bands is subject to the provisions of No. S15.13.

S5.282

In the bands 435-438 MHz, 1 260-1 270 MHz, 2 400-2 450 MHz, 3 400-3 410 MHz (in Regions 2 and 3 only) and 5 650-5 670 MHz, the amateur-satellite service may operate subject to not causing harmful interference to other services operating in accordance with the Table (see No. S5.43). Administrations authorising such use shall ensure that any harmful interference caused by emissions from a station in the amateur-satellite service is immediately eliminated in accordance with the provisions of No. S25.11. The use of the bands 1 260-1 270 MHz and 5 650-5 670 MHz by the amateur-satellite service is limited to the Earth-to-space direction.

S5.337

The use of the bands 1 300-1 350 MHz, 2 700-2 900 MHz and 9 000-9 200 MHz by the aeronautical radionavigation service is restricted to ground-based radars and to associated airborne transponders which transmit only on frequencies in these bands and only when actuated by radars operating in the same band.

S5.339

The bands 1 370-1 400 MHz, 2 640-2 655 MHz, 4 950-4 990 MHz and 15.20-15.35 GHz are also allocated to the space research (passive) and earth exploration-satellite (passive) services on a secondary basis.

S5.340

All emissions are prohibited in the following bands:

1 400-1 427 MHz,	
2 690-2 700 MHz	except those provided
for by Nos. S5.421 and S5.422,	
10.68-10.7 GHz	except those provided
for by No. S5.483,	
15.35-15.4 GHz	except those provided
for by No. S5.511,	
23.6-24 GHz,	
31.3-31.5 GHz,	
31.5-31.8 GHz	in Region 2,
48.94-49.04 GHz	from airborne
stations,	
50.2-50.4 GHz,	except those provided
for by No. S5.555A,	
52.6-54.25 GHz,	
86-92 GHz,	
100-102 GHz,	
109.5-111.8 GHz,	
114.25-116 GHz,	
148.5-151.5 GHz,	
164-167 GHz,	
182-185 GHz,	except those
provided for by No. S5.563,	
190-191.8 GHz,	
200-209 GHz,	
226-231.5 GHz,	
250-252 GHz.	

S5.367

Additional allocation: The bands 1 610-1 626.5 MHz and 5 000-5 150 MHz are also allocated to the aeronautical mobile-satellite (R) service on a primary basis, subject to agreement obtained under No. S9.21.

S5.425

In the band 2 900-3 100 MHz, the use of the shipborne interrogator-transponder system (SIT) shall be confined to the sub-band 2 930-2 950 MHz.

S5.426

The use of the band 2 900-3 100 MHz by the aeronautical radionavigation service is limited to ground-based radars.

S5.427

In the bands 2 900-3 100 MHz and 9 300-9 500 MHz, the response from radar transponders shall not be capable of being confused with the response from radar beacons (racons) and shall not cause interference to ship or aeronautical radars in the radionavigation service, having regard, however, to No. S4.9.

S5.438

Use of the band 4200-4400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground. However, passive sensing in the earth exploration-satellite and space research services may be authorised in this band on a secondary basis (no protection is provided by the radio altimeters).

S5.440

The standard frequency and time signal-satellite service may be authorised to use the frequency 4

202 MHz for space-to-Earth transmissions and the frequency 6 427 MHz for Earth-to-space transmissions. Such transmissions shall be confined within the limits of ± 2 MHz of these frequencies, subject to agreement obtained under No. S9.21.

S5.441

The use of the bands 4500-4800 MHz (s-E), 6725-7025 MHz (E-s) by the fixed-satellite service shall be in accordance with the provisions of APS30B. The use of the bands 10.7-10.95 GHz (s-E), 11.2-11.45 GHz (s-E) and 12.75-13.25 GHz (E-s) by the GSO FSS shall be in accordance with the provisions of APS30B. The use of the bands 10.7-10.95 GHz (s-E), 11.2-11.45 GHz (s-E) and 12.75-13.25 GHz (E-s) by the non-GSO FSS is subject to application of the provisions of No. S9.12 for co-ordination with other non-GSO FSS. Non-GSO FSS shall not claim protection from GSO FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete co-ordination or notification information, as appropriate, for the non-GSO FSS systems and of the complete co-ordination or notification information, as appropriate, for the GSO networks, and No. S5.43A does not apply. Non-GSO FSS in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated.

S5.442

In the bands 4 825-4 835 MHz and 4 950-4 990 MHz, the allocation to the mobile service is restricted to the mobile, except aeronautical mobile, service.

S5.443

Different category of service: in Argentina, Australia and Canada, the allocation of the bands 4 825-4 835 MHz and 4 950-4 990 MHz to the radio astronomy service is on a primary basis (see No. S5.33).

