GENERAL NOTICE

NOTICE 606 OF 2012

INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

Draft
Frequency Migration Regulation
And
Frequency Migration Plan

August 2012

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

HEREBY ISSUES A NOTICE INVITING COMMENTS REGARDING THE DRAFT FREQUENCY MIGRATION REGULATION AND RADIO FREQUENCY MIGRATION PLAN

1. The Independent Communications Authority of South Africa ("the Authority'), in terms of section 4, read with sections 31(4), 34(7)(c)(iii), 34(8) and 34(16) of the Electronic Communications Act (Act No. 36 of 2005), hereby gives notice and invites comments on the draft *Radio Frequency Migration Regulations and Radio Frequency Migration Plan*.

2. Interested persons are hereby invited to submit written representations, including an electronic version of the representation in Microsoft Word, of their views on the Draft Frequency Migration Regulations and Radio Frequency Migration Plan by no later than 16h00 on Friday, 28 September 2012.

3. Persons making representations are further invited to indicate whether they are requesting an opportunity to make oral representations which shall not exceed one hour. The public hearings will be held from the 8th to the 11th of October 2012.

4. Written representations or enquiries may be directed to:

The Independent Communications Authority of South Africa

Pinmill Farm Block A

164 *Katherine Street*

South Africa

Private Bag XI0002

Sandton

2146

Attention:

Mr Manyaapelo Richard Makgotlho

e-mail: rmakgotlho@icasa.org.za

5. All written representations submitted to the Authority pursuant to this notice shall be made available for inspection by interested persons from 27th of September 2012 at the ICASA Library or website and copies of such representations and documents will be obtainable on payment of a fee.

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

Dr SS MNCUBE
CHAIRPERSON

PART 1

Draft Frequency Migration Regulations

DRAFT REGULATION
Radio Frequency Migration Regulations

SCHEDULE

1. Definitions

In these Regulations, terms used shall have the same meaning as in the Electronic Communications Act 2005 (no. 36 of 2005); unless the context indicates otherwise:

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

"ITU" means the International Telecommunications Union;

"SADC FAP" means the Southern African Development Community Frequency Allocation Plan;

"User" means a licensed or licence exempt user of the radio frequency spectrum; and

"WRC" means the World Radio Conference.

2. Purpose

The purpose of these regulations is to establish the framework by which the Authority may migrate users of the radio frequency spectrum under the National Radio Frequency Plan of South Africa.

3. Principles

(1) Radio frequency spectrum migration must be in accordance with the Radio Frequency Migration Plan.

(2) Radio frequency spectrum migration must be consistent with the National Radio Frequency plan.

(3) The National Radio Frequency Plan itself must be consistent with the International Telecommunications Union (ITU) Radio-regulations as updated by WRC, and with the SADC FAP.

(4) Allocations and assignments of radio frequency spectrum that are no longer in line and accordance with the National Radio Frequency Plan will be migrated.

(5) The users to be migrated shall not be entitled to be compensated by the Authority for the costs of the migration.

(6) To the extent that it is possible, the cost of migration should be minimised by considering, amongst other things, the duration of the licence and the economic life time of the equipment.

4. Process for Radio Frequency Migration

The Authority shall initiate a process of radio frequency migration in the following circumstances:

(a) As specified in the Frequency Migration Plan.

(b) Where a change in the use of a radio frequency band is required to bring the South African National Frequency Plan into line with ITU Radio-regulations or the final acts of the latest WRC.

(c) Where a change in the use of a radio frequency band is required to ensure harmonisation of the South African National Radio Frequency Plan with the SADC FAP.

(d) Where the Authority has determined that a change in use of the frequency is necessary for efficient utilisation of the radio frequency spectrum and to otherwise meet the objectives of the Act.

(e) Where the Authority has determined that a change in a radio frequency spectrum licence holder's assignment within a radio frequency band is required to enable more efficient use of the radio frequency spectrum (in-band migration).

5. Preparation of a Radio Frequency Spectrum Assignment Plan

(1) A change in the use of a radio frequency band(s) must be initiated through a Radio Frequency Spectrum Assignment Plan for the radio frequency spectrum bands in the manner specified in the latest Radio Frequency Spectrum Regulations.

(2) With respect to the radio frequency migration process, a Radio Frequency Assignment Plan may include

(a) The process for migrating existing users and usages from their existing spectrum location, specifying the bands to which the users and uses will be migrated; including in-band migration where applicable.

(b) The time scale for the reallocation of the radio frequency band in question, specifying the date at which the users to be migrated should cease transmission.

(3) A Radio Frequency Spectrum Assignment Plan shall be subject to public consultation:

(a) The Authority shall publish the Radio Frequency Spectrum Assignment Plan in the Government Gazette, inviting interested persons to submit written representations as specified by the notice in the Gazette.

(b) The Authority may, after any defined period for lodging comments by interested persons has passed, hold a public hearing in respect of the application.

6. Amendment of a Radio Frequency Spectrum Licence

(1) Upon completion of the Radio Frequency Spectrum Assignment Plan, the Authority must issue a notice to users to be migrated.

(2) The notice of amendment may include the following:

(a) The date at which the licensee must cease transmitting within the frequency range of his existing assignment.

(b) The date at which the licensee may commence transmitting within the new assignment.

(c) The date within which the licensee must collect their updated radio frequency spectrum licence which contains the new terms and conditions of the new assignment, including technical parameters and whether the assignment is exclusive or shared.

7. Short title and commencement

These Regulations are called the Radio Frequency Migration Regulations 2012 and shall come into effect upon publication in Government Gazette.

PART 2

Draft Radio Frequency Migration Plan

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1 Introduction

1.1 Purpose

To develop a Radio Frequency Migration Plan with the aim of managing spectrum efficiently to the benefit of all South Africans in terms of section 2(e) of the Electronic Communications Act, 2005 (Act No. 36 of 2005) as amended ("the Act").

The plan provides for:

- Background and basis of the Radio Frequency Migration Plan.
- How the Radio Frequency Migration Plan was developed.
- Identification of the radio frequency bands where migration may be required and makes proposals regarding such frequency migration as may be required.
- The impact of the Frequency Migration Plan.
- International benchmark study on the experience of other countries with respect to matters relevant to spectrum migration.

1.2 Definitions

To avoid terminological confusion, it is useful to discuss exactly what is meant by the various terms that are used in spectrum management.

Full definitions are given in the glossary.

1.2.1 ITU Definitions

The standard definitions for spectrum management in the International Telecommunications Union (ITU) Radio regulations (Article 1) are as follows:

> ***allocation*** (of a frequency band): Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space *radiocommunication services* or the *radio astronomy service* under specified conditions. This term shall also be applied to the frequency band concerned. (1.16)
>
> ***allotment*** (of a radio frequency or radio frequency channel): Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space *radiocommunication service* in one or more identified countries or geographical areas and under specified conditions. (1.17)
>
> ***assignment*** (of a radio frequency or radio frequency channel): Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions. (1.18).

The key element here is the clear distinction between allocation and assignment which is not always followed in certain benchmark examples.

1.2.2 Defining Spectrum Migration

It is important to define exactly what is meant by spectrum migration as this defines the scope of the plan and regulation. The ITU does not define spectrum migration as such.

In the Act, the reference to spectrum migration is clearly the migration of users of radio frequency spectrum to other radio frequency bands in accordance with the radio frequency plan. The main focus of the FMP is on migrating existing users.

Since certain issues of spectrum migration involve usage as opposed to users, it is useful to expand the definition of migration to include not just users but also uses[1].

> ***"Radio Frequency Spectrum Migration"*** *means the movement of users or uses of radio frequency spectrum from their existing radio frequency spectrum location to another.*

1.2.3 Spectrum re-farming

The term spectrum re-farming is widely used, but like spectrum migration does not have a universal definition and can mean slightly different things in different countries.

The ICT Regulation Toolkit[2] notes the following regarding spectrum re-farming:

> *Generally speaking, re-farming may be seen as process constituting any basic change in conditions of frequency usage in a given part of radio spectrum. Such basic changes might be:*
>
> 1. *Change of technical conditions for frequency assignments;*
> 2. *Change of application (particular radiocommunication system using the band);*
> 3. *Change of allocation to a different radiocommunication service.*

The term re-farming is used to describe:

- the process where a GSM operator changes the use of all or part of the spectrum used for GSM to UMTS / LTE; especially where the spectrum licence has specified the technology (as GSM) and the operator licence has to be changed[3] .

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[1] This allows spectrum migration to encompass re-farming of spectrum within assigned bands to other technologies and in-band migration such as the digitalisation of TV broadcast.

[2] The ICT Regulation Toolkit is a joint production of infoDev and the International Telecommunication Union

[3] Even where the licences are not technologically specific and it could be argued that the change in use from GSM to LTE does not require a regulator to get involved, in order to make efficient use of the spectrum it may be necessary to modify the individual assignments within the band.

- The situation where the individual assignments within a band are changed to allow more efficient use to be made of the frequency band (usually due to a change in technology).
- The process of reallocating and reassigning frequency bands where the licence period has expired, this is happening in Europe where the original GSM licences are expiring[4].

For the purposes of the plan therefore, radio frequency spectrum re-farming may be defined as follows:

> *"Radio Frequency Spectrum Re-farming" means the process by which the use of a Radio Frequency Spectrum band is changed following a change in allocation, this may include change in the specified technology and does not necessarily mean that the licensed user has to vacate the frequency.*

1.2.4 Other definitions

Where the user of a radio frequency has a change of assignment within the same band, usually to allow greater efficiency in the use of the spectrum, this may be termed **in-band migration**.

In some cases, a radio spectrum user may not only have his assignment changed in the same band, but have a new spectrum allocated in a different band. This has occurred with respect to the balancing of spectrum assignments in the GSM 900 MHz and 1800 MHz bands (refer to Appendix B 1.1.7) and may well become a feature of mobile broadband assignments in the future.

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[4] A good example is in Ireland ref: "Multi-band Spectrum Release: Release of the 800 MHz, 900 MHz and 1800 MHz Radio Spectrum Bands' – various consultations by ComReg 2012.

2 Review of Legislation and Regulations

2.1 Electronic Communications Act

2.1.1 Section 34 - Radio Frequency Plan

Section 34 of the Act deals with the National Radio Frequency Plan and as part of this, radio frequency migration.

Subsection (2) essentially contains the key statement:

.....national radio frequency plan developed by the Authority, which must set out the specific frequency bands designated for use by particular types of services.....

Referring specifically to matter of migration:

- Section 34 (7) (c) (iii), states that the Authority must:

  Co-ordinate a plan for migration of existing users, as applicable, to make available radio frequency spectrum to satisfy the requirements of subsection (2) and the objects of this Act and of the related legislation.

- Section 34 (16) states that:

  The Authority may, where the national radio frequency plan identifies radio frequency spectrum that is occupied and requires the migration of the users of such radio frequency spectrum to other radio frequency bands, migrate the users to such other radio frequency bands in accordance with the national radio frequency plan, except where such migration involves governmental entities or organisations, in which case the Authority—

  (a) must refer the matter to the Minister; and

  (b) may migrate the users after consultation with the Minister

It is clear that ICASA has the obligation and authority to plan and implement the migration of users, subject to the approval of the Minister with respect to government entities.

2.1.2 Section 31 - Radio Frequency Spectrum Licence

Section 31 of the Electronic Communication Act (2005) deals with the radio frequency spectrum licences.

