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GENERAL NOTICE

NOTICE 18 OF 1996

- i) **NEW SOUTH AFRICAN FREQUENCY ALLOCATION PLAN (BAND PLAN), and**
- ii) **MIGRATION STRATEGY TO IMPLEMENT THE BAND PLAN.**

Following a review of the radio frequency spectrum usage between the frequencies 20 MHz and 3 GHz, known as Project SABRE (South African Band Re-planning Exercise), in wide consultation with the radiocommunications sector and with due consideration of international frequency management and technology trends, a revised Band Plan for this portion of the spectrum was presented to Cabinet for approval. Such approval for the Band Plan was duly granted on 6 November 1996 and included approval for the finalisation and publication of the Migration Strategy, which will facilitate the implementation of the Band Plan.

The following is included in and forms part of this Notice:

- i) the Band Plan approved by Cabinet on 6 November 1996, now published as Version 1.61 and dated October 1996; and
- ii) the Migration strategy, now published as Version 1.2 and dated 11 December 1996.

In terms of section 2 of the Radio Act (Act No 3 of 1952) I hereby announce:

- a) the Band Plan to be in force;
- b) the Migration Strategy to be in force;
- c) some existing users already operate in terms of the new Band Plan and consequently will not be affected by the Migration Strategy;
- d) the balance of the existing users will be migrated in accordance with the Migration Strategy.

ANDILE NGCABA
DIRECTOR-GENERAL
DEPARTMENT OF COMMUNICATIONS

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The following is included in and forms part of this notice:

- (i) the Band Plan approved by Cabinet on 6 November 1996, now published as Version 1.81 and dated October 1996; and
 (ii) the Migration Strategy, now published as Version 1.7 and dated 11 December 1996.

In terms of section 2 of the Radio Act (Act No 3 of 1993) I hereby announce:

- a) the Band Plan to be in force;
 b) the Migration Strategy to be in force;
 c) some existing users already operating in terms of the new Band Plan and consequently will not be affected by the Migration Strategy;
 d) the balance of the existing users will be migrated in accordance with the Migration Strategy.

ANDILE NGCABA
 DIRECTOR-GENERAL
 DEPARTMENT OF COMMUNICATIONS

Department of Communications

Project SABRE
(South African Band Re-planning Exercise)

Band plan for the frequencies
20 MHz to 3 GHz

Version 1.61
October 1996

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1 Introduction

1.1 General

This document presents the band plan for the future use of the radio spectrum in South Africa between the frequencies 20 MHz and 3 GHz. The document has been produced by the Department of Communications (hereinafter referred to as the Department) in South Africa, with the assistance of Smith System Engineering and the CSIR, as part of Project SABRE (South African Band Re-planning Exercise).

1.2 Project SABRE

The need for Project SABRE emerged over a period of time, in response to factors such as the increased demand for radio spectrum and developments elsewhere in the world that could potentially benefit South Africa. The project was established by the former Department of Posts and Telecommunications in 1995 in order to re-plan the radio frequency spectrum between 20 MHz and 3 GHz. The project has been conducted by the Department, together with an international team of consultants, led by Smith System Engineering from the UK and including the CSIR in South Africa, the UK Radiocommunications Agency and the economic consultants NERA.

The principal aims of the project are as follows:

- to review the usage of the radio spectrum between the frequencies 20 MHz and 3 GHz;
- to produce a band plan for the future use of the spectrum, which is both agreed nationally in South Africa and consistent with international trends.

In order to achieve these aims, the project is divided into four phases:

- Phase 1 - 'Current spectrum usage', has reviewed the current spectrum usage in South Africa.
- Phase 2 - 'Requirements capture', has identified the requirements for the future use of the spectrum in South Africa.
- Phase 3 - 'International trends', has examined relevant international trends, both in technology and services and in the usage of the spectrum in other countries.
- Phase 4 - 'Band plan', has taken as input the results of the previous three phases, and has balanced these in order to produce the band plan which is presented in this document. The production of this final version follows the distribution of a draft version and the subsequent consultation process.

1.3 Methodology

The development of this future band plan has taken account of inputs from a wide variety of sources. In particular, the process has involved achieving an appropriate balance between the following three (sometimes contradictory) forces:

- the current usage of the radio spectrum in South Africa, and other related aspects of the current situation (any move from the current situation will inevitably create problems for those required to change);
- the future requirements and aspirations of spectrum users, industry and other interested parties in South Africa (it would be impossible for any future band plan to satisfy everyone's wishes);
- developments and trends elsewhere in the world (these are important in order to be able to source equipment economically and to be able to take advantage of emerging systems, technologies and services).

The capture of the current situation and future requirements has involved an extensive consultation and information gathering process conducted in South Africa. This has included the following activities:

- A series of interviews with major users of the radio spectrum, and manufacturers and suppliers of systems which utilise the spectrum. Over 50 interviews have taken place with representatives from, among others, the military, the police, the parastatals, local and regional authorities, other big radio users, telecommunications operators, broadcasters and signal distributors, dealers and manufacturers of radio equipment, groups representing disadvantaged communities, and other representative groups such as SARL, LMRA, BEAPS, etc. Each interview took place in South Africa, with typical attendees including senior executives and personnel responsible for communications and spectrum management. The interviews took place in the period January to March 1996.
- The distribution of a questionnaire to a larger set of stakeholders and other interested parties. The questionnaire was initially sent out in January 1996 to a list of around 200 organisations, the majority of which were big users of the radio spectrum. At the same time, advertisements were placed in the national press, the Government Gazette and trade publications inviting input from the general public. The questionnaire was sent out to respondents to these advertisements. The questionnaire was also distributed by the LMRA to its members, and a separate mailing was made to paging operators. In excess of 300 questionnaires were sent in total, and over 100 completed questionnaires were received by the Project SABRE team.
- The Project SABRE team has also drawn on previous exercises which have invited input concerning the radio spectrum in South Africa. In particular, extensive use has been made of submissions to previous Department spectrum review exercises, in particular the review of the spectrum between 30 and 470

MHz in 1994, and the request in February 1995 for proposals for technologies to be implemented in the 440-470 MHz band. Submissions in response to the recent telecommunications Green Paper have also been consulted, especially the answers to the questions regarding radio frequency spectrum management.

The above consultation and information gathering process formed the basis of Phases 1 and 2 of Project SABRE. Phase 3 of the project, which was performed in parallel with Phases 1 and 2, was aimed at ensuring that South Africa is able to make full use of emerging opportunities from elsewhere in the world, and that the band plan is as far as possible future-proof to anticipated advances internationally. This phase included a wide ranging information gathering process concerning international trends relating to technologies, services, growth rates, spectrum plans, spectrum pricing, neighbouring countries, etc. This included discussions with a range of organisations around the globe, including regulatory and standardisation bodies, major international manufacturers, and experienced industry analysts.

Following the completion of Phases 1 to 3, a draft version of the future band plan was produced. This draft was distributed to industry at a launch conference on 12 June 1996, at which time written comments on the draft band plan were requested. This final version of the future band plan follows careful evaluation of the many comments that were received.

1.4 Importance of the exercise

Project SABRE has resulted in a frequency band plan which indicates how the radio spectrum between 20 MHz and 3 GHz is to be used in South Africa in the future. This radio spectrum is utilised by a wide range of systems and services, which are either already being used or will in future be used by almost every person in South Africa.

Many different types of systems and services utilise this section of the radio spectrum. The following is only a small selection of these:

- telephone services to rural areas and disadvantaged communities;
- television and radio broadcasts;
- mobile radio systems used by commercial organisations;
- emergency communications by the police, fire and ambulance services, etc;
- cellular, cordless telephones and pagers;
- satellites (for telecommunication and broadcasting);
- alarm systems, remote control devices, etc.