S5.443A

The band 5000-5010 MHz is also allocated to the radionavigation-satellite service (E-s) on a primary basis. See Resolution [COM 5/15] (WRC 2000).

S5.443B

The band 5010-5030 MHz is also allocated to the radionavigation-satellite service (s-E) (s-s) on a primary basis. In order not to cause harmful interference to the microwave landing system above 5030 MHz, the aggregate power flux-density produced at the Earth's surface in the band 5030-5150 MHz by all the space stations within any radionavigation-satellite system (s-E) operating in the band 5010-5030 MHz shall not exceed -124.5 dB(W/m²) in a 150 kHz band. In order not to cause harmful interference to the radio astronomy service in the band 4990-5000 MHz, the aggregate power flux-density produced in the 4990-5000 MHz band by all the space stations within any RNSS (s-E) system operating in the 5010-5030 MHz band shall not exceed the provisional value of -171 dB(W/m²)

in a 10 MHz band at any radio astronomy observatory site for more than 2% of the time. For the use of this band, Resolution [COM5/16] (WRC-2000) applies.

S5.444

The band 5030-5150 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band. For the use of this band No. S5.444A and Resolution 114 (WRC-95) apply.

S5.444A

Additional allocation: the band 5 091-5 150 MHz is also allocated to the fixed-satellite service (Earth-to-space) on a primary basis. This allocation is limited to feeder links of non-geostationary mobile-satellite systems and is subject to co-ordination under No. S9.11A.

In the band 5 091-5 150 MHz, the following conditions also apply:

prior to 1 January 2010, the use of the band 5 091-5 150 MHz by feeder links of non-geostationary-satellite systems in the mobile-satellite service shall be made in accordance with Resolution 114 (WRC-95);

prior to 1 January 2010, the requirements of existing and planned international standard systems for the aeronautical radionavigation service which cannot be met in the 5 000-5 091 MHz band, shall take precedence over other uses of this band;

after 1 January 2008, no new assignments shall be made to stations providing feeder links of non-geostationary mobile-satellite systems;

after 1 January 2010, the fixed-satellite service will become secondary to the aeronautical radionavigation service.

S5.447A

The allocation to the fixed-satellite service (Earth-to-space) is limited to feeder links of non-geostationary-satellite systems in the mobile-satellite service and is subject to co-ordination under No. S9.11A.

S5.447B

Additional allocation: the band 5 150-5 216 MHz is also allocated to the fixed-satellite service (space-to-Earth) on a primary basis. This allocation is limited to feeder links of non-geostationary-satellite systems in the mobile-satellite service and is subject to provisions of No. S9.11A. The power flux-density at the Earth's surface produced by space stations of the fixed-satellite service operating in the space-to-Earth direction in the band 5 150-5 216 MHz shall in no case exceed -164 dB(W/m²) in any 4 kHz band for all angles of arrival.

S5.447C

Administrations responsible for fixed-satellite service networks in the band 5 150-5 250 MHz operated under Nos. S5.447A and S5.447B shall co-ordinate on an equal basis in accordance with Resolution No. S9.11A with administrations responsible for non-geostationary-satellite networks operated under No. S5.446 and brought into use prior to 17 November 1995. Satellite networks operated under No. S5.446 brought into use after 17 November 1995 shall not claim protection from, and shall not cause harmful interference to, stations of the fixed-satellite service operated under Nos. S5.447A and S5.447B.

S5.447D

The allocation of the band 5 250-5 255 MHz to the space research service on a primary basis is limited to active spaceborne sensors. Other uses of the band by the space research service are on a secondary basis. (WRC-97)

S5.448A

The use of the frequency band 5 250-5 350 MHz by the earth exploration-satellite (active) and space research services (active) shall not constrain the future development and deployment of the radiolocation service. (WRC-97)

S5.448B

The earth exploration-satellite (active) service operating in the 5 350-5 460 MHz shall not cause harmful interference to, or constrain the use and development of, the aeronautical radionavigation service.

S5.449

The use of the band 5 350-5 470 MHz by the aeronautical radionavigation service is limited to airborne radars and associated airborne beacons.

S5.452

Between 5 600 MHz and 5 650 MHz, ground-based radars used for meteorological purposes are authorised to operate on a basis of equality with stations of the maritime radionavigation service.

S5.458

In the band 6 425-7 075 MHz, passive microwave sensor measurements are carried out over the oceans. In the band 7 075-7 250 MHz, passive microwave sensor measurements are carried out. Administrations should bear in mind the needs of the Earth exploration-satellite (passive) and space research (passive) services in their future planning of the bands 6 425-7 025 MHz and 7 075-7 250 MHz.