- Section 31 (4) states that:

  (4) The Authority may amend a radio frequency spectrum licence—

  (a) to implement a change in the radio frequency plan;

  (b) in the interest of orderly radio frequency spectrum management;

  (c) to effect the migration of licensees in accordance with a revised radio frequency plan or the transition from analogue to digital broadcasting;

(d) if requested by the licensee concerned to the extent that the request is fair and does not prejudice other licensees; or

(e) with the agreement of the licensee.

This section clearly establishes that the ICASA has the right to amend a radio frequency licence to cater for instances listed in section 31(4) (a)-(e) of the Act.

2.1.3 Chapter 3 – Licensing Framework

Chapter 3 of the Act which in principle deals with the award of licences for individual and class licences for the provision of services. It also refers to the use of the radio frequency spectrum. This is consistent with the provisions of Section 31(1) and (2) of the Act dealing with the radio frequency spectrum licence in that a person cannot provide services, in terms of chapter 3, which requires the use of the radio frequency spectrum without a radio frequency spectrum licence.

2.1.4 Spectrum Licence Duration

The process of migrating users will not have an impact on the duration of their radio frequency spectrum licences.

2.2 Review of Regulations

2.2.1 Radio Frequency Spectrum Regulations

The Final Radio Frequency Spectrum Regulations (Notice 184 0f 2011 in Government Gazette 34172) do not elaborate further (than the Act) on the issue of migration or the related issue of the amendment of a radio frequency spectrum licence initiated by the authority.

Regulation 15 deals with the duration of a radio frequency spectrum licence

- Regulation 15 (1) stipulates that *The grant of a Radio Frequency Spectrum Licence and assignment[5] must not be construed as conferring upon the holder a monopoly of the use of the frequency or a right of continued tenure with respect of the frequency;*
- Regulation 15 (2) stipulates that, *unless otherwise specified, a Radio Frequency Spectrum Licence remains valid for one year and thereafter is renewable upon payment of the annual licence fee.*

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[5] There is a semantic difference between licence and assignment. The assignment is the right of use of a specific frequency or frequency band, the licence is the document giving the assignment. Where a user is migrated from one spectrum location to another, his licence may be amended to give a new assignment and change other terms and conditions.

- Regulation 15 (3) stipulates that where an assignment is issued in the Amateur Radio, Aeronautical, Maritime, Citizen Band frequency bands or for Ski Boats, the radio frequency spectrum licence can be renewed for a maximum period of 5 years.

2.2.2 Terrestrial Broadcasting Frequency Plan

The Final Terrestrial Broadcasting Frequency Plan (Notice 1538 of 2009 in Government Gazette 32728) deals with the planning of the broadcast bands in South Africa including the digitalisation programme and the vacation of broadcast channels from the 800 MHz frequency band following the 2006 regional radio conference in Geneva (GE06), which in turn was derived from resolutions made in WRC 07.

This plan is being currently updated and will reflect the WRC12 resolutions on the migration of broadcast channels from the 700 MHz band.

This plan essentially deals with the conversion of analogue to digital Television and the subsequent migration of the existing TV channels to a new spectrum location. The key issues of interest are that there is a period during which broadcasts continue simultaneously in analogue and digital until the analogue channels are switched off.

2.3 Overview of rights and responsibilities

2.3.1 Radio frequency spectrum rights

Neither in the Act, nor in the regulations are there any rights on the parts of users to retain spectrum. The spectrum licence is currently valid for one year only and a spectrum assignment can be revoked at any time. As the International benchmark study (refer to Appendix B (1) indicates, this is not unique to South Africa and many administrations retain the ultimate right to decide on the use of the spectrum at any time, notwithstanding the procedures for withdrawal, amendment or suspension of a licence.

The process for spectrum migration shall include the following:

- a consultation process,
- consideration of the economic lifetime of the equipment,
- the identification of alternative frequencies for users who have to be migrated out of a frequency band,
- advance planning along with an adequate time frame,
- consideration of the duration of the radio frequency spectrum licence,
- consideration of the duration of a broadcast licence.

2.3.2 Responsibilities

ICASA is the responsible body for frequency migration planning.

ICASA has the obligation to consult with the Minister[6] on various issues, notably where migration involves government entities and organisations.

[6] Section 34 (16) of the Act

3 Principles Governing Frequency Migration

3.1 Identification of Bands are subject to Frequency Migration

Bands are identified for radio frequency migration according to the following hierarchy

- First Level – where the ITU radio regulations / decision of a World Radio Conference (WRC) require a change in national allocation that will require existing users to be migrated.
- Second Level - where a Regional Radio Conference require a change in national allocation that will require existing users to be migrated
- Third Level – where the SADC Frequency Allocation Plan (FAP) requires a change in a change in national allocation that will require existing users to be migrated.
- Fourth Level – a decision is taken to change the use of a frequency band at national level and this requires the migration of existing users.

3.2 Process

The process of frequency migration is carried out in a manner consistent with the radio frequency spectrum regulations and the generic process is described in the draft frequency migration regulation that is attached to this draft plan. The key processes are:

- Preparation of a Radio Frequency Spectrum Assignment Plan
- Amendment of a Radio Frequency Spectrum Licence

When it has been established that migration is required, then the critical issue is to determine the time frame in a manner consistent with sound radio frequency spectrum management.

3.3 Time Frame for Migration

In principle, ICASA can migrate a user to another location as part of sound radio frequency spectrum management. However, an appropriate time frame should be applied as a matter of standard practice.

In determining the time frame, the following factors should be taken into account:

- the duration of the spectrum licence,
- the time frame to migrate existing customers (end users)
- the economic life of the equipment installed,
- adequate forward planning

3.3.1 Duration of the radio frequency spectrum licence

The radio frequency spectrum licences in South Africa are in principle granted for a one year period, the multi-year licences will be restricted so that any migration will not fall within the period of a multi-year licence.

3.3.2 Time Frame to migrate existing end users

The issue of the migration of existing users is a key determinant of a spectrum migration time frame. The issue arose in the past with cessation of the analogue mobile phone systems and the migration to GSM and is currently an issue with respect to broadcasting. In Europe, the main controversy is with regard to proposed plans to terminate VHF FM and possibly Medium Wave broadcasting and as a result of this opposition; the termination of FM does not seem likely in the short term. There has been less opposition to the cessation of analogue television broadcasts.

The critical area in South Africa is the digitalisation of TV where end users have to obtain a digital-to-analogue box to accommodate digital signals to their existing televisions before analogue switch off in 2015.

Potential areas that may arise in the future include:

- Conversion of existing cellular frequencies to HSPA/ LTE.
    - Because of the large number of GSM customers with voice / text only phones and the availability of other bands for mobile broadband, it is unlikely that GSM bands will be shut off any time soon.
    - A switch over from 3G / HSPA to LTE – if this ever occurs would involve a time frame of 3-5 years to accommodate the life cycle of the end-terminal equipment.
- Switch off of analogue radio. This is unlikely to occur within the time frame envisaged by this spectrum migration strategy.

3.3.3 Economic life of the equipment installed

It should not be automatically assumed that a change in frequencies will require new transmission equipment; it is entirely possible that the equipment can be retuned at relatively low cost.

In terms of the economic lifetime of the equipment, SABRE 2 which was gazetted in August 2001, planned for switchover deadline of December 2005 for the services subject to migration which was a time frame of just under 5 years. This was at a time when the technological life-cycle was longer than it is today.

3.3.4 Adequate Forward Planning

Probably the most important factor for a frequency migration is the allowance of sufficient time for adequate forward planning. In terms of the overall process this may include:

- Proper time for consultation.
- Band planning.
- Adequate time for existing users of the spectrum to migrate out.
- Adequate time required for dual illumination during a switchover period subject to no interference.

In terms of the time frame, the critical determinant is the earliest time in which new users can begin transmitting as this will be the final date at which existing users cease transmitting. In principle, there is little to be achieved by shutting down existing transmission before new licensees are ready to start transmitting.

3.3.5 Conclusions regarding time frame.

It is proposed that the forward looking time frame for a process of spectrum migration should be 3-5 years from the moment of announcement, unless otherwise specified.

To ensure that there is no confusion, where there are multi-year radio frequency spectrum licences, these should generally not exceed 5 years. Where there is a spectrum migration planned for a particular frequency band, there is nothing to stop a licence being issued for the period up to the date at which transmission should cease if the licensee is able to 'live with' this.

4 Development of the Radio Frequency Migration Plan

4.1 Background

The table below illustrates the time line of documents and conferences that informs the creation of this radio Frequency Migration Plan.

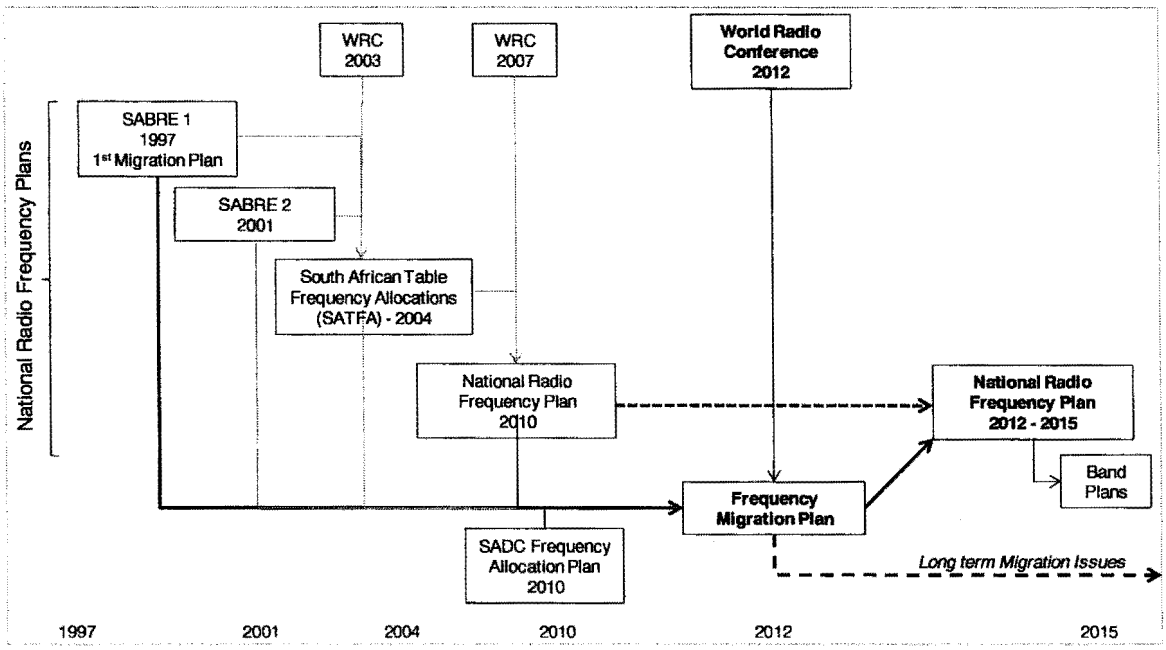

Figure 1 Time Frame and events informing Frequency Migration Plan

The radio Frequency Migration Plan reflects all relevant activities to date and comments on potential long term migration issues.

4.2 International Context

The use of the Radio Frequency Spectrum is fundamentally determined through the ITU Radio Regulations which are established by treaty and modified by treaty in the form of the Resolutions of the World Radio Conferences in which South Africa has participated since 1994. South Africa fundamentally follows the allocations in the Radio Frequency Plan for Region 1 in the ITU Radio Regulations and the primary driver for a change in use is a change in allocation stemming from a World Radio Conference Resolution.