The radio spectrum is not currently being utilised as efficiently and effectively as it could be. This has a number of implications:

- there is congestion and interference in some frequency bands;
- opportunities for the introduction of new technologies and services are restricted;
- users are not able to obtain as many frequencies as they would like;
- there are costs to business in terms of operational efficiency and equipment costs.

The aim of Project SABRE has been to produce a frequency band plan for the future that will make effective use of the scarce resource that is the radio frequency spectrum. This has been done in a way that will benefit all South Africans and will aid the social and economic development of the country.

There are thus a wide range of benefits that should result from Project SABRE and the frequency band plan that is produced. The following are some examples:

- helping to enable the provision of telephone services to communities that do not at present have any telecommunications;
- making more efficient use of the spectrum so that more users are able to benefit from it;
- providing opportunities for the use of advanced broadcasting technologies which will enable higher quality and wider ranging broadcasts;
- improving the quality of service for existing users;
- helping to enable businesses to operate more effectively, and to generate additional revenue for the country.

1.5 Structure of this document

This document is divided into the following sections:

- Section 2 presents, in tabular format, the proposed future band plan for the use of the radio spectrum in South Africa between 20 MHz and 3 GHz.
- Section 3 provides supporting notes to explain and give more information about the future band plan.
- Section 4 presents the future band plan in diagrammatic form, in order to aid comprehension.
- Appendix A provides a list of abbreviations used in the document.

2 Future band plan

The following table presents the band plan for the future use of the radio spectrum in South Africa between 20 MHz and 3 GHz. The plan represents a target that the country should strive to achieve.

The table is divided into the following columns:

- **Frequency Band.** The range of frequencies associated with the main allocations (in MHz). The frequency indicated as the start of the band is the centre frequency of the first channel included within the band. The frequency used to denote the end of the band is not included in the band.
- **Main Allocations.** This column indicates the main services to which each band is to be allocated. The service types are as defined by the ITU, and the allocations are in most cases consistent with the ITU Radio Regulations for Region 1 (as modified as a result of the World Radio Conference WRC-95). The allocations are all primary unless otherwise indicated, with different services delimited by oblique strokes. The service that will have most widespread use in the future is generally listed first.
- **Sub-Allocations.** This column gives details of any sub-allocations within a band, including proposed usage of the sub-band and range of frequencies in MHz. Where no sub-bands are indicated, the column may in some cases provide further details of the proposed usage of the band.
- **Notes and comments.** The comments in the right hand column give further information concerning the band, in particular when changes to its usage are proposed. This may include details such as major utilisations, the nature of the usage, and implications for migration. Where additional explanation is required a reference is made to the supporting notes in section 3, which might, for example, explain the rationale behind the proposed changes or give an outline of the proposed migration strategy.
- For some bands, the last column is divided into two, with the right-most column indicating significant geographic variations. Within certain bands different uses may be authorised based on geographical separation (coastal and inland, or urban and rural, for example). Such instances are noted in this manner.

The table and supporting notes make reference to a number of sources of information, including the following:

- The frequency allocation tables within the ITU Radio Regulations, as modified following WRC-95. Notes within these Radio Regulations are referred to by references of the form "RR S5.XYZ".
- The results of the ERC's Detailed Spectrum Investigation into the band 29.7 - 960 MHz (referred to as the "European DSI").

- ITU Recommendations (eg ITU-R F1098)
- CEPT Recommendations (eg T/R 13-01) and ERC Decisions.
- Declaration regarding radio apparatus published in the Government Gazette on 17 November 1995.

Throughout the band plan and the supporting notes in section 3, reference is made to broad timescales for the realisation of objectives. These timescales are being addressed in more detail in separate migration planning documentation, but in this document the terms immediate short, short, medium and long term are broadly used to indicate the following:

- immediate short term: 1 - 2 years (ie before 1999);
- short term: 2 - 5 years (ie 1999 - 2002);
- medium term: 5 - 10 years (ie 2002 - 2006);
- long term: 10 - 15 years (ie beyond 2006).

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
19.995 - 20.01	Standard Frequency and Time Signal		No change
20.01 - 21	Fixed		No change
21 - 21.45	Amateur / Amateur-Satellite		No change
21.45 - 21.85	Broadcasting		No change
21.85 - 21.924	Fixed		No change
21.924 - 22	Aeronautical Mobile		No change
22 - 22.855	Maritime Mobile		No change
22.855 - 23.2	Fixed		No change
23.2 - 23.35	Aeronautical Mobile / Fixed		No change
23.35 - 24.89	Mobile / Fixed		No change
24.89 - 24.99	Amateur / Amateur-Satellite		No change
24.99 - 25.01	Standard Frequency and Time Signal		No change
25.01 - 25.07	Mobile / Fixed		No change
25.07 - 25.21	Maritime Mobile		No change
25.21 - 25.55	Mobile / Fixed		No change
25.55 - 25.67	Radio Astronomy		No change
25.67 - 26.1	Broadcasting		No change
26.1 - 26.175	Maritime Mobile		No change
26.175 - 27.5	Mobile / Fixed	Single Frequency Mobile 26.175 - 27.5	No change Includes existing assignments for low power paging in 26.995 - 27.195 MHz and CB radio in 27.185 - 27.275 MHz
		ISM 26.957 - 27.283	International ISM band (RR S5.150 refers) See also Govt Gazette of 17 Nov 1995
27.5 - 28	Mobile / Fixed / Meteorological Aids		No change

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
28 - 29.7	Amateur / Amateur-Satellite		No change
29.7 - 30.005	Mobile / Fixed	Single Frequency Mobile 29.7 - 29.99	
		Amateur 29.7 - 30	29.7 - 30 MHz to be allocated to Amateur on a secondary basis (see note 3.3.1)
30.005 - 30.01	Mobile / Fixed / Space Operation	Government 29.99 - 32	
30.01 - 50	Mobile / Fixed		
		Single Frequency Mobile 32 - 32.325	No change
		Mobile 1 MTX 32.325 - 33.675	No change Paired with 41.65 - 43 MHz
		Single Frequency Mobile 33.675 - 34.175	No change
		Mobile 2 MTX 34.175 - 35	No change Paired with 40.625 - 41.45 MHz
			Demonstration frequency at 34.7 MHz unchanged (paired with 41.15 MHz)
		Model Aircraft Control 35 - 35.25	New allocation for control of model aircraft (see note 3.3.2) Current DF assignments in 35 - 35.15 MHz and SF assignments in 35.2 - 35.25 MHz to be migrated
		Single Frequency Mobile 35.25 - 35.5	No change
		Mobile 3 BTX 35.5 - 36.825	No change Paired with 38.5 - 39.825 MHz
		Single Frequency Mobile 36.825 - 38.5	No change 36.85 - 38.45 MHz currently assigned to Government Radio Astronomy at 38.45 MHz
		Mobile 3 MTX 38.5 - 39.825	No change Paired with 35.5 - 36.825 MHz
		Single Frequency Mobile 39.825 - 40.625	No change