S5.458A

In making assignments in the band 6 700-7 075 MHz to space stations of the fixed-satellite service, administrations are urged to take all practicable steps to protect spectral line observations of the radio astronomy service in the band 6 650-6 675.2 MHz from harmful interference from unwanted emissions.

S5.458B

The space-to-Earth allocation to the fixed-satellite service in the band 6 700-7 075 MHz is limited to feeder links for non-geostationary satellite systems of the mobile-satellite service and is subject to co-ordination under No. S9.11A. The use of the band 6 700 - 7 075 MHz (space-to-Earth) by feeder links for non-geostationary satellite systems in the mobile-satellite service is not subject to No. S22.2.

S5.458C

Administrations making submissions in the band 7 025-7 075 MHz (Earth-to-space) for geostationary-satellite systems in the fixed-satellite service after 17 November 1995 shall consult on the basis of relevant ITU-R Recommendations with the administrations that have notified and brought into use non-geostationary-satellite systems in this frequency band before 18 November 1995 upon request of the latter administrations. This consultation shall be with a view to facilitating shared operation of both geostationary-satellite systems in the fixed-satellite service and non-geostationary-satellite systems in this band.

S5.460

Additional allocation: the band 7 145-7 235 MHz is also allocated to the space research (Earth-to-space) service on a primary basis, subject to agreement obtained under No. S9.21. The use of the band 7 145-7 190 MHz is restricted to deep space; no emissions to deep space shall be effected in the band 7 190-7 235 MHz.

S5.461

Additional allocation: the bands 7 250-7 375 MHz (space-to-Earth) and 7 900-8 025 MHz (Earth-to-space) are also allocated to the mobile-satellite service on a primary basis, subject to agreement obtained under No. S9.21.

S5.461A

The use of the frequency band 7 450-7 550 MHz by the meteorological-satellite service (space-to-Earth) is limited to geostationary satellite systems. Non-geostationary meteorological-satellite systems in this band notified before 30 November 1997 may continue to operate on primary basis until the end of their lifetime. (WRC-97)

S5.461B

The use of the band 7 750-7 850 MHz by the meteorological-satellite service (space-to-Earth) is limited to non-geostationary satellites.

S5.462A

In Regions 1 and 3 (except for Japan), in the band 8 025-8 400 MHz, the earth exploration-satellite service using geostationary satellites shall not produce a power flux-density in excess of the following provisional values for angles of arrival (θ), without the consent of the affected administration:

$$-174\text{dB(W/m}^2\text{)} \text{ in a 4 kHz band} \\ \text{for } 0^\circ \leq \theta < 5^\circ$$

-174+0.5 ($\theta - 5$) dB (W/m²) in a 4 kHz band
for $5^\circ \leq \theta < 25^\circ$

-164 dB(W/m²) in a 4 kHz band
for $25^\circ \leq \theta \leq 90^\circ$

These values are subject to study under **Resolution 124 (WRC-97)**.

S5.463

Aircraft stations are not permitted to transmit in the band 8 025-8 400 MHz. (WRC-97)

S5.465

In the space research service, the use of the band 8 400-8 450 MHz is limited to deep space.

S5.469A

In the band 8 550-8 650 MHz, stations in the earth exploration satellite service (active) and space research service (active) shall not cause harmful interference to, or constrain the use and development of, stations of the radiolocation service. (WRC-97)

S5.470

The use of the band 8 750-8 850 MHz by the aeronautical radionavigation service is limited to airborne Doppler navigation aids on a centre frequency of 8 800 MHz.

S5.472

In the bands 8 850-9 000 MHz and 9 200-9 225 MHz, the maritime radionavigation service is limited to shore-based radars.

S5.474

In the band 9 200-9 500 MHz, search and rescue transponders (SART) may be used, having due regard to the appropriate ITU-R Recommendation (see also Article S31).

S5.475

The use of the band 9 300-9 500 MHz by the aeronautical radionavigation service is limited to airborne weather radars and ground-based radars. In addition, ground-based radar beacons in the aeronautical radionavigation service are permitted in the band 9 300-9 320 MHz on condition that harmful interference is not caused to the maritime radionavigation service. In the band 9 300-9 500 MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices.

S5.476

In the band 9 300-9 320 MHz in the radionavigation service, the use of shipborne radars, other than those existing on 1 January 1976, is not permitted until 1 January 2001.

S5.476A

In the band 9 500-9 800 MHz, stations in the earth exploration-satellite service (active) and space research service (active) shall not cause harmful interference to, or constrain the use and

development of, stations of the radionavigation and radiolocation.

S5.479

The band 9 975-10 025 MHz is also allocated to the meteorological-satellite service on a secondary basis for use by weather radars.