As Region 1 also includes Europe, it is common for South Africa to harmonise the way it uses and manages frequency bands with Europe on the grounds that this facilitates coordination and allows South Africa to benefit from potential economies of scale with regard to equipment as well being able to capitalize on existing development work.

South Africa also participates in the African Telecommunications Union and again will seek to harmonise its frequency allocations with other African countries.

For Southern Africa, South Africa is part of SADC, the Southern African Development Community. South Africa has actively participated in the preparation of the SADC Frequency Allocation Plan (SADC FAP) and to keep the National Radio Frequency Plan as harmonised as possible with the latest version of the SADC FAP is necessary to maintain international co-ordination with neighbouring countries.

4.3 Approach to development of FMP

The Radio Frequency Migration Plan is drawn up using the latest National Radio Frequency Plan (NRFP 2010) as a baseline.

As a first step, a check is made as concerning the frequency migrations proposed in SABRE[7] (see below) with respect to the following:

- Whether the migration as proposed (both from and to other bands) has been carried out and
- If certain services still continue to occupy the original band, whether these services should still be migrated or if this now irrelevant in the present context. This is carried out by:
    - Evaluating the current utilization of these bands by the incumbent
    - Determining whether these bands could be put to better use

In the next step, the proposals in the SADC Frequency Allocation Plan 2010 (SADC FAP 2010) are considered for relevancy in the Republic of South Africa. In terms of relevancy, points under consideration are:

- Whether the bands proposed for alternate use by SADC are being currently utilized (by whom and to what extent).
- If there is a global trend and perceived economic benefit in migrating the current users to accommodate new services.

The third step involves looking at the resolutions adopted at the World Radiocommunication Conference (WRC) 7 and 12 applicable to Region 1 and determine applicability for South Africa. Similar criteria as used to evaluate SADC proposals would be applied here.

The fourth step involves identifying South Africa specific migration issues.

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[7] The Revision of South African Frequency Allocation Plans (Band Plans) and Migration Strategies – Notice 759 of 1997 – which covered 20MHz to 3 GHz (SABRE-1) and 3.4GHz to 3.6 GHz.

In this manner, all matters of significance from global, regional and national context along with the historical activities around migration are awarded due consideration in drafting the frequency migration plan.

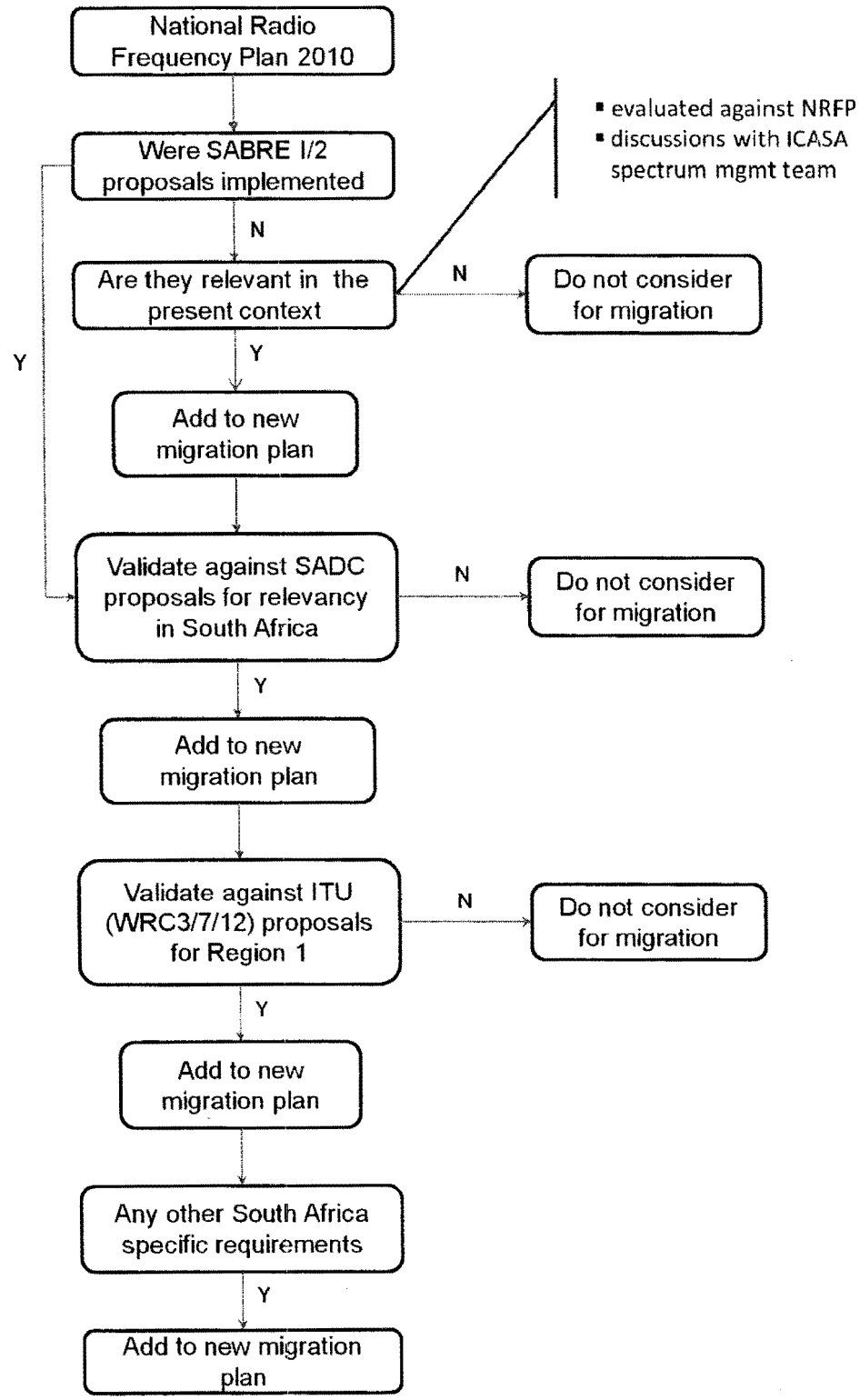

Figure 2 Process for Development of Frequency Migration Plan

4.4 SABRE 1 and SABRE 2

There were two South African Band Re-planning Exercises (SABRE) carried out in 1997 and 2001. SABRE 1 has been the most comprehensive spectrum migration exercise to date.

- SABRE I – in 1997 addressing the radio frequency spectrum between 20MHz and 3 GHz, and between 3.4 – 3.6 GHz
- SABRE II – in 2001 addressing radio frequency spectrum above 3 GHz with the exception of those bands already addressed in SABRE I

4.4.1 SABRE 1 – 1997

SABRE 1[8] was a significant programme to re-plan the radio frequency in line with the ITU Region 1 frequency allocation plan from 20 MHz to 3GHz and to migrate users that either did not accord with the existing allocation plan or prevented efficient use of the spectrum. A prime example of this was the drive to migrate fixed links to over 3 GHz. SABRE 1 was extended to cover 3.4 – 3.6 GHz

The primary services which were targeted for this exercise were

- Fixed links – plan to migrated the fixed links (wherever possible) to higher frequencies above 3 GHz. The primary rationale was that the frequency below 3 GHz was prime estate for mobile communications and should be reserved for that purpose
- Mobile services in VHF High Band – plan for migrating existing services such as paging, alarms, municipal and governmental authorities into bands reserved for their use. Migrate in mobile services into the cleared band
- Paging services – consolidate paging services into bands specifically allocated for that purpose. This would include low power paging, amateur, regional and other paging system
- Alarms – consolidate alarm systems into specific bands

4.4.2 SABRE 2 – 2001

SABRE 2[9] was a programme to re-plan the radio frequency spectrum from 3GHz to 70 GHz (with the exception of 3.4 – 3.6 GHz which was part of SABRE 1), partly driven by the need to in-migrate fixed-links from below 3Gz.

Extracts from SABRE 2 are given in the appendix (1.3Appendix C).

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[8] The Revision of South African Frequency Allocation Plans (Band Plans) and Migration Strategies – Notice 759 of 1997 – which covered 20MHz to 3 GHz (SABRE-1) and 3.4GHz to 3.6 GHz.

[9] Radio frequency spectrum band plan covering the range 3 GHz to 70 GHz – (SABRE-2) Notice 1920 of 2001

4.4.3 Analysis of SABRE

The analysis conducted shows that the following migration of services out of specified bands as proposed under SABRE (1 and 2) did not take place.

Table 1 SABRE planned allocations that have not been implemented

Frequency Band (MHz)	Planned allocation under SABRE	Current allocation in NRFP 2010
53.025 – 53.225	Low power paging	Wireless Microphones (53 -54 MHz)
(81 – 81.625 BTX) paired with (86.375 - 87 MTX)	Dual frequency alarms/ Mobile	Mobile 7 BTX only
141 – 142	None	Remote controlled industrial apparatus (should be in the ISM band)
150.05 – 151	Wide area paging	Wildlife telemetry tracking 148-152 MHz
(165.55 – 167.4875) paired with (172.05 – 173.9875)	BTX-DF (165.55 – 167.4875 MHz) MTX-DF(172.05 – 173.9875 MHz)	MTX-DF (165.55 – 167.4875 MHz) BTX-DF(172.05 – 173.9875 MHz)
240 – 246	DAB	International distress (239 MHz)
278 - 286	FLEX outbound paging services	SF Mobile
406.1 – 410	SF links only	Fixed links (406.1 – 407.625 MHz) paired with (416.1 – 417.625 MHz) Fixed links (407.625 – 410 MHz) paired with (417.625 – 420 MHz)
426.1 – 427.625	Public trunking	SF links (426.1 – 430 MHz)
427.625 – 430	urban–government and public safety rural – SF links	SF links (426.1 – 430 MHz) only
(454.425 – 460) paired with (464.425 – 470)	Mobile trunking MTX (454.425 – 460 MHZ) BTX (464.425 – 470 MHz)	Mobile trunking BTX (454.425 – 460 MHZ) MTX (464.425 – 470 MHz)
463 – 463.975	SF Mobile out of the band	SF Mobile
876 – 880	Digital trunking	Mobile Wireless Access (824 – 849 MHz paired with 869 - 894 MHz)
925 – 925.4	Two-way paging (FLEX inbound)	No allocation
1885 – 1980	FPLMTS (satellite)	No allocation

Frequency Band (MHz)	Planned allocation under SABRE	Current allocation in NRFP 2010
1980 – 2010/ 2170 - 2200	Mobile – Satellite (earth – to – space)	Fixed links 1980 – 2010 MHz paired with 2170 – 2200 MHz
21400 – 22000	Broadcasting satellite service	Fixed links

4.5 National Radio Frequency Plans

After SABRE, there have been two national radio frequency plans, SATFA and the NRFP 2010.

4.5.1 The South African Table of Frequency Allocations 2004

SATFA: The South African Table of Frequency Allocations 2004[10] consolidated SABRE 1 and SABRE 2 in one plan covering the range 20MHz to 70 GHz.

This plan is discussed in the appendix (1.3Appendix D) with respect to frequency migration.

4.5.2 National Radio Frequency Plan 2010

The National Radio Frequency Plan 2010[11] updated SATFA 2004[12] and extended the frequency range covered (now 9 kHz – 3000 GHz). Its stated aim was to incorporate the decisions taken by WRC and include updates on the Table of Frequency Allocations extending up to 3000GHz.