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
	Mobile / Fixed (continued)	Mobile 2 BTX 40.625 - 41.45	No change Paired with 34.175 - 35 MHz
			40.675 - 40.685 MHz to be allocated to Amateur for propagation study (max ERP 10W)
			Current low power paging at 40.68 MHz to be migrated
			Wireless microphones in 40.65 - 40.7 MHz (Govt Gazette of 17 Nov 1995 refers)
			40.66 - 40.7 MHz is international ISM band (RR S5.150 refers)
			Demonstration frequency at 41.15 MHz unchanged (paired with 34.7 MHz)
		Single Frequency Mobile 41.45 - 41.65	SF assignments due to model control at 35 - 35.25 MHz Current DF assignments in 41.45 - 41.6 MHz to be migrated
		Mobile 1 BTX 41.65 - 43	No change Paired with 32.325 - 33.675 MHz
			ITU footnote regarding use of 41 - 44 MHz for Aeronautical no longer required (see note 3.3.3)
		Government 43 - 50	
		Meteor Burst 45.3 - 46.9 and 47.5 - 49.1	New allocation for meteor burst communications
		CT0 Cordless Telephones BTX 46.61 - 46.97 MTX 49.67 - 49.97	7 frequency pairs assigned to CT0 (see note 3.3.4)
50 - 54	Amateur		No change Wireless microphone and model control assignments in 53 - 54 MHz (Govt Gazette of 17 Nov 1995 refers) and low power paging in 53.025 - 53.225 MHz remain unchanged

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
54 - 66	Mobile / Fixed	Single Frequency Mobile 54 - 54.325	No change
		Mobile 1 BTX 54.325 - 54.45	No change Paired with 59.9 - 60.025 MHz Demonstration frequency at 54.35 MHz to be removed
		Government 54.45 - 55.45	Model control still required at 54.45 - 54.55 MHz
		Mobile 2 BTX 55.45 - 56.85	No change Paired with 58.5 - 59.9 MHz
		Single Frequency Mobile 56.85 - 58.5	No change
		Mobile 2 MTX 58.5 - 59.9	No change Paired with 55.45 - 56.85 MHz
		Mobile 1 MTX 59.9 - 60.025	No change Paired with 54.325 - 54.45 MHz Demonstration frequency at 59.925 MHz to be removed
		Government 60.025 - 66	Current assignments for model aircraft control in 60.1375 - 60.375 MHz to be phased out in medium term (see note 3.3.2)
66 - 68	Mobile / Fixed	National Emergency Alarm Radio (NEAR)	Block allocation for NEAR (see note 3.4.1)
68 - 74.8	Mobile / Fixed	Single Frequency Mobile 68 - 69.25	No change
		Mobile 1 BTX 69.25 - 70	No change Paired with 76.175 - 76.925 MHz
		Mobile 2 BTX 70 - 70.975	No change to Mobile usage Paired with 75.2 - 76.175 MHz
		Amateur 70 - 70.3	Allocation to Amateur is on a secondary basis (see note 3.4.3)
		Single Frequency Mobile 70.975 - 71.475	No change Current assignments to fire fighting
		Mobile 3 BTX 71.475 - 72.525	No change Paired with 76.925 - 77.975 MHz
		Single Frequency Mobile 72.525 - 73.425	No change
		Mobile 4 BTX 73.425 - 74.8	No change Paired with 78.625 - 80 MHz

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
74.8 - 75.2	Aeronautical Radionavigation	Instrument Landing System markers	No change
75.2 - 87.5	Mobile / Fixed	Mobile 2 MTX 75.2 - 76.175	No change Paired with 70 - 70.975 MHz
		Mobile 1 MTX 76.175 - 76.925	No change Paired with 69.25 - 70 MHz
		Mobile 3 MTX 76.925 - 77.975	No change Paired with 71.475 - 72.525 MHz
		Mobile 5 BTX 77.975 - 78.625	No change Paired with 82.975 - 83.625 MHz
		Mobile 4 MTX 78.625 - 80	No change Paired with 73.425 - 74.8 MHz
		Mobile 6 BTX 80 - 80.5	No change Paired with 87 - 87.5 MHz Demonstration frequency at 80.15 MHz unchanged (paired with 87.15 MHz)
		Single Frequency Mobile 80.5 - 81	No change
		Mobile 7 BTX 81 - 81.625	No change Paired with 86.375 - 87 MHz To include assignments for dual frequency alarms (see note 3.6.2)
		Mobile 8 BTX 81.625 - 82.975 MHz	No change Paired with 85.025 - 86.375 MHz
		Mobile 5 MTX 82.975 - 83.625	No change Paired with 77.975 - 78.625 MHz
		Single Frequency Mobile 83.625 - 85.025	No change
		Mobile 8 MTX 85.025 - 86.375	No change Paired with 81.625 - 82.975 MHz
		Mobile 7 MTX 86.375 - 87	No change Paired with 81 - 81.625 MHz To include assignments for 2-way alarms (see note 3.6.2)
		Mobile 6 MTX 87 - 87.5	No change Paired with 80 - 80.5 MHz Demonstration frequency at 80.15 MHz unchanged (paired with 80.15 MHz)

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
87.5 - 108	Broadcasting	FM Sound Broadcasting	No change
108 - 117.975	Aeronautical Radionavigation	ILS localiser 108-112 VOR (VHF Omni-directional Range) 112-117.975	No change
117.975 - 137	Aeronautical Mobile		No change
137 - 138	Mobile-Satellite / Meteorological-Satellite / Mobile / Space Operation / Space Research	MSS 137 - 138 NOAA meteorological satellite 137.5 - 137.62	All except mobile are space-to-Earth MTX assignments at 137.775 - 138 MHz to be migrated
138 - 144	Mobile / Fixed	Mobile 1 MTX 138 - 140.5	Paired with 141.5 - 144 MHz New allocation includes current MTX assignments at 138 - 138.425 and 138.475 - 138.95 MHz (pairings to change) Current SF assignments at 138.975 - 140.5 MHz to be migrated or changed to DF
		Alarms 140.5 - 141	See note 3.6.2 Current SF assignments to be migrated
		Single Frequency Mobile 141 - 141.5	Primary status of current users will be rescinded. Plan to migrate towards MTX leg of duplex pair with 152.55 - 153.05 MHz as use of SF reduces
		Mobile 1 BTX, 141.5 - 144	Paired with 138 - 140.5 MHz New allocation includes current BTX assignments at 142.8 - 143.275 and 143.325 - 143.975 MHz (pairings to change) Current SF assignments at 141.5 - 142.775 MHz to be migrated or changed to DF Demonstration frequency at 143.9 MHz to be removed
144 - 146	Amateur / Amateur-Satellite		No change
146 - 148	Mobile / Fixed	Mobile 2 MTX 146 - 148	Paired with 153.05 - 155.05 MHz New allocation includes existing MTX assignments at 146.05 - 148.9 MHz

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
148 - 149.9	Mobile-Satellite (E-to-s) / Mobile / Fixed	MSS 148 - 149.9 Mobile 2 MTX 148 - 148.95 Single Frequency Mobile 148.95 - 149.8	See note 3.6.3 Band allocated at WARC-92 to MSS (Little LEOs) Current MTX and SF assignments can remain in short-medium term	
149.9 - 150.05	Radionavigation-Satellite / Land Mobile-Satellite (E-to-s)	MSS 149.9 - 150.05 Single Frequency Mobile 149.9 - 150.05	See note 3.6.3 Current SF assignments can remain in short-medium term	
150.05 - 156.7625	Mobile / Fixed	Paging 150.05 - 151	Block allocation for paging (see note 3.6.4) Current SF assignments at 150.05 - 150.5 MHz to be migrated	
		Government 151 - 152.05	No change	
		Alarms 152.05 - 152.55	See note 3.6.2 Current SF assignments to be migrated	
		Single Frequency Mobile 152.55 - 153.05	Plan to migrate towards BTX leg of duplex pair with 141 - 141.5 MHz as use of SF reduces	
		Mobile 2 BTX 153.05 - 156	Unchanged Paired with 146 - 148.95 MHz	
		Mobile 3 MTX 156 - 156.7625	International maritime MTX (ship station) at 156 - 156.375 MHz paired with 160.6 - 160.975 MHz unchanged Single frequency maritime at 156.375 - 156.7625 MHz unchanged International distress call (digital) at 156.525 MHz unchanged	156 - 156.375 MHz allocated to land mobile MTX in inland areas (paired with 160.6 - 160.975 MHz) 156.375 - 156.7625 MHz allocated to SF mobile in inland areas
156.7625 - 156.8375	Maritime Mobile		International distress, safety and call frequency at 156.8 MHz unchanged	