S5.482

In the band 10.6-10.68 GHz, stations of the fixed and mobile, except aeronautical mobile, services shall be limited to a maximum equivalent isotropically radiated power of 40 dBW and the power delivered to the antenna shall not exceed -3 dBW. These limits may be exceeded subject to agreement obtained under No. S9.21. However, in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, China, the United Arab Emirates, Georgia, India, Indonesia, the Islamic Republic of Iran, Iraq, Japan, Kazakstan, Kuwait, Latvia, Lebanon, Moldova, Nigeria, Uzbekistan, Pakistan, the Philippines, Qatar, Syria, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the restrictions on the fixed and mobile, except aeronautical mobile, services are not applicable.

S5.484

In Region 1, the use of the band 10.7-11.7 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service.

S5.484A

The use of the bands 10.95-11.2 GHz (s-E), 11.45-11.7 GHz (s-E), 11.7-12.2 GHz (s-E) in region 2, 12.2-12.75 GHz (s-E) in Region 3, 12.5-12.75 GHz (s-E) in Region 1, 13.75-14.5 GHz (E-s), 17.8-18.6 GHz (s-E), 19.7-20.2 GHz (s-E), 27.5-28.6 GHz (E-s), 29.5-30 GHz (E-s) by a non-GSO FSS is subject to application of the provisions of No. S9.12 for co-ordination with other non-GSO FSS. Non-GSO FSS shall not claim protection from GSO FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete co-ordination or notification information, as appropriate, for the non-GSO FSS systems and of the complete co-ordination or notification information, as appropriate, for the GSO networks, and No. S5.43A does not apply. Non-GSO FSS in the above bands shall operate in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated.

S5.487

In the band 11.7-12.5 GHz in Region 1 and 3, the fixed, fixed-satellite, mobile, except aeronautical mobile, and broadcasting services, in accordance with their respective allocations, shall not cause harmful interference to, or claim protection from, broadcasting-satellite stations operating in accordance with the provisions of the region 1 and 3 plan in APS30.

S5.487A

In Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (s-E) on a primary basis, limited to non-GSO and subject to application of the provisions of No. S9.12 for co-ordination with other non-GSO FSS. Non-GSO FSS shall not claim protection from GSO BSS operating in accordance with the Radio Regulation, irrespective of the dates of receipt by the Bureau of the complete co-ordination or notification information, as appropriate, for the non-GSO FSS systems and of the complete co-ordination or notification information, as appropriate, for the GSO networks, and No.S5.43A does not apply. Non-GSO FSS in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated.

S5.492

Assignments to stations of the broadcasting-satellite service which are in conformity with the appropriate regional plan or included in the Regions 1 and 3 List in APS30 may also be used for transmissions in the fixed-satellite service (s-E), provided that such transmissions do not cause more interference, or require more protection from interference, than the broadcasting-satellite service transmissions operating in conformity with the plan or the list, as appropriate.

S5.497

The use of the band 13.25-13.4 GHz by the aeronautical radionavigation service is limited to Doppler navigation aids.

S5.498A

The earth exploration-satellite (active) and space research (active) services operating in the 13.25-13.4 GHz band shall not cause harmful interference to, nor constrain the use and development of, the aeronautical radionavigation service. (WRC-97)

S5.501A

The allocation of the band 13.4-13.75 GHz to the space research service on a primary basis is limited to active spaceborne sensors. Other uses of the band by the space research service are on a secondary basis. (WRC-97)

S5.501B

In the band 13.4-13.75 GHz, the Earth exploration-satellite (active) and space research (active) services shall not cause harmful interference to, or constrain the use and development of, the radiolocation service. (WRC-97)

S5.502

In the band 13.75-14GHz, an earth station in the fixed-satellite service shall have a minimum antenna diameter of 4.5 m and the e.i.r.p. of any emission should be at least 68 dBW and should not exceed 85 dBW. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services shall not exceed 59 dBW. The protection of assignments to receiving space stations in the fixed-satellite service operating with

earth stations that, individually, have an e.i.r.p. of less than 68 dBW shall not impose constraints on the operation of the radiolocation and radionavigation stations operating in accordance with the Radio Regulations. No.S5.43A does not apply. See Resolution [COM5/10] (WRC-2000).

S5.503

In the band 13.75-14GHz, geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. Until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band:

the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in GSO shall not exceed 71 dBW in the 6 MHz band from 13.772 to 13.778GHz;

the e.i.r.p. density of emissions from any earth station in the FSS operating with a space station in non-GSO shall not exceed 51 dBW in the 6 MHz band from 13.772 to 13.778GHz.

Automatic power control may be used to increase the e.i.r.p. density in the 6 MHz band in this frequency range to compensate for rain attenuation, to the extent that the power-flux density at the FSS space station does not exceed the value resulting from use by an earth station of an e.i.r.p. of 71 dBW or 51 dBW, as appropriate, in the 6 MHz band in clear-sky conditions.