This plan is discussed in the appendix (1.3Appendix E) with respect to frequency migration.

4.6 SADC Frequency Allocation Plan (FAP)

The SADC Frequency Allocation Plan was drawn up in 2010 and guides the use of frequency in the SADC countries as spectrum coordination is required between SADC members. The allocations of the SADC FAP are largely consistent with those for South Africa and the SADC FAP is used as a reference in the preparation of the FMP.

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[10] The South African Table of Frequency Allocations (SATFA) – Notice 1442 of 2004.

[11] The National Radio Frequency Plan – Notice 727 of 2010

[12] The main reason for the name change is that the term 'National Radio Frequency Plan' is used in the ECA.

4.7 ITU World Radio Conference resolutions

The following resolutions from the World Radio Conferences have been taken into consideration. The primary focus is on WRC12, however 4 resolutions from WRC07 have also been analysed. WRC12 is discussed in the annex (1.3Appendix F).

Table 2 WRC resolutions

Frequency Band (MHz)	WRC	Res. No.	Resolution
108 - 117.975	12	413	Use by aeronautical mobile (R) service without interfering with existing ARNS systems
450 – 470	7	224	Frequency bands for the terrestrial component of International Mobile Telecommunications below 1 GHz
690 – 794	12	232	Use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and related studies
790 – 862	12	224	Frequency bands for the terrestrial component of International Mobile Telecommunications below 1 GHz
960 – 1164	12	417	Use of 960 – 1164 MHz by aeronautical mobile (R) service meeting standard and recommended practice
1518 - 1544 1545 - 1559 1610 - 1626.5 1626.5 - 1645.5 1646.5 - 1660.5 1668 - 1675 2483.5 - 2500	12	225	Use of additional frequency bands for the satellite component of IMT
1525 – 1559/ 1626.5 – 1660.5	12	222	Use of 1525-1559 MHz and 1626.5-1660.5 MHz by the mobile-satellite service, and procedures to ensure long-term spectrum access for the aeronautical mobile-satellite (R) service
1885 – 2025/ 2100 - 2200	7	212	Implementation of International Mobile Telecommunications in the bands 1885-2025 MHz and 2110-2200 MHz
2300 – 2400	12	223	Additional frequency bands identified for IMT
5150 – 5250/ 5250 – 5350/ 5470 - 5725	12	229	Use of the bands 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz by the mobile service for the implementation of wireless access systems including

Frequency Band (MHz)	WRC	Res. No.	Resolution
			radio local area networks
15400 – 15700	7	614	Use of the band 15.4-15.7 GHz by the radiolocation service
22550 – 23150	7	753	Use of the band 22.55-23.15 GHz by the space research service

4.8 Key issues with respect to migration

The following explains the approach to key issues regarding the frequency migration plan:

Broadcasting Service

- DTT – Digital Terrestrial Television. The process of moving TV services from analogue to digital (and corresponding in-band migration) is in progress. The plans need to be updated following the WRC 12 along with the allocation of the 700 MHz band to IMT and the corresponding need to consolidate UHF TV broadcasting to the 470-692 MHz UHF band in line with the original Draft Broadcasting Digital Migration Framework (Government Gazette number 31490). The freed spectrum that has been reallocated to IMT in the 800 MHz (WRC07) and 700 MHz band will be the major spectrum resource for mobile broadband.
- Studio Links – These are point-to-point links connecting broadcast studios to transmitters that have been part of the broadcast frequency bands, especially the 800MHz band. With the reallocation of the 700MHz and 800 MHz band to IMT, these studio links also need to be migrated out. They should be given assignments in the bands allocated for Fixed Point to Point links.
- Self Help Stations – These are repeater stations rebroadcasting television channels to limited areas on a low power basis[13]. These must be migrated into the broadcast bands below 692 MHz.

Mobile Service

- Mobile broadband. 'Mobile' broadband is an important use of radio frequency spectrum at the current time and there is a large demand for spectrum in several bands for this purpose. As such, mobile broadband is the service that is most likely to require the migration of other services to accommodate its spectrum needs. The allocation of spectrum for mobile broadband / IMT has already been done via WRC

[13] Refer to 'Review of Self-Help Stations' – ICASA Position Paper February 2006 and 'Inquiry into Self Help Stations' – ICASA Discussion document of December 2004.

resolutions for ITU region 1 as well as per SADC proposed common sub-allocation/ utilization. This ensures that equipment is readily available and a harmonized service can be provided both across the Southern African region as well as other countries in Region 1

- Paging – Paging was still considered to be a major service at the time of SABRE, however (due mainly to GSM) the use of paging services is declining to the point where it will only be used in certain niche areas such as hospitals. SABRE aimed to consolidate paging channels and planned specific migration to achieve this; however this is probably no longer relevant. It is expected that the remaining principle use will continue to be in medical environments where current allocations for low-power paging services would be more than adequate to meet the demand. Accordingly, the SABRE plans for paging can be discounted.
- Alarms – There are a large number of assignments in the bands allocated for alarms and the bands are generally highly utilised. If the present trend of demand for new assignments continues, there are two options:
    - Direct users to convert to a newer technology that is more spectrally efficient and can be accommodated in the existing spectrum allocation.
    - Allocate more spectrum for Alarms in adjacent bands.
- Public Safety: It is proposed that:
    - All public safety services should be consolidated in the same radio frequency band (380 – 400 MHz)
    - It is recommended that where possible public safety users should adopt a common standard. This would have multiple benefits including economic benefits borne out of infrastructure sharing as well as increased effectiveness due to interoperability between users using a common equipment base.

4.9 Proposed Migration Plan

The following table deals with all bands where there is a potential frequency migration issue. The motivation for a migration is either that it is an original SABRE proposal, stems from WRC resolutions and the SADC FAP or is a 'New ICASA' proposal for migration.

Column 1 indicates the frequency range.

Column 2 states the existing allocation in the National Radio Frequency Plan 2010 and also any applications that are mentioned in the NRFP. As is the standard practice for frequency plans, primary allocations are in UPPER CASE, secondary allocations are in Lower Case. Applications are (within brackets).

Column 3 indicates the proposals for new allocations and utilization. The proposed allocation is indicated along with the source of the proposal (SABRE, WRC, SADC FAP, New ICASA proposals).

Column 4 contains notes on any migration issues.

This table only includes those bands where frequency migration is under consideration.

Table 3 Proposed migration plan

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
75.2 – 87.5	MOBILE except aeronautical mobile (Private and communal repeaters)	Allocate (81 – 81.625 MHz) BTX paired with (86.375 – 87 MHz) MTX for dual frequency (DF) alarms as per SABRE DF and SF links remain as-is	Migrate in DF alarms in line with original SABRE 1 proposed allocation (SABRE proposal, refer 4.4) Other SF / DF links can be maintained for use in private/ communal repeaters (refer to 4.11.1)
138 – 143.6	MOBILE Fixed (SF alarms, SF Mobile, MTX-BTX paired links, Remote controlled industrial apparatus)	Expand allocation for SF Alarms to (140.5 – 141.5 MHz) Mobile 1 MTX-BTX pairing remain as-is	Migrate SF Mobile (141 – 141.5 MHz) out of this band and allocate for SF alarms (New ICASA Proposal)[14] Migrate remote controlled industrial apparatus from 141 – 142 MHz to ISM Band (New ICASA Proposal) (refer to 4.11.2)
150.05 – 153	FIXED MOBILE except aeronautical mobile (Alarms, telemetry, SF Mobile and paging[15])		152.05 – 152.55 MHz should be exclusively allocated to SF alarms. All other users must migrate out of this band (refer to 4.11.3)
156.4875 –	MARITIME MOBILE	Maritime Distress	Migrate any SF mobile

[14] Proposal only if alarm systems cannot be migrated to more spectrally efficient technologies

[15] Alarms, SF Mobile. In-house paging and load shedding (148.95 – 151 MHz); SF Alarms (152.05 – 152.55 MHz); Government Service Wildlife Telemetry Tracking (148 – 152 MHz); SF Mobile (152.55 – 153.05 MHz)

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
156.5625	(distress and calling via DSC) FIXED MOBILE (Maritime Radio-navigation and location (radar), SF mobile in inland areas)	(distress and calling via DSC) SF Mobile (in in-land areas)	(156.375 – 156.7625 MHz) operating inland in the vicinity of water-bodies out of this band (in accordance with ITU Appendix 18) (refer to 4.11.4)
156.8375 – 174	MOBILE except aeronautical mobile (R) Mobile Satellite Services (Earth-to-space)	Migrate BTX-DF (165.55 – 167.4875 MHz) to (172.05 – 173.9875 MHz) swap with the MTX-DF band	Allows for contiguous spectrum for MTX and BTX (currently MTX lies between the BTX assignments and vice-versa) (refer to 4.11.5)
174 - 223	BROADCASTING (TV)	TV Broadcasting (174 – 214 MHz) T-DAB (214 – 230 MHz) As per SADC FAP proposed common sub-allocation/ utilization	TV Band III (GE-06 applies) Migration from analogue to digital in accordance with planned SADC timelines T-DAB would be the new service introduced in this band (refer to 4.11.6)
214 – 230	BROADCASTING (TV)	T-DAB (214 – 230 MHz) As per SADC FAP proposed common sub-allocation/ utilization	TV Band III (GE-06 applies) Migration from analogue to digital in accordance with planned SADC timelines T-DAB would be the new service introduced in this band

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
			(refer to 4.11.7)
235 – 267	BROADCASTING (TV) MOBILE	235 – 238 MHz TV Broadcasting (DTT) 238 – 242.95 MHz PMR 242.95 – 243.05 MHz International Distress 243.05 – 246 MHz Low power devices 246.18 – 254.18 MHz TV Broadcast (DTT) (Channel 13) 254 – 267 MHz PMR as per SADC FAP proposed common sub-allocation/ utilization	TV Band III (GE-06 applies) Migration from analogue to digital in accordance with planned SADC FAP timelines Migration as per SADC FAP proposed common sub-allocation/ utilization (refer to 4.11.8)
335.4 - 387	FIXED MOBILE	335.4-336 MHz/ 346.0-356.0 MHz/ 366.0-380.0 MHz PMR and/or PAMR 336-346 MHz paired with 356-366 MHz Fixed Wireless Access/ PTP/PTMP rural system (as per SADC FAP proposed common sub-allocation/ utilization)	Migrate existing fixed links to above 3 GHz as per SADC proposed common sub-allocation/ utilization (refer to 4.11.9)
380 – 400	FIXED (380 – 387 MHz) MOBILE (380 – 400 MHz) (Public safety, SAPS, DOD, Army etc)	380.0-387.0 MHz paired with 390.0-397.0 MHz for digital systems to be used for PPDR 387.0-390.0 MHz paired with 397.0-399.9 MHz. To be used mainly for digital systems (PMR and/or PAMR) (SADC FAP proposed	Consolidate all public safety services into this band, migrating all users falling into this category into this band (New ICASA proposal) Other links to be migrated out as per SADC FAP proposed common sub-allocation/