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
156.8375 - 174	Mobile / Fixed	Mobile 3 MTX 156.8375 - 157.95	Single frequency maritime at 156.8375 - 156.875 MHz unchanged	156.8375 - 156.875 MHz allocated to SF mobile in inland areas
			International maritime MTX (ship station) at 156.875 - 157.45 MHz paired with 161.475 - 162.05 MHz unchanged	156.875 - 157.95 MHz allocated to land mobile MTX in inland areas (paired with 161.475 - 162.55 MHz)
			Private maritime MTX at 157.45 - 157.95 MHz paired with 162.05 - 162.55 MHz	
		Mobile 4 BTX 157.95 - 160.6	Paired with 162.55 - 165.2 MHz Tx/Rx separation to be altered	
		Mobile 3 BTX 160.6 - 162.55	International maritime BTX (coast station) at 160.6 - 160.975 MHz paired with 156 - 156.375 MHz unchanged	160.6 - 160.975 MHz allocated to land mobile BTX in inland areas (paired with 156 - 156.375 MHz)
			Single frequency mobile at 160.975 - 161.475 MHz unchanged International maritime BTX (coast station) at 161.475 - 162.05 MHz paired with 156.875 - 157.45 MHz unchanged Private maritime BTX at 162.05 - 162.55 MHz paired with 157.45 - 157.95 MHz	160.975 - 161.475 MHz allocated to SF mobile 161.475 - 162.55 MHz allocated to land mobile BTX in inland areas (paired with 156.875 - 157.95 MHz)

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
	Mobile / Fixed (continued)	Mobile 4 MTX 162.55 - 165.2	Paired with 157.95 - 160.6 MHz Tx/Rx separation to be altered	Restrictions on civilian use of 161.875 - 173.875 MHz (Sonobuoy frequencies) in coastal areas to be relaxed (see note 3.6.5)
		Mobile 5 MTX 165.2 - 169.4	Paired with 169.8 - 174 MHz	
		Paging 169.4 - 169.8	New allocation of national paging band for ERMES (see note 3.6.6)	
		Mobile 5 BTX 169.8 - 174	Paired with 165.2 - 169.4 MHz	
174 - 238	Broadcasting	Band III TV Broadcast Channels 4 to 11	No change Current wireless microphone assignments throughout this band unchanged	
238 - 246	Mobile / Fixed	International Distress Frequency 242.95 - 243.05 Digital Audio Broadcasting (T-DAB) 238.4 - 239.9	This band is currently kept clear for the International Distress frequency Spillover from NICAM transmissions on Channel 11 affects low end of this band Current wireless microphone and other low power device assignments unchanged Allocation of initial T-DAB channel at 238.432 - 239.968 MHz. Possibility of further T-DAB channels either above or below this (see note 3.7.1)	
246 - 254	Broadcasting	Band III TV Broadcast Channel 13	Problems with use of NICAM on Channel 13 (see note 3.7.2)	
254 - 272	Mobile / Fixed	Public Trunking (MPT 1327) BTX 254 - 259.4	No change See note 3.7.3	
		Government 259.4 - 262	No change	
		Public Trunking (MPT 1327) MTX 262 - 267.4	No change See note 3.7.3	

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
	Mobile / Fixed (continued)	Government 267.45 - 400	
272 - 273	Mobile / Fixed / Space Operation		
273 - 328.6	Mobile / Fixed	Paging 700 kHz from 278 - 286	Proposed new band for 2-way paging (700 kHz from within 278 - 286 MHz, paired with 925 - 925.4 MHz) See note 3.7.4
328.6 - 335.4	Aeronautical Radionavigation	ILS Glide Path 328.6 - 335.4	
335.4 - 399.9	Mobile / Fixed	WLL 20 MHz from 300 - 380 Trunked Mobile MTX 380 - 390 BTX 390 - 400	See note 3.7.5 To be used for digital trunking in the long term (see note 3.7.6)
399.9 - 400.05	Radionavigation-Satellite / Land Mobile-Satellite		No change
400.05 - 400.15	Standard Frequency and Time Signal		No change
400.15 - 401	Mobile-Satellite / Meteorological-Satellite / Meteorological Aids / Space Research		No change All except Meteorological Aids are space-to-Earth
401 - 402	Meteorological Aids / Space Operation (s-to-E)		No change
402 - 406	Meteorological Aids	Low Power Devices 402 - 406	No change Govt Gazette of 17 Nov 1995 refers
406 - 406.1	Mobile-Satellite (E-to-s)	Emergency Position Indicating Radio Beacon (EPIRB)	No change

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments		
406.1 - 420	Mobile / Fixed	Single Frequency Mobile 406.1 - 407.625	See note 3.8.2 Migration of fixed links to higher frequencies as far as possible		
		Mobile MTX 407.625 - 413	See note 3.8.3 Allocation for Government / public safety usage (mainly trunked) Migration of fixed links to higher frequencies as far as possible Paired with 417.625 - 423 MHz MHz		
		Mobile Data MTX 413 - 413.7625	New band for public mobile data, paired with 423 - 423.7625 MHz (see note 3.8.4)		
		Public Trunking MTX 413.7625 - 417.625	See notes 3.8.2 & 3.8.4 New band for public trunking using digital mobile radio Migration of fixed links to higher frequencies as far as possible Paired with 423.7625 - 427.625 MHz	415 - 417.2 MHz (paired with 425 - 427.2 MHz) to be allocated to WLL in rural areas (see note 3.8.4)	
		Mobile BTX 417.625 - 420	See notes 3.8.3 & 3.8.5 Paired with 407.625 - 410 MHz		
		Trunked Mobile MTX (Urban) 417.625 - 420	Trunked Mobile MTX paired with 427.625 - 430 MHz Allocation for Government / public safety usage Possibility to introduce other trunked mobile radio in urban areas in medium term		

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
420 - 430	Mobile / Fixed	Trunked Mobile BTX 420 - 423	Trunked mobile radio for Government / public safety, paired with 410 - 413 MHz (see note 3.8.3) Current single frequency links to be migrated
		Mobile Data BTX 423 - 423.7625	New band for public mobile data, paired with 413 - 413.7625 MHz (see note 3.8.4) Current single frequency links to be migrated
		Public Trunking BTX 423.7625 - 427.625	New band for public trunking using digital mobile radio (see note 3.8.4) Paired with 413.7626 - 417.625 MHz Current single frequency links to be migrated (see note 3.8.1)
		Trunked Mobile BTX (Urban) 427.625 - 430	See note 3.8.5 Use for trunked mobile radio in urban areas in medium term (paired with 417.625 - 420 MHz)
		Single Frequency Fixed (Rural) 427.625 - 430	Frequencies will only be assigned for SF links where migration above 1 GHz would be impractical
430 - 440	Amateur / Radiolocation	Amateur 430 - 440	See note 3.8.6
		ISM / Low Power Devices 433.05 - 434.79	Used for low power applications such as remote control. Centre frequency 433.92 MHz. Govt Gazette of 17 Nov 1995 refers
		Amateur-Satellite 435 - 438	Subject to conditions in RR S5.282