S5.503A

Until 1 January 2000, stations in the fixed-satellite service shall not cause harmful interference to non-geostationary space stations in the space research and Earth exploration-satellite services. After that date, these non-geostationary space stations will operate on a secondary basis in relation to the fixed-satellite service. Additionally, when planning earth stations in the fixed-satellite service to be brought into service between 1 January 2000 and 1 January 2001, in order to accommodate the needs of spaceborne precipitation radars operating in the band 13.793-13.805 GHz, advantage should be taken of the consultation process and the information given in Recommendation ITU-R SA.1071.

S5.504

The use of the band 14-14.3 GHz by the radionavigation service shall be such as to provide sufficient protection to space stations of the fixed-satellite service.

S5.506

The band 14-14.5 GHz may be used, within the fixed-satellite service (Earth-to-space), for feeder links for the broadcasting-satellite service, subject to

co-ordination with other networks in the fixed-satellite service. Such use of feeder links is reserved for countries outside Europe.

S5.510

The use of the band 14.5-14.8 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. This use is reserved for countries outside Europe.

S5.511A

The band 15.43-15.63GHz is also allocated to the fixed-satellite service (s-E) on a primary basis. Use of the band 15.43-15.63GHz by the fixed-satellite service (s-E and E-s) is limited to feeder links of non-geostationary systems in the mobile-satellite service, subject to co-ordination under No.S9.11A. The use of the frequency band 15.43-15.63GHz by the FSS is limited to feeder links of non-GSO MSS for which advance publication information has been received by the Bureau prior to 2 June 2000. In the (s-E) direction, the minimum earth station elevation angle above and gain towards the local horizontal plane and the minimum co-ordination distances to protect an earth station from harmful interference shall be in accordance with **Recommendation ITU-R S.1341**. In order to protect the radio astronomy service in the band 15.35-15.4GHz, the aggregate power flux density radiated in the 15.35-15.4GHz band by all the space stations within any non-GSO MSS feeder (s-E) system operating in the 15.43-15.63GHz band shall not exceed the level of -156 dB(W/m²) in a 50 MHz bandwidth, into any radio astronomy observatory site for more than 2% of the time.

S5.511C

Stations operating in the aeronautical radionavigation service shall limit the effective e.i.r.p. in accordance with Recommendation ITU-R S.1340. The minimum co-ordination distance required to protect the aeronautical radionavigation stations (No. S4.10 applies) from harmful interference from feeder link earth stations and the maximum e.i.r.p. transmitted towards the local horizontal plane by a feeder link earth station shall be in accordance with Recommendation ITU-R S.1340. (WRC-97)

S5.511D

Fixed-satellite service systems for which complete information for advance publication has been received by the Bureau by 21 November 1997 may operate in the bands 15.4-15.43 GHz and 15.63-15.7 GHz in the space-to-Earth direction and 15.63-15.65 GHz in the Earth-to-space direction. In the bands 15.4-15.43 GHz and 15.65-15.7 GHz, emissions from a non-geostationary space station shall not exceed the power flux-density limits at the Earth's surface of -146 dB(W/m²/MHz) for any angles of arrival. In the band 15.63-15.65 GHz, where an administration plans emissions from a non-geostationary space station that exceed -146 dB(W/m²/MHz) for any angle of arrival, it shall co-ordinate under No.S9.11A with the affected administrations. Stations in the fixed-satellite service operating in the band 15.63-15.65 GHz in

the Earth-to-space direction shall not cause harmful interference to stations in the aeronautical radionavigation service (No. S4.10 applies). (WRC-97)

S5.513A

Spaceborne active sensors operating in the frequency band 17.2-17.3 GHz shall not cause harmful interference to, or constrain the development of, the radiolocation and other services allocated on a primary basis (WRC-97)

S5.516

The use of the band 17.3-18.1 GHz by GSO FSS (E-s) is limited to feeder links for the BSS. The use of the band 17.3-17.8GHz in Region 2 by systems in the FSS (E-s) is limited to geostationary satellites. For the use of the band 17.3-17.8GHz in Region 2 by feeder links for the BSS in the band 12.2-12.7GHz, see **Article S11**. The use of the bands 17.3-18.1GHz (E-s) in Regions 1 and 3 and 17.8-18.1GHz (E-s) in Region 2 by non-GSO FSS is subject to application of the provisions of No.S9.12 for co-ordination with other non-GSO FSS. Non-GSO FSS shall not claim protection from GSO FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete co-ordination or notification information, as appropriate, for the GSO networks, and No.S5.43A does not apply. Non-GSO FSS in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated.