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
		common sub-allocation/ utilization)	utilization (refer to 4.11.10)
405 – 430	FIXED Mobile except aeronautical mobile (Government services, Mobile Data and public trunking)	PMR and/ or PPDR (SADC FAP proposed common sub-allocation/ utilization) Public digital trunking only (New ICASA proposal)	Migrate government services (especially SAPS) to public safety band 380 – 400 MHz, Mobile Data - Migrate Mobile Data users out of this band Band reserved for Public Digital Trunking (New ICASA proposal) (refer to 4.11.11)
440 – 450	FIXED Mobile except aeronautical mobile (Short range business radio and PMR)	Short range business radio and PMR (New ICASA proposal) Other allocations stay as-is	Other users to be migrated out of the sub-band for Short-range business radio (440 – 440.1/ 445 – 445.1 MHz) (New ICASA proposal) (refer to 4.11.12)
450 – 470	FIXED MOBILE (Trunked Mobile Railways, Mines etc)	Mobile (IMT) as per WRC-07 (Res. 224)	Migrate existing users out of this band (refer to 4.11.13)
694 – 790	BROADCASTING RADIO ASTRONOMY	IMT (Terrestrial) (WRC-12)	Digital Dividend 2; DTT bands between 470 – 690 MHz Planned migration of TV out of this band by 2015 Migrate studio links out Migrate self-help stations below 692 MHz (refer to 4.11.14)
790 – 862	FIXED	IMT (Terrestrial) (WRC-	Digital Dividend 1; DTT

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	BROADCASTING MOBILE except aeronautical mobile (TV Broadcast including fixed links (Secondary transmitter links))	07)	bands between 470 – 690 MHz Align with the on-going efforts within the 800 MHz band as defined in Notice 911 of 2011 Government Gazette 34872. Migrate studio links out. Migrate self-help stations below 692 MHz (refer to 4.11.15)
862 – 890	FIXED MOBILE except aeronautical mobile (Wireless audio (863-865 MHz), Fixed links (868.1–876 MHz), RFID (865 – 868 MHz), RFID (869.4- 869.65 MHz) Alarms (868.6 – 868.7 MHz, 860.25 – 869.3 MHz, 869.65 – 869.7 MHz) Wireless Access Services (824-849 MHz paired with 869-894 MHz) Mobile (880-890 MHz paired with 925-935 MHz))	Mobile (IMT) (as per SADC FAP proposed common sub-allocation/ utilization)	Migrate to IMT as per SADC FAP proposed common sub-allocation/ utilization to facilitate development of harmonized channelling arrangement (refer to 4.11.16)
890 – 942	MOBILE except aeronautical mobile (Mobile (890-915 MHz paired with 925-935 MHz)	Allocate 921 – 925 MHz for GSM-R (New ICASA proposal) All other allocations maintained as-is	Allocate 921 – 925 MHz to GSM-R. (SABRE 1 proposal to allocate this band for Digital Trunking was never implemented)

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	Several RFID systems (915.1 – 921 MHz), (GSM900 band)		(refer to 4.11.17) Spectrum re-farming when deemed required may be carried out based upon defined process (refer to 4.13)
942 – 960	MOBILE except aeronautical mobile (GSM 900)		No migration planned Spectrum re-farming when deemed required may be carried out based upon defined process (refer to 4.13)
1350 – 1375 paired with 1492 – 1517 1375 – 1400 MHz paired with 1427 – 1452	FIXED (Fixed low capacity PTP DF links)	Rural BFWA (New ICASA proposal)	Allocate to rural BFWA; maintain existing links where required (refer to 4.11.19)
1452 – 1492	BROADCASTING BROADCASTING-SATELLITE (T-DAB and S-DAB (L-band))	FWBA/ PTP/ PMP/ LMR (New ICASA proposal)	Currently allocated to T-DAB (1452 – 1479.5 MHz) and S-DAB (1479.5 – 1492) Propose to align allocation with ITU Region 1 (New ICASA proposal) (refer to 4.11.20)
1518 – 1525	FIXED MOBILE-SATELLITE (space-to-earth)	Band is currently not occupied; potential application for LMR repeaters (New ICASA proposal)	Migrate in fixed links for LMR repeaters, band could also be used for outside-broadcasting links currently operating in 2300 – 2450 MHz (New ICASA proposal) (refer to 4.11.21)
1525 – 1559	(1525 – 1530 MHz)	potential application for LMR repeaters	Migrate in fixed links for LMR repeaters, band

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	SPACE OPERATION (space-to-earth) FIXED MOBILE-SATELLITE (space-to-earth) Earth exploration satellite Mobile except aeronautical mobile (Mobile satellite services)	(New ICASA proposal)	could also be used for outside-broadcasting links currently operating in 2300 – 2450 MHz (New ICASA proposal) (refer to 4.11.22)
	(1530 – 1535 MHz) SPACE OPERATION (space-to-earth) MOBILE-SATELLITE (space-to-earth) Earth exploration satellite Mobile except aeronautical mobile Fixed (Mobile satellite services)		No migration planned (refer to 4.11.22)
	(1535 – 1559 MHz) MOBILE-SATELLITE (space-to-earth)		No migration planned (refer to 4.11.22)
1668 – 1675	(1668 – 1668.4 MHz) MOBILE SATELLITE (earth-to-space) RADIO ASTRONOMY SPACE RESEARCH (passive)	(refer to 4.11.23)	Propose to align allocation with ITU Region 1 (New ICASA proposal) (refer to 4.11.23)
	(1668.4 – 1670 MHz)	(refer to 4.11.23)	Propose to align

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	METEOROLOGICAL AIDS MOBILE SATELLITE (earth-to-space) RADIO ASTRONOMY		allocation with ITU Region 1 (New ICASA proposal) (refer to 4.11.23)
	(1670 – 1675 MHz) METEOROLOGICAL AIDS MOBILE MOBILE SATELLITE (earth-to-space)	(refer to 4.11.23)	Propose to align allocation with ITU Region 1 (New ICASA proposal) (refer to 4.11.23)
1710 – 1785 paired with 1805-1880	FIXED MOBILE (GSM1800 band)		No migration planned Spectrum re-farming when deemed required may be carried out based upon defined process (refer to 4.13)
1880 – 1900	FIXED MOBILE (Cordless DECT phone)	FWA (SADC FAP proposed common sub-allocation/ utilization)	Currently under use by Telkom in a WLL configuration. Can be allocated for FWA (refer to 4.11.24)
1920 – 1980 paired with 2110 – 2170	FIXED MOBILE (Current 3G band)		No migration planned Spectrum re-farming when deemed required may be carried out based upon defined process (refer to 4.13)
1980 – 2010 paired with 2170-2200	FIXED MOBILE-SATELLITE (Earth-to-space) (Fixed Links (DF), IMT (Satellite))	Fixed Links (DF), BFWA (New ICASA Proposal)	Migrate in Fixed links (DF) from other bands; consider for BFWA (New ICASA proposal) (refer to 4.11.25)
2025 – 2110 paired with 2200 -	FIXED	Fixed Links (DF)	Fixed links – currently under-utilized.

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
2285	(Fixed links)	BFWA (New ICASA proposal)	Migrate in Fixed links (DF) from other bands (refer to 4.11.26)
2110 – 2170	FIXED MOBILE (Current 3G band)		No migration planned Spectrum re-farming when deemed required may be carried out based upon defined process (refer to 4.13)
2290 – 2300	FIXED	BFWA (as per SADC FAP proposed common sub-allocation/ utilization)	Band currently unused; can be allocated for BFWA as per SADC FAP proposed common sub-allocation/ utilization (refer to 4.11.27)
2300 – 2450	FIXED MOBILE Amateur (Fixed links (2307 – 2387 MHz) paired with (2401 – 2481 MHz) Several outside broadcasting links ISM band (2400 – 2483.5 MHz))	IMT (Terrestrial) 2300 – 2400 MHz as per SADC FAP proposed common sub-allocation/ utilization	Migrate existing fixed links above 3 GHz (refer to 4.11.28)
2500 – 2690	2500-2520 MHz FIXED MOBILE except aeronautical mobile		Currently being used by Sentech (2500 – 2550 MHz) and WBS (2550 – 2565 MHz). 125 MHz available for assignment Align with the on-going efforts within the 800
	2520-2655 MHz FIXED MOBILE except	BFWA Mobile IMT	

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	aeronautical mobile Radio astronomy 2655-2690 MHz FIXED MOBILE except aeronautical mobile Radio astronomy	(as per SADC FAP proposed common sub-allocation/ utilization)	MHz band as defined in Notice 911 of 2011 Government Gazette 34872. (refer to 4.11.29)
3400 – 3600	FIXED MOBILE except aeronautical mobile	BFWA Mobile IMT (as per SADC FAP proposed common sub-allocation/ utilization)	Band needs harmonizing in SADC for IMT; channelling plan to be developed (refer to 4.11.30)
3600 – 4200	FIXED FIXED-SATELLITE (space-to-earth) (Satellite (VSAT, downlink), Terrestrial backhaul)	(3600-4200 MHz) Fixed services (PTP) (3600-4200 MHz) Fixed-satellite (space-to-Earth) (PTP/VSAT/SNG) (3600-3800 MHz) Broadband Fixed Wireless Access (BFWA) as per SADC FAP proposed common sub-allocation/ utilization	Migrate VSAT to Ku band, and use 3600 – 3800 for BFWA as per SADC FAP proposed common sub-allocation/ utilization (refer to 4.11.31)
5150 – 5350	(5150 – 5250 MHz) AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE-SERVICE (Earth-to-space) Mobile except aeronautical mobile (Wireless Access (short	Wireless Access Systems / RLAN As per SADC FAP proposed common sub-allocation/ utilization	License exempt; Wireless Access Systems / Radio Local Access Network (WAS & RLAN) indoor use only. as per Notice 184 of 2011 Government Gazette 34172 *(previously Notice number 944 of 2008 in*

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	range))		*Government Gazette 31321)*
	(5250 – 5255 MHz) SPACE RESEARCH Mobile except aeronautical mobile		
	(5255 – 5350 MHz) EARTH EXPLORATION SATELLITE (active)		
5470 – 5725	(5470 – 5570 MHz) MARITME RADIONAVIGATION Mobile except aeronautical mobile EARTH EXPLORATION SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION (Maritime radionavigation (radar) and Wireless Access (short range))	Wireless Access Systems / RLAN As per SADC FAP proposed common sub-allocation/ utilization	No migration planned; as per as per Notice 184 of 2011 Government Gazette 34172 *(previously Notice number 944 of 2008 in Government Gazette 31321)* (refer to 4.11.32)
	(5570 – 5650 MHz) MARITME RADIONAVIGATION Mobile except aeronautical mobile RADIOLOCATION		
	(5650 – 5725 MHz) RADIOLOCATION Mobile except		

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	aeronautical mobile Amateur Space Research (deep space)		
5725 – 5830	FIXED-SATELLITE (earth-to-space) RADIOLOCATION Amateur (ISM, Amateur, SRD)		No migration for South Africa; maintain for ISM as per Notice 184 of 2011 Government Gazette 34172 *(previously Notice number 926 of 2008 in Government Gazette 31290).*
5850 -5925	FIXED FIXED-SATELLITE (earth-to-space) Mobile (Upper C-band (VSAT, Satellite PTP links), ISM (5725 – 5875 MHz))	(5850-6425 MHz) Fixed-satellite uplinks (PTP/VSAT/SNG)/ temporary Outside broadcast links (5850-5925 MHz) FIXED links (5725-5875 MHz) ISM as per SADC FAP proposed common sub-allocation/ utilization	(refer to 4.11.34)
5925 – 6700	FIXED FIXED-SATELLITE (earth-to-space) (Fixed links/ VSAT, FSS, SNG feeder links)	5925 – 6425 MHz Fixed links 6425 – 7110 MHz Fixed links as per SADC FAP proposed common sub-allocation/ utilization	(refer to 4.11.35)
10700 – 11700	FIXED FIXED-SATELLITE (space-to-earth)/(earth-to-space)	as-is	Migrate VSAT links into this band as per SADC FAP proposed common sub-

Frequency Band (MHz)	Existing Allocation in NRFP 2010 (Applications)	Proposed Allocation/ (Utilization)	Notes on migration/ usage
	(Ku-band satellite)		allocation/ utilization Other allocation remains as-is (refer to 4.11.36)
12290, 16420		Reserved for safety related calling as per WRC-03 Res. 352	
15400 – 15700		Radio location service as per WRC-07 Res. 614	
40000 – above		Allocate for high capacity PTP links	(refer to 4.11.37)

4.10 Current utilization / assignments of bands intended for migration

To be incorporated by reference to the Department of Communications Spectrum Audit Project.