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
440 - 450	Mobile / Fixed	Telemetry / Data BTX 440 - 441	Scanning telemetry, dual frequency alarms, and other fixed point-to-multipoint data services that require to use mobile technology (see note 3.8.7) Paired with 445 - 446 MHz Existing links to be migrated
		Mobile BTX 441 - 445	Paired with 446 - 450 MHz (see note 3.8.7) Existing links to be migrated
		Telemetry / Data MTX 445 - 446	Scanning telemetry, dual frequency alarms, and other fixed point-to-multipoint data services that require to use mobile technology (see note 3.8.7) Paired with 440 - 441 MHz Existing links to be migrated
		Mobile MTX 446 - 450	Paired with 441 - 441 MHz (see note 3.8.7) Existing links to be migrated
450 - 470	Mobile / Fixed	Fixed Links 450 - 453	Paired with 460 - 463 MHz (see note 3.8.8) Existing links will be migrated in accordance with fixed link strategy (see notes 3.2.1 & 3.8.1). Dual frequency links that have to remain in UHF will be migrated to this band
			Assignments to data in 451.5 - 452.675 MHz will migrate to 440 - 441 MHz
		Single Frequency Mobile 453.025 - 453.975	No change
		Paging 453.975 - 454.425	New national paging band, including 4 channels for on-site paging (see note 3.8.8) Current MTX assignments at 454.025 - 454.125 MHz and SF assignments at 454.275 - 454.725 MHz to be migrated

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
		Trunked Mobile MTX 454.425 - 460	Paired with 464.425 - 470 MHz (see note 3.8.8) Current BTX assignments at 454.875 - 454.975 and 459 - 459.975 MHz will be affected. C450 license (BTX at 455.5 - 459.48 MHz) expires in 1999	455 - 460 MHz (paired with 465 - 470 MHz) to be allocated to WLL in rural areas (see note 3.8.8)
	Mobile / Fixed (continued)	Fixed Links 460 - 463	Paired with 450 - 453 MHz (see note 3.8.8) Existing links will be migrated in accordance with fixed link strategy (see notes 3.2.1 & 3.8.1). Dual frequency links that have to remain in UHF will be migrated to this band Assignments to data in 461.5 - 462.675 MHz will migrate to 445 - 446 MHz	
		Single Frequency Mobile 463.025 - 463.975	No change	
		Low Power Mobile Radio 463.975 - 464.425	Includes short range business radios 464.375 - 464.425 MHz to be dedicated for control of hazardous equipment (see note 3.8.6)	
		Trunked Mobile BTX 464.425 - 470	Paired with 454.425 - 460 MHz (see note 3.8.8) Current single frequency assignments at 464.525 - 464.975 MHz will be affected Current C450 license (MTX at 465.5 - 469.48 MHz) expires in 1999	465 - 470 MHz (paired with 455 - 460) allocated to WLL in rural areas (see note 3.8.8)
470 - 854	Broadcasting	TV Broadcasting Channels 21 - 68	No change to basic allocation One 8 MHz channel should be reserved for digital TV experiments (see note 3.9.1)	Sharing of broadcasting spectrum with WLL and links in 790 - 854 MHz (see note 3.9.2)

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
854 - 862	Fixed	Fixed links 856 - 864.1	Current links in this band can remain unchanged in the short term (see note 3.9.3)	
862 - 890	Mobile / Fixed	CT2 Cordless Telephones 864.1 - 868.1	No change See note 3.9.4	
		Fixed links 868.1 - 876	Link frequencies will be assigned or retained in this band only where migration would be impractical (see note 3.9.3)	Part of 869 - 894 MHz (paired with 824 - 849 MHz) to be allocated to WLL in rural areas (see note 3.9.2)
		Trunked Mobile MTX 876 - 880	Reserved for use for digital trunked mobile radio services, eg using GSM-R or TETRA (see note 3.9.6) Paired with 921 - 925 MHz Links in this band to be migrated in accordance with fixed link strategy (see note 3.2.3)	872- 905 MHz (paired with 917 - 950 MHz) to be allocated to WLL in rural areas (see note 3.9.5)
		E-GSM Cellular MTX 880.4 - 890	Reserved for Extended GSM (see note 3.9.7) Paired with 925.4 - 935 MHz Links in this band to be migrated in accordance with fixed link strategy (see note 3.2.3)	
			Lower 400 kHz unavailable due to paging at 925 - 925.4 MHz	

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
890 - 960	Mobile / Fixed	GSM Cellular MTX 890 - 914	No change	
			Paired with 935 - 959 MHz	
		CT1 Cordless Telephones 914 - 915	No change (see note 3.9.8)	
			Paired with 959 - 960 MHz	
		Reserved 915.4 - 921	Part of Region 2 ISM band at 902 - 928 MHz (see note 3.9.9)	917- 950 MHz (paired with 872- 905 MHz) to be allocated to WLL in rural areas (see note 3.9.5)
		Low Power Devices 915 MHz \pm 0.0015%	Govt Gazette of 17 Nov 1995 refers	
		Vehicle location systems 915.025 - 915.2		
		Radio tagging systems 915.2 - 915.4		
		Trunked Mobile BTX 921 - 925	Reserved for use for digital trunked mobile radio services, eg using GSM-R or TETRA (see note 3.9.6)	
			Paired with 876 - 880 MHz	
		Paging 925 - 925.4	See note 3.9.10	
			Inbound leg of national paging band (including guard bands), paired with 700 kHz in 276 - 282 MHz	
		E-GSM Cellular BTX 925.4 - 935	Reserved for Extended GSM (see note 3.9.7)	
			Paired with 880.4 - 890 MHz	
960 - 1215	Aeronautical Radionavigation	GSM Cellular BTX 935 - 959	No change	
			Paired with 890 - 914 MHz	
		CT1 959 - 960	No change (see note 3.9.8)	
			Paired with 914 - 915 MHz	
		Distance Measuring Equipment / Secondary Surveillance Radar	No change	

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
1215 - 1240	Radiolocation / Radionavigation-Satellite (s-to-E)	Low Power Devices 1215 - 1225 GPS L2 1215 - 1260	Govt Gazette of 17 Nov 1995 refers	
1240 - 1260	Radiolocation / Radionavigation-Satellite (s-to-E) / Amateur	Amateur 1240 - 1300	Amateur at 1240 - 1300 MHz on secondary basis	
1260 - 1300	Radiolocation / Amateur	Air Traffic Control Radar 1240 - 1350		
1300 - 1350	Aeronautical Radionavigation			
1350 - 1400	Fixed / Mobile / Radiolocation	Fixed links (Go) 1350 - 1375	Allocation for dual frequency links migrated from other bands. Paired with 1492 - 1517 MHz. CEPT T/R 13-01 refers. (see note 3.10.1)	
		Fixed links (Return) 1375 - 1400	New allocation for dual frequency links migrated from other bands. Paired with 1427 - 1452 MHz. CEPT T/R 13-01 refers. (see note 3.10.1)	
1400 - 1427	Earth Exploration-Satellite / Radio Astronomy / Space Research		No change Earth Exploration-Satellite and Space Research are passive	
1427 - 1429	Fixed / Mobile / Space Operation (E-to-s)	Fixed links (Go)	Allocation for dual frequency links migrated from other bands. Paired with 1375 - 1400 MHz. CEPT T/R 13-01 refers. Existing links will require change of return frequency to match new plan (see also notes 3.10.1 and 3.10.3)	1429 - 1465 MHz (paired with 1477 - 1513 MHz) to be allocated to WLL on shared basis (see note 3.10.2)
1429 - 1452	Fixed / Mobile			