S5.519

Additional allocation: the band 18.1-18.3 GHz is also allocated to the meteorological-satellite service (space-to-Earth) on a primary basis. Its use is limited to geostationary satellites and shall be in accordance with the provisions of **Article S21**, Table S21-4.

S5.520

The use of the band 18.1-18.4GHz by the FSS (E-s) is limited to feeder links of GSO systems in the BSS.

S5.522A

The emissions of the fixed service and the FSS in the band 18.6-18.8GHz are limited to the values given in Nos.S21.5A and S21.16.2, respectively.

S5.522B

The use of the band 18.6-18.8GHz by the FSS is limited to geostationary systems and systems with an orbit of apogee greater than 20000 KM.

S5.523A

The use of the bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1GHz (Earth-to-space) by geostationary and non-geostationary fixed-satellite service networks is subject to the application of the provisions of No. S9.11A and No. S22.2 does not apply. Administrations having geostationary-satellite networks under co-ordination prior to 18 November 1995 shall cooperate to the maximum extent possible to coordinate pursuant to No. S22.2.

S9.11A with non-geostationary-satellite networks for which notification information has been received by the Bureau prior to that date, with a view to reaching results acceptable to all the parties concerned. Non-geostationary-satellite networks shall not cause unacceptable interference to geostationary fixed-satellite service networks for which complete Appendix S4 notification information is considered as having been received by the Bureau prior to 18 November 1995. (WRC-97)

S5.523B

The use of the band 19.3-19.6 GHz (Earth-to-space) by the fixed-satellite service is limited to feeder links for non-geostationary-satellite systems in the mobile-satellite service. Such use is subject to the application of the provisions of No. S9.11A, and No. S22.2 does not apply.

S5.523C

No. S22.2 of the Radio Regulations shall continue to apply in the bands 19.3-19.6 GHz and 29.1-29.4 GHz, between feeder links of non-geostationary mobile-satellite service networks and those fixed-satellite service networks for which complete Appendix S4 co-ordination information, or notification information, is considered as having been received by the Bureau prior to 18 November 1995. (WRC-97)

S5.523D

The use of the band 19.3-19.7 GHz (space-to-Earth) by geostationary fixed-satellite service systems and by feeder links for non-geostationary satellite systems in the mobile-satellite service is subject to the application of the provisions of No. S9.11A, but not subject to the provisions of No. S22.2. The use of this band for other non-geostationary fixed-satellite service systems, or for the cases indicated in No. S5.523C and S5.523E, is not subject to the provisions of No. S9.11A and shall continue to be subject to Articles S9 (except No. S9.11A) and S11 procedures, and to the provisions of No. S22.2.

S5.523E

No. S22.2 of the Radio Regulations shall continue to apply in the bands 19.6-19.7 GHz and 29.4-29.5 GHz, between feeder links of non-geostationary mobile-satellite service networks and those fixed-satellite service networks for which complete Appendix S4 co-ordination information, or notification information, is considered as having been received by the Bureau prior to 21 November 1997. (WRC-97)

S5.525

In order to facilitate interregional co-ordination between networks in the mobile satellite and fixed satellite services, carriers in the mobile-satellite service that are most susceptible to interference shall, to the extent practicable, be located in the higher parts of the bands 19.7-20.2 GHz and 29.5-30 GHz. (WRC-97)

S5.526

In the bands 19.7-20.2 GHz and 29.5-30 GHz in Region 2, and in the bands 20.1-20.2 GHz and 29.9-30 GHz in Regions 1 and 3, networks which are both in the fixed-satellite service and in the mobile-satellite service may include links between earth stations at specified or unspecified points or while in motion, through one or more satellites for point-to-point and point-to-multipoint communications.

S5.527

In the bands 19.7-20.2 GHz and 29.5-30 GHz, the provisions of No. S4.10 do not apply with respect to the mobile-satellite service.

S5.528

The allocation to the mobile-satellite service is intended for use by networks, which use narrow spot-beam antennas and other advanced technology at the space stations. Administrations operating systems in the mobile-satellite service in the band 19.7-20.1 GHz in Region 2 and in the band 20.1-20.2 GHz shall take all practicable steps to ensure the continued availability of these bands for administrations operating fixed and mobile systems in accordance with the provisions of No. S5.524.

S5.530

In Regions 1 and 3, the allocation to the broadcasting-satellite service in the band 21.4-22 GHz shall come into effect on 1 April 2007. The use of this band by the broadcasting-satellite service after that date and on an interim basis prior to that date is subject to the provisions of Resolution 525. (WARC-92)

S5.532

The use of the band 22.21-22.5 GHz by the Earth exploration-satellite (passive) and space research (passive) services shall not impose constraints upon the fixed and mobile, except aeronautical mobile, services.