4.11 Commentary on bands with respect to migration

4.11.1 75.2 – 87.5 MHz

The band is primarily used by Repeaters (Private, Communal) in several applications such as mining, farming and other small businesses. SABRE 1 had proposed migration of the dual-frequency alarms into this band. It is proposed to:

- Keep the DF/ SF radio links as-is.
- Allocate (81 – 81.625 MHz) BTX paired with (86.375 – 87 MHz) MTX for dual frequency (DF) alarms, and migrate-in DF alarms that may be operating in other bands.

4.11.2 138 – 144 MHz

The band is primarily used by Repeaters (Private, Communal) in several applications such as mining, farming and other small businesses along with SF alarms. In addition there is

an allocation for remote controlled industrial apparatus (ISM Licence exempt band 141 – 142)[16].

Within South Africa there has been a significant usage of alarms and this is forecast to continue to grow over the next decade. In this case the current band allocations for SF alarms at 140.5 – 141 MHz as well as at 152.05 – 152.55 MHz will be insufficient to meet this demand. At the same time modern alarm systems are more spectrally efficient, and if users migrate to such systems then it is probable that the current allocation is sufficient to meet South Africa's current and future needs. In order to meet this future need it is proposed to:

- Request proposals to determine whether new / current technologies can provide a mechanism for the users to use the current allocation in a more spectrally efficient manner.
- If this is not possible, consider migrating SF Mobile at 141 – 141.5 MHz out of this band. Timeline for this migration would be Year 5 – Year 7.
- Migrate in SF alarms into the band 141 – 141.5 vacated by SF mobile – allocating a total of 1 MHz for this application in the 140 MHz band. This would be the second step in a two stage process of allocating an SF alarm band. In the first stage all other users who are operating within the 152.05 – 152.55 MHz band allocated for SF alarms would be migrated out to free up spectrum for additional SF alarm assignments (Year 0 – Year 3).
- Migrate the remote controlled industrial apparatus out of the 141 -142 MHz band into a band dedicated for ISM. This is important since the alarms are sensitive and the remote controlled industrial apparatus devices may cause interference with the operation of these alarm systems.

It is therefore proposed to allocate this band in the following manner:

- Mobile 1 MTX 138 – 140.5 MHz paired with 141.5 – 144 MHz.
- SF alarms 140.5 – 141.5 MHz.

4.11.3 150.05 – 153 MHz

The current users may continue to operate in this band with the following exceptions:

- Channels 150.625, 150.650, 150.675 MHz are reserved for in-house paging. The demand for paging has shown a sharp decrease over the past decade and may only occupy a very niche segment (e.g. hospitals etc). If there are no current

[16] Government Gazette No. 31290, Notice No. 926 of 2008 as amended.

assignments for paging it is proposed to de-allocate these channels for this purpose.

- SF Alarms are supposed to operate within the 152.05 – 152.55 MHz band on an exclusive basis. However, there are other users (SF Mobile etc) operating in this band. Given the growing demand from alarms (refer 4.11.2) it is proposed to migrate these users out of this band (Year 0 – Year 3) and allocate it on an exclusive basis to SF alarms.

4.11.4 156.4875 – 156.5625 MHz

Although SF Mobile may continue to operate within 156.375 – 156.7625 MHz on a non interference basis and non protection basis to Maritime mobile services in inland areas, there are many occasions where these are situated in proximity (50km or less to water-bodies). This is as per ITU RR Article 31 and Appendix 18. It is therefore proposed to:

- Identify and migrate all SF Mobile users within close proximity (50 km or less) to water-bodies out of this band and/ or relocate the same.

4.11.5 156.875 - 174 MHz

The planned frequency allocation as per the NFRP in this band is as shown in Figure 3

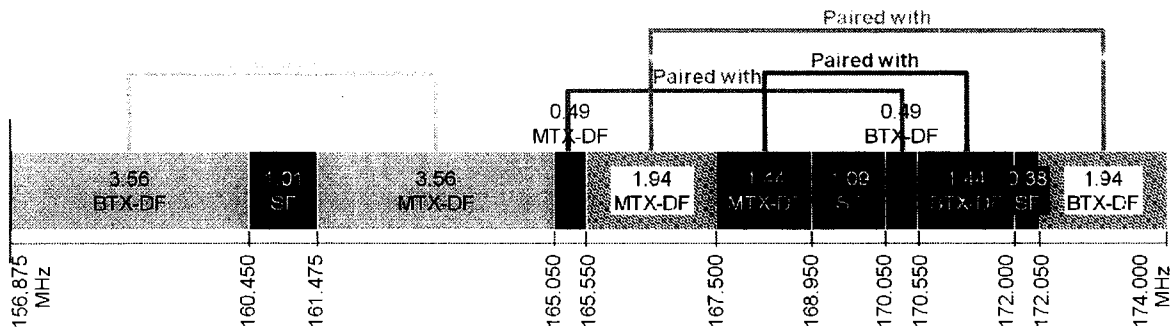

Figure 3 Proposed Allocation 156.875MHz – 174MHz

However at present the MTX-DF (165.55 – 167.5 MHz) and BTX-DF (172.05 – 174 MHz) are interchanged as indicated in Figure 4.

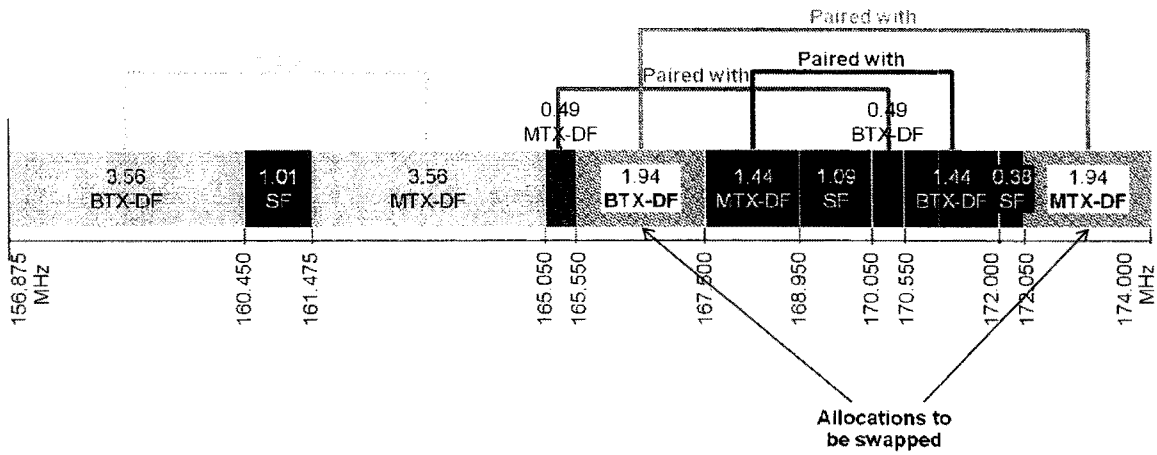

Figure 4 Current situation 156.875MHz – 174MHz

This has resulted in the situation that the BTX lies within the MTX allocation and vice-versa, leading to interference and other challenges during assignment.

It is therefore proposed to:

- Restore the allocation as proposed with immediate effect by swapping the MTX and BTX.

4.11.6 174 – 223 MHz

The VHF TV service currently operating in this band will be migrated to DTT by 2015 in line with GE-06 guidelines. The new allocation could be carried out in line with SADC FAP proposed common sub-allocation / utilization.

There are a few important points to consider here:

- T-DAB: in line with SADC proposed common sub-allocation/ utilization this service has been allocated to two bands (214 – 230 MHz) as well as (1452 – 1492 MHz). Depending upon the utilization of the service this band the allocation of two frequency bands would be re-evaluated. It may be sufficient to restrict allocation of T-DAB to 214-230 MHz and allocate the 1452 – 1492 MHz band for other uses.
- It is also recognized that although DAB is the standard proposed by SADC proposed common sub-allocation/ utilization there are other alternatives being proposed such as DMB, DVB-H etc.
- It is recognized that apart from selecting the technology based upon spectral efficiency itself, it is also important to be harmonized with the SADC region as well as consider the wide-spread availability and costs associated in using alternative standards.

It is therefore proposed that the allocation for this band be as follows:

- 174- 214 MHz TV Broadcasting.

- 214 - 230 MHz Terrestrial – Digital Audio broadcasting and comments and considerations for the technology standard(s) to be specifies for this purpose are invited.

4.11.7 223 – 230 MHz

The band is proposed to be allocated for T-DAB (refer to 4.11.6):

- 214 - 230 MHz T-DAB.

4.11.8 235 – 267 MHz

This band is currently being occupied by Analogue TV. Consequent to the planned migration in line with GE-06, the band can be used for the following purposes as per SADC proposed sub-allocation / utilization:

- 235 – 238 MHz TV Broadcasting.
- 238 – 242.95 MHz PMR including public trunking.
- 242.95 – 243.05 MHz International Distress.
- 243.05 – 246 MHz Low power devices ancillary to broadcasting services.
- 246.18 – 254.18 MHz TV Broadcast (Channel 13).
- 254 – 267 MHz PMR and/ or PAMR including public trunking.

4.11.9 335.4 - 387 MHz

Spectrum in this band could be freed up for rural broadband if equipment for FBWA in this band is available in the market. The current players have show indications that they may relinquish this spectrum due to spectrum fees imposed.

It is proposed that the band be allocated for one or more of the following uses as per SADC FAP proposed sub-allocation/ utilization:

- 335.4-336 MHz PMR and / or PAMR.
- 346.0-356.0 MHz PMR and / or PAMR.
- 366.0-380.0 MHz PMR and / or PAMR.
- 336-346 MHz paired with 356-366 MHz for Fixed Wireless Access/ PTP/PTMP rural system.

4.11.10 380 – 400 MHz

This band will be allocated as a contiguous block for public protection and disaster relief (PPDR) as well as public safety with users including SAPS, SANDF, the ambulance service, metro police and Fire-fighting services. All other users will migrate out of this

band. This allocation would recognize the importance having a band dedicated for public safety and free of any other potential sources of interference. In ideal circumstances, these users would make use of a common digital public trunking network which would also promote interoperability between such users in periods of emergency

It is also recommended that private establishments who work alongside and are responsible for public safety also operate within this band. This would allow interoperability with other public safety/ emergency services users.