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
1452 - 1492	Broadcasting / Broadcasting-Satellite / Fixed / Mobile	Terrestrial Digital Audio Broadcasting (T-DAB) 1452 - 1467	See note 3.10.4 Current fixed link (Go) allocations at 1449 - 1464 MHz will need to be migrated in long term
		Satellite Digital Audio Broadcasting (S-DAB) 1467 - 1492	See note 3.10.4 No fixed links to be migrated
1492 - 1525	Fixed / Mobile	Fixed Links (Return) 1492 - 1517	Allocation for DF links migrated from other bands. Paired with 1350 - 1375 MHz. CEPT T/R 13-01 refers. Existing links will require change of Go frequency to match new plan. (see also notes 3.10.1 & 3.10.3)
		Single Frequency Fixed Links 1517 - 1525	New allocation for SF links migrated from other bands
1525 - 1535	Maritime Mobile- Satellite (s-to-E)/ Fixed / Space Operation (s-to-E) /		Some current fixed links to be migrated in line with fixed links strategy in long term (see note 3.2.3)
1535 - 1544	Maritime Mobile- Satellite (s-to-E)	Inmarsat	No change
1544 - 1545	Mobile-Satellite (s-to-E)		No change
1545 - 1555	Aeronautical Mobile- Satellite (s-to-E)		No change. Paired with 1646.5 - 1656.5 MHz
1555 - 1559	Land Mobile-Satellite (s-to-E)		No change

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
1559 - 1610	Aeronautical Radionavigation / Radionavigation-Satellite (s-to-E)	GPS L1	No change for GPS in 1559 - 1610 MHz APC (Aeronautical Public Correspondence) BTX in 1593 - 1594 MHz, paired with MTX in 1625.5 - 1626.5 MHz. Situation may need reviewing in long term
1610 - 1626.5	Mobile-Satellite (E-to-s)		1610 - 1626.5 MHz designated worldwide for emerging MSS systems. Paired with 2483.5 - 2500 MHz for some systems. (see note 3.10.5)
1626.5 - 1645.5	Maritime Mobile-Satellite (E-to-s)	Inmarsat	No change
1645.5 - 1646.5	Mobile-Satellite (E-to-s)		No change
1646.5 - 1656.5	Aeronautical Mobile-Satellite (E-to-s)		No change. Paired with 1545 - 1555 MHz
1656.5 - 1660.5	Land Mobile-Satellite (E-to-s)		No change
1660.5 - 1668.4	Radio Astronomy / Space Research		No change
1668.4 - 1670	Meteorological Aids / Radio Astronomy / Mobile/ Fixed		No change
1670 - 1700	Meteorological Aids / Meteorological-Satellite (s-to-E) / Mobile / Fixed	Terrestrial Flight Telephone System (TFTS) 1670 - 1675	Possible allocation for TFTS ground stations (paired with 1800 - 1805 MHz) (see note 3.10.6)
1700 - 1710	Fixed / Mobile / Meteorological-Satellite (s-to-E)	Fixed Links	Current fixed links to be migrated in long term according to fixed links strategy (see note 3.2.3)

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
1710 - 1980	Mobile / Fixed	Personal Communication Networks (PCN) MTX 1710 - 1785	See note 3.10.7 Paired with 1805 - 1880 MHz. CEPT T/R 22-07 refers Current fixed link assignments to be migrated according to fixed link strategy (see note 3.2.3)	PCN band also to be used for WLL (see note 3.10.2)
		Reserved 1785 - 1800	Migration of fixed links out of this band in long term	
		Terrestrial Flight Telephone System (TFTS) 1800 - 1805	Possible allocation for TFTS aircraft stations (paired with 1670 - 1675 MHz) (see note 3.10.6) No immediate plans to migrate fixed links out of this band	
		Personal Communication Networks (PCN) BTX 1805 - 1880	See note 3.10.7 Paired with 1710 - 1785 MHz. CEPT T/R 22-07 refers Current fixed link assignments in this band to be migrated according to fixed link strategy	PCN band to be used also for WLL (see note 3.10.2) 1850 - 1910 MHz (paired with 1930 - 1990 MHz) to be used for WLL on shared basis (see note 3.10.2)
		DECT 1880 - 1900	DECT band to be used for short range cordless telephones, wireless PABX, local loop provision, radio LANs, etc Migration of fixed links out of this band an immediate requirement (see note 3.10.8)	DECT band to be used also for WLL (see note 3.10.2)
		PHS 1895 - 1918.1	See note 3.10.10 1895 - 1900 MHz to be shared with DECT	PHS band to be used for WLL as well as other cordless applications

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
	Fixed / Mobile (continued)	Terrestrial component of FPLMTS/UMTS 1885 - 1980	See note 3.10.9 Terrestrial component of FPLMTS to be introduced from the top of this band (ie just below 1980 and 2170 MHz) Migration of fixed links out of this band in the long term	1930 - 1990 MHz (paired with 1850 - 1910 MHz) to be used for WLL on shared basis (see note 3.10.2)
1980 - 2010	Mobile-Satellite (E-to-s) / Fixed / Mobile	Satellite component of FPLMTS/UMTS	See note 3.10.9 Paired with 2170 - 2200 MHz Satellite component of FPLMTS/UMTS expected to be introduced from top of band Band also to be used for MSS system	1900 - 2300 MHz to be used for WLL on a shared basis (see note 3.10.2)
2010 - 2025	Mobile / Fixed	Terrestrial component of FPLMTS/UMTS	See note 3.10.9	
2025 - 2110	Fixed / Mobile / Space Operation / Earth-Exploration-Satellite / Space Research	WLL 2025 - 2031.5 Fixed Links 2031.5 - 2101.5 WLL 2101.5 - 2110	See note 3.10.11 Paired with 2200 - 2285 MHz. ITU-R F1098 and CEPT 13-01 refer All except Fixed and Mobile are Earth-to-space and space-to-space	
2110 - 2170	Mobile / Fixed	Terrestrial component of FPLMTS / UMTS	See note 3.10.9 Terrestrial component of FPLMTS to be introduced from top of band (ie just below 1980 and 2170 MHz) Migration of fixed links out of this band in long term	

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments	
2170 - 2200	Mobile-Satellite (s-to-E) / Fixed / Mobile	Satellite component of FPLMTS/UMTS	See note 3.10.9 Paired with 1980 - 2010 MHz Satellite component of FPLMTS/UMTS expected to be introduced from top of band Band also to be used for MSS system	
2200 - 2290	Fixed / Mobile / Space Operation / Earth-Exploration-Satellite / Space Research	WLL 2200 - 2206.5 Fixed Links 2206.5 - 2276.5 WLL 2276.5 - 2290	See note 3.10.11 Paired with 2025 - 2110. ITU-R F.1098 and CEPT T/R 13-01 refer All except Fixed and Mobile are space-to-Earth and space-to-space	
2290 - 2483.5	Fixed / Mobile	Fixed links ISM 2400 - 2500	Some migration of fixed links may be required in medium-long term Existing frequencies for 28 MHz OB links to remain (ie 2377 and 2471 MHz on primary basis plus 4 others on secondary basis) International ISM band, including for spread spectrum links. RR S5.150 and Govt Gazette of 17 Nov 1995 refer	2300 - 2483.5 MHz allocated to WLL including Ruritel (2308 - 2390 / 2402 - 2484 MHz) in rural areas (see note 3.10.2)
2483.5 - 2500	Mobile-Satellite (s-to-E) / Fixed / Mobile	MSS 2483.5 - 2500	MSS allocation for emerging systems (paired with 1610 - 1626.5 MHz). (see also note 3.10.5)	