S5.535A

The use of the band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service. Such use is subject to the application of the provisions of No. S9.11A, but not subject to the provisions of No. S22.2, except as indicated in No. S5.523C and S5.523E where such use is not subject to the provisions of No. S9.11A and shall continue to be subject to Articles S9 (except No. S9.11A) and S11 procedures, and to the provisions of No. S22.2. (WRC-97)

S5.536

Use of the 25.25-27.5 GHz band by the inter-satellite service is limited to space research and Earth exploration-satellite applications, and also transmissions of data originating from industrial and medical activities in space.

S5.536A

Administrations installing earth exploration-satellite earth stations cannot claim protection from stations in the fixed and mobile services operated by

neighbouring administrations. In addition, earth stations operating in the earth exploration-satellite service should take into account **Recommendation ITU-R SA.1278**.

S5.537A

In Bhutan, Indonesia, Iran (Islamic Republic of), Japan, Maldives, Mongolia, Myanmar, Pakistan, the Dem. People's Rep. of Korea, Sri Lanka, Thailand and Viet Nam, the allocation to the fixed service in the band 27.5-28.35 GHz may also be used by high altitude platform stations (HAPS). The use of the band 27.5-28.35 GHz by HAPS is limited to operation in the HAPS-to-ground direction and shall not cause harmful interference to, nor claim protection from, other types of fixed service systems or other co-primary services.

S5.538

Additional allocation: the bands 27.500-27.501 GHz and 29.999-30.000 GHz are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis for the beacon transmissions intended for up-link power control. Such space-to-Earth transmissions shall not exceed an equivalent isotropically radiated power (e.i.r.p.) of +10 dBW in the direction of adjacent satellites on the geostationary-satellite orbit. In the band 27.500-27.501 GHz, such space-to-Earth transmissions shall not produce a power flux-density in excess of the values specified in Article S21, Table S21-4 on the Earth's surface.

S5.539

The band 27.5-30 GHz may be used by the fixed-satellite service (Earth-to-space) for the provision of feeder links for the broadcasting-satellite service.

S5.540

Additional allocation: the band 27.501-29.999 GHz is also allocated to the fixed-satellite service (space-to-Earth) on a secondary basis for beacon transmissions intended for up-link power control.

S5.541

In the band 28.5-30 GHz, the earth exploration-satellite service is limited to the transfer of data between stations and not to the primary collection of information by means of active or passive sensors

S5.541A

Feeder links of non-GSO MSS and GSO FSS operating in the band 29.1-29.5 GHz (E-s) shall employ uplink adaptive power control or other methods of fade compensation, such that earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks. These methods shall apply to networks for which APS4 co-ordination information is considered as having been received by the Bureau after 17 May 1996 and until they are changed by a future competent world radiocommunication conference. Administrations submitting APS4 information for co-ordination before this date are encouraged to utilise these techniques to the extent practicable.

S5.543

The band 29.95-30 GHz may be used for space-to-space links in the earth exploration-satellite service for telemetry, tracking, and control purposes, on a secondary basis.

S5.543A

In Bhutan, Indonesia, Iran (Islamic Republic of), Japan, Maldives, Mongolia, Myanmar, Pakistan, the Dem. People's Rep. of Korea, Sri Lanka, Thailand and Viet Nam, the allocation to the fixed service in the band 31-31.3 GHz may also be used by high altitude platform stations (HAPS) in the ground-to-HAPS direction. The use of the band of 31-31.3 GHz by systems using HAPS shall not cause harmful interference to, nor claim protection from, other types of fixed service systems or other co-primary services, taking into account No. S5.545. The use of HAPS in the band 31-31.3 GHz shall not cause harmful interference to the passive services having a primary allocation in the band 31.3-31.8 GHz, taking into account the interference criteria given in **Recommendations ITU-R SA.1029** and **ITU-R RA.769**. The administrations of the countries listed above are urged to limit the deployment of HAPS in the band 31-31.3 GHz to the lower half of this band (31-31.15GHz) until **WRC-03**.

S5.544

In the band 31-31.3 GHz the power flux-density limits specified in Article S21, Table S21-4 shall apply to the space research service.

S5.547

The bands 31.8-33.4GHz, 37-40GHz, 40.5-43.5GHz, 51.4-52.6GHz, 55.78-59GHz and 64-66GHz are available for high-density applications in the fixed service (see **Resolutions [COM5/11] (WRC-2000)** and **[COM5/27] (WRC-2000)**).

Administrations should take this into account when considering regulatory provisions in relation to these bands. Because of the potential deployment of high-density applications in the FSS in the bands 39.5-40 GHz and 40.5-42GHz, administrations should further take into account potential constraints to high-density applications in the fixed service, as appropriate (see **Resolution [COM5/28] (WRC-2000)**).