The proposed allocation of this band would be as per SADC proposed sub-allocation/ utilization

- 380.0-387.0 MHz paired with 390.0-397.0 MHz for digital systems to be used for PPDR.
- 387.0-390.0 MHz paired with 397.0-399.9 MHz. To be used mainly for digital systems (PMR and/or PAMR).
- It is the New ICASA proposal that this band be exclusively reserved for public safety and all users (e.g. SAPS etc) migrate into this band.
- Considerations be made to adopt a common digital trunking technology standard which would allow:
  - Economic savings by operating and sharing a single network infrastructure
  - Improving effectiveness and promoting interoperability

4.11.11 405 - 430 MHz

This band is currently used for public trunking services. In addition there is a Mobile Data Service (WBS) operating in this band as well The SADC proposed sub-allocation/ utilization indicates use for PMR and/ or PAMR as well as PPDR. Given the NRFP allocation for Digital Trunked Mobile there is the possibility of other services (including those using FDMA) and other TDMA systems including DMR may be introduced in this band. ICASA proposes that:

- 410 – 430 MHz reserved for digital public trunking only.
- All other services apart from public trunking to be migrated out of the band.

It is important to note that although this band is allocated to Digital Trunking there are several different technologies which could suit this purpose, not all of which are interoperable with each other. In the present assignments there are several who are using TETRA, while other Digital Trunking technologies are also being proposed. Proposals are invited to determine the best way forward which would allow technology neutrality but however would ensure that interference between users using different technology standards (FDMA versus TDMA etc) is minimized.

4.11.12 440 - 450 MHz

This band is allocated for Short Range Business Radio (441 – 441.1 MHz) while the remaining portion is allocated for PMR (both UHF repeaters and DMR). The Short Range Business Radio has wide application in South Africa and is type approved (unlicensed). It is important to ensure that this sub-band is maintained for Short Range Business Radio purposes. There is no migration planned in the PMR sub-band.

It is hence proposed by ICASA that:

- 440 – 440.1 MHz be allocated to Short-range Business radio.
- 446 – 446.1 MHz be used for temporary assignments within PMR band.
- All other users migrate out of the band.
- The rest of the users in this band can stay as-is.

4.11.13 450 - 470 MHz

This band is currently used for Trunked Mobile with several users including the Railways (Transnet) and mines (Figure 5). The SADC FAP proposed common sub-allocation/ utilization seeks to allocate this spectrum for Mobile IMT. This is important to note that several adjacent countries (e.g. Mozambique) are moving to implement this proposal. Although the band has a large number of assignments, a recently concluded spectrum audit indicates that the spectrum usage is quite low – indicating inefficient spectrum use.

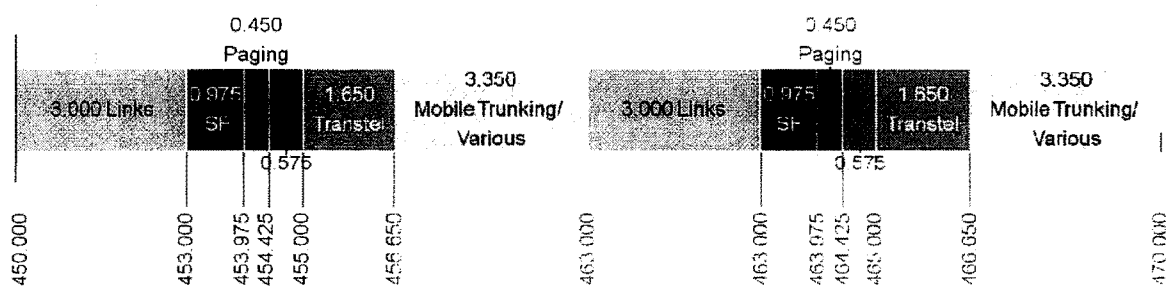

Figure 5 Current assignment 450 – 470 MHz

In view of the other spectrum that has been identified for IMT, it is proposed therefore:

- To migrate the current users out of this band into the radio frequency 3 GHz and above space
- To allocate this band to Mobile (IMT) as per Res. 224 of WRC-07.

In view however of the large number of assignments in this band, comments on this suggestion are particularly welcome

4.11.14 694 - 790 MHz

This band has been assigned for IMT (Terrestrial) for Region 1 countries at the WRC-12 (Table 2) and is often termed as Digital Dividend 2. Currently this band is occupied by UHF TV.

Given that there is a current planned migration underway in the 790 – 862 MHz band (due to be completed by 2015), a proposal would be to concurrently define and implement a migration plan for the 694 – 790 MHz band as well. The time-line to complete the migration could be staggered as compared to the 794 – 862 MHz band. This would ensure that no new services are allocated for this band and the existing users have a finite and defined period to migrate.

It is proposed that:

- The migration plan is aligned with the on-going efforts within the 800 MHz band as defined in Government Gazette 34872[17].
- With respect to the small number of Studio Links in this band; these must be migrated out and given point to point fixed assignments.
- Self Help Stations must be migrated out into the broadcast bands below 692 MHz.

4.11.15 790 - 862 MHz

This band has been allocated for IMT (Terrestrial) for Region 1 countries at WRC-07 (Table 2) and is often termed as Digital Dividend 1. Currently this band is occupied by UHF TV. Migration is planned to be completed by 2015.

It is proposed that:

- The migration plan is aligned with the on-going efforts within the 800 MHz band as defined in Government Gazette 34872[18].

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[17] Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz

[18] Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz

- With respect to the small number of Studio Links in this band; these must be migrated out and given point to point fixed assignments.
- Self Help stations must be migrated out into the broadcast bands below 692 MHz.

4.11.16 862 - 890 MHz

This band currently has several users including:

- Wireless audio (863-865 MHz).
- Fixed links (868.1–876 MHz).
- RFID (865 – 868 MHz), RFID (869.4- 869.65 MHz).
- Alarms (868.6 – 868.7 MHz, 860.25 – 869.3 MHz, 869.65 – 869.7 MHz).
- Wireless Access Services (824-849 MHz paired with 869-894 MHz).
- Mobile (880-890 MHz paired with 925-935 MHz) – currently assigned to Neotel.

It is essential to note that alarms were not part of the SABRE proposed allocations and may need to be consolidated within designated alarm bands. Additionally there is some level of confusion with regards to the Wireless Access Service (824-849 MHz paired with 869-894 MHz) as part of the NRFP – given that such an assignment would interfere with the Mobile band assigned to Netotel. It is proposed to:

- Align re-planning efforts within the 800 MHz band as defined in Government Gazette 34872[19].
- Remove the assignment for Wireless Access Services in this band.
- Re-plan the entire band to accommodate IMT (terrestrial) as per SADC FAP proposed common sub-allocation/ utilization.
- Migrate existing users out of this band.

4.11.17 890 - 942 MHz

This band currently has several users including:

- Mobile (890 – 915 MHz paired with 925 – 935 MHz) currently assigned to Cell C.
- Several RFID (short range applications) from 915.1 – 919.2 MHz.

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[19] Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz.

- GSM-R (921-925 MHz). However, it is important to note that GSM-R is not mentioned as an explicit service in the NRFP, while SABRE recommended that this band be allocated for digital trunking.

It is proposed that:

- 921-925 MHz is allocated for the purposes of GSM-R.
- The remaining allocations remain as-is.
- Spectrum re-farming, when deemed necessary is carried out based upon the principles and policies defined in section 4.13.

4.11.18 942 - 960 MHz

This band currently is allocated for GSM900 (Vodacom, MTN). There is currently no spare capacity left in this band.

It is proposed that:

- No migration is planned for the band, the allocations remain as-is.
- Spectrum re-farming, when deemed necessary is carried out based upon the principles and policies defined in section 4.13.

4.11.19 1350 - 1375 (1492- 1517)/ 1375 – 1400 (1427 – 1452) MHz

This band is currently allocated to low capacity PTP / DF links. Spectrum is available on a radio coordinated basis. Based upon availability of equipment as well as user demand, ICASA proposes that:

- Maintain existing links where required (too expensive to migrate etc).
- Allocation to rural broadband (BFWA) due to good propagation characteristics.

4.11.20 1452 - 1492 MHz

This band is currently allocated to T-DAB and S-DAB due to the current South African allocations of BROADCASTING and BROADCASTING-SATELLITE. Given the allocation of DAB in the VHF band (from 214 – 230 MHz) it is important to determine whether the frequency allocation is sufficient or additional spectrum in the L-band needs to be allocated for the purpose. Consideration of this depends upon:

- Whether there is sufficient and adequate demand for DAB services to require assignment in two bands.
- Whether equipment is readily available encompassing both bands.

Under the present and forecasted situation, it is believed that the DAB allocation in the VHF band is sufficient to meet the requirements of T-DAB. This would also result in lower equipment costs since any receiver would have to be designed to cover only a single

band rather than two distinct bands. In addition, S-DAB may have only very limited potential within South Africa and this spectrum may be better utilized for other purposes. It is there proposed by ICASA to:

- Modify the allocation in this band and align it with the ITU Region 1 to include FIXED, MOBILE except aeronautical mobile, BROADCASTING and BROADCASTING-SATELLITE.
- Allocate this band to PTP/ PMP/ BFWA depending upon the availability of equipment. Communal/ private repeaters could also operate in this band.

4.11.21 1518 - 1525 MHz

The band was allocated for both SF links as well as the IMT satellite component. However, this band remains unoccupied and there are views that the IMT (satellite) will have limited usage within South Africa.

Due to these factors, ICASA proposes to:

- Allocate this band for repeater links for land-mobile radio (LMR) and migrate such links into this band.
- Band could also be allocated for outside-broadcasting links currently operating in 2300 – 2450 MHz.

4.11.22 1525 - 1559 MHz

The band has been identified for IMT (satellite); Res. 225 (WRC applies). In the band 1530 – 1544 MHz priority for maritime mobile distress, urgency and safety communication (GMDSS); Res. 222 applies. The band is currently being used by INMARSAT.

Due to these factors, ICASA proposes to:

- Consider using the 1525 – 1530 MHz band for Fixed links (e.g. repeater links) and migrate such links into this band.
- Band could also be allocated for outside-broadcasting links currently operating in 2300 – 2450 MHz.
- Keep the remaining allocation (1535 – 1559 MHz) of the band as-is.

4.11.23 1668 – 1675/ 2483.5 - 2500 MHz

The band has been identified for the satellite component of IMT; Res 225 applies. However, the use of IMT (Satellite) within South Africa is limited and it is unclear whether this application would ever become significant for broadband with the strong growth of IMT (Terrestrial).

It is therefore proposed by ICASA to:

- Change the current allocation to be in line with ITU Region 1 allocations of:

- 1668 – 1668.4 MHz:
  - MOBILE-SATELLITE (earth-to-space)
  - RADIO ASTRONOMY
  - SPACE RESEARCH (passive)
  - Fixed
  - Mobile except aeronautical mobile
- 1668.4 – 1670 MHz:
  - METEOROLOGICAL AIDS
  - FIXED
  - MOBILE except aeronautical mobile
  - MOBILE-SATELLITE (earth-to-space)
  - RADIO ASTRONOMY
- 1670 – 1675 MHz:
  - METEOROLOGICAL AIDS
  - FIXED
  - METEOROLOGICAL SATELLITE (space-to-earth)
  - MOBILE
  - MOBILE-SATELLITE (earth-to-space)

- This change in allocation, in line with ITU region 1 would open up the possibilities of introducing Fixed links (PTP, PMP) into this band.