Frequency Band (MHz)	Main Allocations	Sub-Allocations (MHz)	Notes and comments
2500 - 2520	Fixed / Mobile / Mobile-Satellite (s-to-E)	MMDS band 2500 - 2690	Need for re-planning of MMDS band to use more effectively (see note 3.10.12)
2520 - 2670	Fixed / Mobile / Broadcasting-Satellite	Fixed links	CEPT 13-01 refers to use of 2520 - 2593 / 2597 - 2670 MHz for fixed links
2670 - 2690	Fixed / Mobile / Mobile-Satellite (E-to-s)		
2690 - 2700	Earth Exploration-Satellite / Radio Astronomy / Space Research		Earth Exploration-Satellite and Space Research are passive
2700 - 3000	Aeronautical Radionavigation		No change

3 Supporting notes

3.1 General

This section provides notes to support and explain the future band plan presented in section 2 of this document. The notes relate in particular to those frequency bands where changes in the usage are proposed. In most cases the notes are concerned with the rationale behind the proposed changes, or the strategy for migrating from the current to the proposed future position.

For convenience the notes are divided according to frequency bands as follows. This is the same division as has been used in previous phases of Project SABRE:

- 20 - 50 MHz;
- 50 - 87.5 MHz;
- 87.5 - 137 MHz;
- 137 - 174 MHz;
- 174 - 400 MHz;
- 400 - 470 MHz;
- 470 - 960 MHz;
- 960 - 3000 MHz.

The notes relating to these bands are presented in sections 3.3 to 3.10 respectively. In addition, section 3.2 describes fundamental principles that have been used in the construction of the band plan, and which relate to the band plan as a whole rather than to particular bands of spectrum within it.

3.2 Fundamental principles

3.2.1 General

This section describes some of the most important principles that have driven the development of the future band plan presented in this document.

The following are fundamental long term aims that are encompassed within the future band plan:

- Migrating of fixed links to higher frequencies, in particular from bands below 1 GHz, and to frequencies above 3 GHz where possible.
- More efficient use of military spectrum, and hence release or sharing of spectrum for non-military applications.
- Making spectrum available for new technologies and services, such as wireless local loop, digital trunked radio, mobile satellite systems, etc.
- Increasing the amount of spectrum available for land mobile radio.

These objectives reflect international trends in spectrum management.

3.2.2 Alignment with ITU Region 1

South Africa is part of ITU Region 1 (as is Europe), and thus the country has an obligation to base its frequency allocations on those specified for Region 1 in the ITU Radio Regulations. Further, the future band plan presented in this document has in many areas been based around band plans adopted by European countries, in order to make it easier to introduce new technologies and source equipment from Europe.

However, South Africa is different from Europe in many ways, and any decisions to follow Europe have not been taken without careful consideration. Where there may be benefits to South Africa in the use of technologies and equipment from outside Region 1, efforts have been taken to try to incorporate these within the band plan, or at least to avoid taking decisions that would prevent their use in the future.

3.2.3 Strategy for migration of fixed links

The overall strategy for migrating fixed link frequencies to higher in the spectrum has a number of strands:

- UHF (400 - 470 MHz) links should be moved above 3 GHz where possible. However, spectrum will be allocated in the UHF band for cases where a sound case can be made why a link should remain at UHF.
- Links in the 800 MHz band (854 - 900 MHz) should in general also be moved above 3 GHz where possible, although in some cases it may be possible for these to remain where this can be justified.
- Links in the range 1.3 - 2.7 GHz should be moved above 3 GHz where possible. However, in some cases the links can remain unchanged, or be moved to new spectrum in 1.3 - 2.7 GHz, if a case can be made why they should not move to higher frequencies.
- New allocations for fixed links will be made in the bands 1350 - 1525 MHz and 2025 - 2290 MHz in accordance with the plans agreed in CEPT Recommendation T/R 13-01. These frequencies will be used in cases where a user is migrating links from the UHF band, or from other frequencies around 1.5 GHz, but for some well-justified reasons it is unreasonable to insist that the links are moved above 3 GHz.

The decision as to whether a particular link may remain below 3 GHz will be judged on a case-by-case basis, and will depend upon a sound justification being made as to why the link cannot be moved higher. The decision will be based upon a number of parameters, including the capacity required, distance to be covered, geographical location, and the cost of alternative means of providing the link. As a general rule, for example, the Department will discourage the use of radio for low capacity links over short distances.

3.2.4 Wireless Local Loop

An important aim in the band re-planning exercise has been to make spectrum available for a variety of different wireless local loop technologies in different areas of the spectrum (eg for the Telkom Million Line Project). Spectrum has been made available in a number of different bands, in some cases on an exclusive basis but in many cases on a shared basis, and between them it is believed that the allocations should provide the possibility for a wide variety of WLL systems to be used which are available from a range of suppliers and are suitable for use in the range of scenarios required for South Africa.

The basis for sharing between WLL and other services will depend upon the case in question. Factors will include the locations where the other services (and the WLL) are required to be used, and technical characteristics of the systems. For example, where the split is between 'urban' and 'rural' and the other service is already used in 'urban' areas (eg for cellular), then the 'rural' areas where WLL can be used will generally be those where it can be used without interfering with the other service (eg a suitable distance away from major population centres and major roads). The precise details of the sharing criteria will need to be established on a case-by-case basis.

3.2.5 Single frequency assignments

Spectrum can often be used more efficiently if assigned in frequency pairs, especially where the frequencies are used at high sites. This has been one of the major reasons for the move in the future band plan towards more dual frequency and less single frequency spectrum for mobile radio (in particular in VHF High band). In certain cases, single frequency assignments may be allowed for non high site use within dual frequency bands.

3.3 20 - 50 MHz

3.3.1 29.7 - 30 MHz (extension of amateur band)

It is proposed that this segment of spectrum should be allocated to the amateur service on a secondary basis for use during disaster exercises and emergency situations. This is in addition to the existing exclusive amateur band 28 - 29.7 MHz, which is to retain its primary status. The additional spectrum is currently used for single frequency mobile applications.

3.3.2 35 - 35.25 MHz (model aircraft control)

South Africa currently uses the frequency band 60.1375 - 60.375 MHz for the control of model aircraft, which differs from bands used elsewhere in the world. In order to allow the model aircraft community to benefit from international economies of scale, to facilitate international competitions, etc, it is proposed that the model aircraft control band will be moved to be in line with the European band at 35 - 35.25 MHz. The existing model aircraft control band could be released in the medium term. It should be noted that the new band will not be available immediately for use for

model aircraft control, as existing users will need to be migrated out.

3.3.3 41 - 44 MHz (removal of ITU footnote regarding aeronautical use)

A footnote in the ITU tables (RR S5.160) provides for the additional allocation in Southern Africa of the band 41 - 44 MHz to the aeronautical radionavigation service on a primary basis. These frequencies are not currently used for this purpose in South Africa, and it is recommended that South Africa should be removed from this footnote.

3.3.4 46.61 - 46.97 / 49.67 - 49.97 MHz (CT0 cordless telephones)

CT0 cordless telephones are widely used in South Africa, and their use on the nominated frequencies within these ranges (as specified in the Government Gazette dated 17 November 1995) should continue.