S5.547A

Administrations should take practical measures to minimise the potential interference between stations in the fixed service and airborne stations in the radionavigation service in the 31.8-33.4GHz band, taking into account the operational needs of the airborne radar systems.

S5.548

In designing systems for the inter-satellite and radionavigation services in the band 32-33 GHz, and for the space research service (deep space) in the band 31.8-32.3 GHz, administrations shall take all necessary measures to prevent harmful

interference between these services, bearing in mind the safety aspects of the radionavigation service (see **Recommendation 707**).

S5.551AA

In the bands 37.5-40GHz and 42-42.5GHz, non-GSO fixed-satellite service systems should employ power control or other methods of downlink fade compensation of the order of 10 dB, such that the satellite transmissions are at power level required to meet the desired performance while reducing the level of interference to the fixed service. The use of downlink fade compensation methods are under study by ITU-R (see **Resolution[COM5/28]** (WRC-2000)).

S5.551A

In the band 35.5-36.0 GHz, active spaceborne sensors in the earth exploration-satellite and space research services shall not cause harmful interference to, claim protection from, or otherwise impose constraints on operation or development of the radiolocation service, meteorological aids service and other services allocated on a primary basis. (WRC-97)

S5.551G

In order to protect the radio astronomy service in the band 42.5-43.5GHz, the aggregate power flux-density in the 42.5-43.5GHz band produced by all the space stations in any non-GSO FSS (s-E) or BSS (s-E) system operating in the 41.5-42.5GHz band shall not exceed -167 dB(W/m²) in any 1 MHz band at the site of a radio astronomy station for more than 2% of the time. The power flux-density in the band 42.5-43.5GHz produced by any GSO FSS (s-E) or BSS (s-E) station operating in the band 42.0-42.5GHz shall not exceed -167 dB(W/m²) in any 1 MHz band at the site of a radio astronomy station. These limits are provisional and will be reviewed in accordance with **Resolution 128** (Rev.WRC-2000).

S5.552

The allocation of the spectrum for the fixed-satellite service in the bands 42.5-43.5 GHz and 47.2-50.2 GHz for Earth-to-space transmission is greater than that in the band 37.5-39.5 GHz for space-to-Earth transmission in order to accommodate feeder links to broadcasting satellites. Administrations are urged to take all practicable steps to reserve the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service operating in the band 40.5-42.5 GHz.

S5.552A

The allocation to the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high altitude platform stations. The use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions of **Resolution 122** (WRC-97).

S5.553

In the bands 43.5-47 GHz and 66-71GHz, stations in the land mobile service may be operated subject to not causing harmful interference to the space radiocommunication services to which these bands are allocated (see No.S5.43).

S5.554

In the bands 43.5-47 GHz and 66-71GHz, 95-100, 123-130GHz, 191.8-200GHz and 252-265GHz, satellite links connecting land stations at specified fixed points are also authorised when used in conjunction with the MSS or RNSS.

S5.555

The band 48.94-49.04GHz is also allocated to the radio astronomy service on a primary basis.

S5.555A

The band 50.2-50.4 GHz is also allocated, on a primary basis to the fixed and mobile services until 1 July 2000. (WRC-97)

S5.556

In the bands 51.4-54.25GHz, 58.2-59GHz and 64-65GHz, radio astronomy observations may be carried out under national arrangements.

S5.556A

Use of the bands 54.25-56.9 GHz, 57.0-58.2 GHz and 59.0-59.3 GHz by the inter-satellite service is limited to satellites in the geostationary satellite orbit. The single entry power flux-density at all altitudes from 0 km to 1 000 km above the Earth's surface produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed -147 dB(W/m²/100 MHz) for all angles of arrival. (WRC-97)

S5.557A

In the band 55.78-56.26GHz, in order to protect stations in the Earth exploration-satellite service (passive), the maximum power density delivered by a transmitter to the antenna of a fixed service station is limited to 26dB (W/MHz).

S5.558

In the bands 55.78-58.2 GHz, 59-64GHz, 66-71,122.25-123GHz, 130-134GHz and 167-174.8 GHz and 191.8-200GHz, stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service (see No.S5.43)

S5.558A

Use of the band 56.9-57 GHz by the inter-satellite systems is limited to links between satellites in geostationary-satellite orbit and to transmissions from non-geostationary satellites in high-Earth orbit to those in low-Earth orbit. For links between satellites in the geostationary-satellite orbit, the single entry power flux-density at all altitudes from 0 km to 1000 km above the Earth's surface, for all conditions and for all methods of modulation, shall not exceed -147 dB (W/m²/100MHz) for all angles of arrival. (WRC-97)

causing interference to the inter-satellite service (see No.S5.43).

S5.559

In the band 59-64GHz, airborne radars in the radiolocation service may be operated subject to not