4.11.24 1880 - 1900 MHz

The band was allocated for cordless DECT by SABRE proposed allocation. This is being currently in use by Telkom to provide WLL services. Depending upon the current utilization of this band, as per SADC FAP proposed common sub-allocation/ utilization, ICASA proposes to:

- Allocate this band to BFWA.

4.11.25 1980-2010/ 2170-2200 MHz

The band has been identified for the satellite component of IMT; Res 225 applies. However, the use of IMT (Satellite) within South Africa is limited and it is unclear whether this application would ever become significant for broadband with the strong growth of IMT (Terrestrial). The band is also allocated for Fixed Links, but currently lies unused in the lower band and utilized by SANDF, Transnet amongst other users in the upper band; this is however under-utilized. It is therefore proposed to:

- Allocate for Fixed links and migrate in Fixed links (DF) from other bands.
- Allocate for BFWA depending upon availability of equipment in these bands (New ICASA proposal).

4.11.26 2025 – 2110 paired with 2200 - 2285 MHz

The band is currently allocated for fixed links – but is under-utilized. SABRE proposed use of 2075 - 2110 MHz for WLL was never implemented.

It is proposed to:

- Keep allocation for Fixed links and migrate in Fixed links (DF) from other bands.
- If band continues to remain under-utilized, then depending upon demand and availability of equipment, allocate for BFWA (New ICASA proposal).

4.11.27 2290 - 2300 MHz

Currently unused; In line with SADC proposed common sub-allocation/ utilization, ICASA proposes to

- Allocate this band to BFWA.

4.11.28 2300 - 2450 MHz

The band is currently in use for several services including:

- Fixed links – 2307 – 2387 MHz paired with 2401 – 2481 MHz.
- Outside broadcasting links (28 MHz) – primary basis at (2377, 2471 MHz), secondary basis at (2321, 2349 MHz, 2415, 2443 MHz).
- ISM – 2400 – 2483.5 MHz.

As per SADC FAP proposed common sub-allocation/ utilization, it is proposed to:

- Allocate 2300 – 2400 MHz for IMT (Terrestrial).
- Continue to retain allocation of 2400 – 2483.5 MHz for ISM.
- Existing Fixed links could be migrated above 3 GHz.
- Migrate outside-broadcasting links in line with the DTT migration (potentially to 1518 – 1559 MHz band).

4.11.29 2500 - 2690 MHz

This band is being used by Sentech (65 MHz) and WBS (15 MHz); 125 MHz is currently available for assignment. As per SADC FAP proposed common sub-allocation/ utilization this band has been allocated for Mobile IMT.

It is proposed to:

- Align re-planning efforts within the 2.6 MHz band as defined in Government Gazette 34872[20].
- Allocate the band to Mobile IMT.

4.11.30 3400 - 3600 MHz

This band is currently being utilized by:

- Sentech (national).
- Neotel (national).
- Telkom (national).
- USAL (regional).

In terms of WRC 07 decisions and as per SADC FAP proposed common sub-allocation/ utilization it is proposed to:

- Allocate for mobile service on a primary basis and use for Mobile IMT. This would also result in a harmonized Mobile IMT band across the entire SADC region.
- Migrate existing users out of the band.

4.11.31 3600 - 4200 MHz

This band (C-band) is currently being utilized for PTP links (terrestrial backhaul) and Satellite links including VSAT, Satellite downlink and tracking. The proposed allocation as per SADC proposed common sub-allocation/ utilization is:

- (3600-4200 MHz) Fixed services (PTP).
- (3600-4200 MHz) Fixed-satellite (space-to-Earth) (PTP/VSAT/SNG).
- (3600-3800 MHz) Broadband Fixed Wireless Access (BFWA).

The sub-band 3600-3800 MHz could be used for BFWA where frequency sharing with FS PTP and/or FSS is feasible. The channelling arrangement for PTP links in this band is based on ITU-R Recommendation F.635. The sub-band 3600-4200 is used for medium and high capacity PTP links and FSS. In the band 3600-3800 MHz, BFWA, FS PTP and FSS applications will have to operate on coordinated basis. However, considering the

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[20] Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz

difficulty in coordinating ubiquitous user terminals used for BFWA and VSAT, it is proposed that:

- VSAT systems should be migrated to the Ku-band (ref: 4.11.36).

4.11.32 5470 - 5725 MHz

As per as per SADC proposed common sub-allocation/ utilization, the band can be allocated for:

- Wireless Access Systems (WAS) / RLAN.

4.11.33 5725 - 5850 MHz

This band is currently being used for ISM, amateur and SRD services. As per ITU footnote 5.453 the band can also be allocated for fixed and mobile services on a primary basis. SADC FAP footnote SADC18 allocates this band for similar services in Swaziland and Tanzania. The NRFP can be updated to reflect the assignment if there is an interest within South Africa for this service in the band.

4.11.34 5850 - 5925 MHz

The upper C-band is currently being used for terrestrial backhaul and satellite (uplink, VSAT). As per the SADC FAP proposed common sub-allocation/ utilization outside broadcasting links could also be potentially migrated into this band with the proposed allocation as follows:

- Fixed-satellite uplinks (PTP/VSAT/SNG) (5850-6425 MHz) – this could also be used for temporary outside-broadcast links.
- FIXED links (5850-5925 MHz).
- ISM (5725-5875 MHz).

4.11.35 5925 - 6700 MHz

As per the SADC proposed common sub-allocation/ utilization the current band would be allocated as follows:

- 5925 – 6425 MHz Fixed links (lower 6 GHz in accordance with ITU-R Rec. F.383).
- 6425 – 7110 MHz Fixed links (upper 6 GHz in accordance with ITU-R Rec. F.384).
- 5850 – 6425 Fixed-satellite uplinks (PTP, VSAT, SNG).

4.11.36 10700 - 11700 MHz

This is the defined Ku band. VSAT links should be migrated into this band as per SADC proposed common sub-allocation/ utilization.

4.11.37 40000 MHz and above

Although out-migration is not an issue above 40GHz, the following comment should be made:

- Frequency bands above 40 GHz are relatively under-utilized. Equipment is available off the shelf for high bandwidth PTP links over distances of up to 5km. It is proposed that in the spectrum above 40GHz, allocations are made for Fixed Services such as PTP links – which would be useful especially in metropolitan areas for line-of-sight (LoS) high capacity data links.

4.12 Summary of New ICASA Proposals

The following table summarises the proposals ICASA is making regarding frequency migration (New ICASA proposals) as extracted from the previous section. These proposals are additional to those proposals made by SABRE and migrations stemming from the WRC and the SADC FAP.

Table 4 Consolidated list of New ICASA proposals for migration

Frequency Band (MHz)	Notes on migration/ usage
141 – 141.5	Migrate SF Mobile out of this band and allocate for SF alarms.
141 – 142	Migrate remote controlled industrial apparatus to ISM Band.
380 – 400	Allocated for public safety/ government services. Migrate all such users into this band.
410 – 430	Allocated for Digital Public Trunking.
440 – 440.1 paired with 445 – 445.1	Allocated for Short-range Business Radio; all other users migrate out of band.
921 – 925	Allocated for GSM-R; migrate other users out of this band.
1350 – 1375 paired with 1492-1517 1375 – 1400 paired with 1427 – 1452	Allocate for Rural BFWA; migrate existing fixed duplex links out of this band.

Frequency Band (MHz)	Notes on migration/ usage
1452 - 1492	Change allocation to include FIXED, MOBILE except aeronautical mobile. Use for BFWA/ PTP/ PMP depending upon availability of equipment.
1518 – 1559	Allocate for links for LMR repeaters; Migrate in outside-broadcasting links currently operating in 2300 – 2450 MHz.
1668 – 1675	Change allocation in line with ITU Region 1 allocations to include FIXED and Mobile except aeronautical mobile within the allocations.
1980 – 2010 paired with 2170-2200	Migrate in Fixed links (DF) from other bands; allocate for BFWA.
2025 – 2110 paired with 2200 - 2285	Migrate in Fixed links (DF) from other bands; allocate for BFWA.
2300 – 2450	Migrate outside broadcasting links to the 1518 – 1559 MHz band.

4.13 Commentary on Spectrum Re-farming

4.13.1 Definition of spectrum re-farming

Spectrum re-farming can be defined as a process of changing the conditions of frequency usage in any part of the radio spectrum[21]. This may include:

- Change of the technical conditions of the frequency assignment.
- Change of the application.
- Change of allocation to a different telecommunications service.

4.13.2 Need for Re-farming in GSM / Mobile bands

Frequency bands in the sub- GHz range are attractive to operators since it offers better propagation characteristics leading to better coverage at lower cost as well as indoor coverage in comparison to higher frequency bands.

At the same time mobile broadband subscriptions and traffic continue to grow at a rapid rate and is expected to reach over 5 billion devices by 2016, worldwide. This is mainly due to a shift towards mobile-broadband enabled smart phones over voice centric phones

[21] ICT Regulation Toolkit

in the mass market coupled with a rapid declining price for the same. However, in order to provide a good quality of mobile broadband service requires better network quality. This can be achieved either through:

- Enhancements in technology (MIMO, Adaptive techniques etc) or.
- Additional spectrum dedicated to mobile broadband either via new carriers or new bands.

This trend also leads to the phenomenon that as a larger number of users migrate to smart-phones the incumbent 'voice only' bands i.e. GSM 900 and 1800 MHz in this case will have spectrum which is being inefficiently utilized (due to fewer users). However, as these bands have been allocated for a particular application the incumbent licensees are not able to use the same band for other purposes (e.g. mobile broadband)

At the same time, it is important that the spectrum being allocated/ dedicated have as wide a regional footprint as possible – this will drive down device costs due to economies of scale. The legacy GSM bands at 900 MHz and 1800 MHz fall into this category. For e.g. the GSM 1800 MHz band is used by over 350 operators in 148 countries around the world[22].

The result is that in order to be able to better utilize the currently assigned frequencies and maximize the social impact by leveraging economies of scale it may be necessary to consider spectrum re-farming, especially in the heavily used GSM bands.

4.13.3 Points of consideration for GSM / Mobile Bands

- South Africa still retains a large number of its subscriber base for Voice with the current 2G GSM spectrum (900 MHz and 1800 MHz) being fully utilized by the current license holders. This subscriber base would to a large extent be represented by lower income groups and it would be important to maintain the voice service for their benefit.
- Until such a stage is reached that the subscriber base using the existing 2G spectrum is reduced in size to a level where the existing 2G bands have spare capacity, the issue of spectrum re-farming should not be allocated high priority. Instead efforts should be focused towards locating additional bands for IMT as per WRC and SADC proposed spectrum allocation/ utilization.
- However, it should be noted that in some cases, such spectrum re-farming may also be in the interest of the current licensee (e.g. the operator) since it allows him to change the allocation/ technical conditions in order to better serve his customer base.

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[22] Delivering the best mobile broadband experience: the 1800MHz spectrum 're-farming' opportunity (Ericsson)

- The GSM 900 MHz and 1800 MHz frequencies are currently occupied by the incumbent mobile operators who have nationwide assignments. If there is a case to inject competition in this market, a re-farming exercise would also need to consider ways and means to re-allocate spectrum between the incumbents and new entrant(s) so as to facilitate free and fair competition. Such an exercise could be carried out for both 900 and 1800 bands at the same time in conjunction with assignments in other bands allocated to IMT to allow existing operators to maintain their existing level of service.