3.4 50 - 87.5 MHz

3.4.1 66 - 68 MHz (block allocation for NEAR)

The band 66 - 68 MHz currently contains several sub-allocations, eg for the MARNET system. It is proposed that the band should be treated as a single block allocation, to be known as National Emergency Alarm Radio (NEAR). It is also proposed that the channel spacing should be reduced from 25 kHz to 12.5 kHz, in order to address the congestion problems that have been reported.

3.4.2 68 - 87.5 MHz (VHF Mid band)

It was proposed in the draft band plan that the land mobile sub-bands of the VHF Mid band should be re-organised, with the new plan for this part of the spectrum to be based on the European DSI. Following inputs in response to the draft band plan and further consideration of the associated migration process, which would inevitably be long, complex and costly, it has been concluded that the long term benefits that such a re-farming exercise would bring cannot currently be justified.

Hence it is now proposed that this part of the spectrum should, at least in the short term, remain largely unchanged. This does not rule out the possibility of smaller scale changes to particular sub-bands in order to address specific local problems (eg interference from broadcasting). The overall situation will also be periodically reviewed, since it is likely that at some time in the future a major re-planning may be more appropriate than at present, for example due to changing patterns of usage in the band or developments elsewhere in the world.

3.4.3 70 - 70.3 MHz (use for amateur service)

It is proposed that this sub-band should be allocated to the amateur service on a secondary basis in order to undertake experimental work on propagation. The change is in line with recommendations made in the European DSI.

3.5 87.5 - 137 MHz

The use of this band is to remain as at present:

- 87.5 - 108 MHz: FM audio broadcasting;
- 108 - 137 MHz: Aeronautical services.

3.6 137 - 174 MHz**3.6.1 138 - 174 MHz (VHF High band re-planning)**

It is proposed that the land mobile sub-bands within the VHF High band will be re-planned in order to bring them more in line with the rest of ITU Region 1. The sub-band boundaries and Tx/Rx separations in the proposed future band plan are based on those in the European DSI, and are illustrated in the relevant figure in Appendix B of this document.

The refarming of this band will be done in a phased and effective manner. The migration will be effected largely by making use of the recently created 12.5 kHz "interleaved channels". As far as possible, users will be moved only when they would normally upgrade their equipment, although some forced migration will inevitably be required at some stages in the process.

3.6.2 140.5 - 141 and 152.05 - 152.5 MHz (alarms)

It is proposed that these two blocks of spectrum are allocated for use for alarm systems (both single and dual frequency). Demand in the short term is expected to be primarily for single frequency systems, although a small number of frequency pairs will be reserved for early dual frequency systems. It is anticipated that in the long term the industry will move towards more extensive use of dual frequency systems, and hence it is planned that the frequencies in the two blocks will increasingly be used as duplex pairs. Some frequencies may also be assigned for dual frequency alarms in other parts of the spectrum, namely VHF Mid band (81 - 81.625 / 86.375 - 87 MHz) and UHF (440 - 441 / 445 - 446 MHz).

3.6.3 148 - 149.9 MHz (little LEOs)

This band was allocated internationally at WARC 92 for the mobile satellite systems known as little LEOs. The band is allocated for the space-to-Earth direction, and is extended up to 150.05 MHz for some little LEO systems. The space-to-Earth link is generally provided at either 137 - 138 MHz or 400.15 - 401 MHz, depending on the system.

In South Africa the band 148 - 149.9 MHz (and the other relevant MSS bands also) is proposed to be allocated for possible use in the medium term for little LEOs, which could potentially provide useful store-and-forward data communications to remote areas of the country. The future of little LEOs on a global scale is uncertain at this

stage, however, and no immediate clearing of the band is proposed. Even if little LEO systems are used in South Africa, it is possible that they will be able to co-exist with existing services in the band, although it has yet to be shown conclusively that this will be possible.

3.6.4 150.05 - 151 MHz (block allocation for paging)

It is proposed that this band should be used to provide a block allocation for paging. The situation regarding assignments for paging systems should gradually be rationalised by moving paging assignments to frequencies within this band (and also to 169.4 - 169.8 MHz (ERMES) and other paging bands).

3.6.5 161.875 - 173.875 MHz (sharing of Sonobuoy frequencies)

There are currently severe restrictions on the civilian use of these frequencies used for Sonobuoy operations, which lie in prime VHF mobile spectrum. The Sonobuoy frequencies between 161.875 and 173.875 MHz are currently unavailable for other uses to a distance of 200 km inland from the coast. This appears to be unnecessarily restrictive. Restrictions elsewhere in the world are generally less severe; in the UK, for example, there is no exclusive allocation to sonobuoys, and they are forced to share with other users in coastal areas. It is believed that there should be scope for increased sharing of Sonobuoy frequencies compared with what is allowed at present, and it is proposed that further study should be undertaken to investigate the possibilities, with a view to relaxing any protection criteria that are found to be excessive.

3.6.6 169.4 - 169.8 MHz (ERMES)

This band is allocated to the digital paging system ERMES. The progress of this technology will be monitored and should there be no requirement in South Africa, this band will be re-allocated to paging in general.

In order to use the band for paging it will be necessary to move existing single frequency radio users elsewhere. It is proposed that interleaved channels elsewhere in VHF High band should be used for this purpose.

3.7 174 - 400 MHz

3.7.1 216 - 246 MHz (frequencies for T-DAB)

The introduction of T-DAB (Terrestrial Digital Audio Broadcasting) is in Europe most likely to occur in the band 216 - 240 MHz. (The plan for this introduction is detailed in the so-called Wiesbaden plan.) In South Africa, the frequencies in this band up to 238 MHz are currently used for TV broadcasting (TV channels 9 to 11), while 238 - 246 MHz is allocated to fixed and mobile services and is lightly used, except for the international distress frequency at 243 MHz.

It is proposed that in South Africa the initial introduction of T-DAB in the VHF spectrum is in the band 238.432 - 239.968 MHz, in accordance with the Wiesbaden

plan. The allocation of up to 4 further T-DAB channels might be possible within the band 238 - 246 MHz, but further technical study would be required to establish the feasibility of this, in particular regarding possible interference to the international distress frequency, and the future availability of equipment to operate above 240 MHz is also uncertain. An alternative in the event that T-DAB is not feasible above 240 MHz is to share T-DAB with existing TV channels in 216 - 238 MHz. The possibility also exists to introduce T-DAB in South Africa in the band 1452 - 1467 MHz (see note 3.10.4).

3.7.2 246 - 254 MHz (TV channel 13)

This channel is used for TV broadcasting in Southern Africa, unlike all other regions of the world. However, it is not possible to use the so-called 'channel 12' (238 - 246 MHz) for TV broadcasts, due to the need to keep the international distress frequency at 243 MHz free from interference. This, combined with the significant guard bands that are generally required between spectrum used for broadcasting and telecommunications, effectively makes it impossible to use the radio spectrum around these frequencies efficiently. A long term solution to address this situation would be to use channel 13 for a different purpose (eg mobile radio, as is the case in other parts of the world), but in the short term it is not practical for channel 13 to cease being used for TV broadcasting.

A further problem is that the broadcasters wish to use NICAM on channel 13 in metropolitan areas, but this results in spillage into the public trunking channels immediately above 254 MHz, thus making a substantial portion of the trunking band unusable. The problem is accentuated by the fact that channel 13 is used with a slightly offset vision and sound carrier (the vision carrier is at 247.43 rather than the standard 247.25 MHz), thus causing interference further into the trunking band than would otherwise be the case.

Discussions should continue between the Department and the IBA on how best to minimise the problems. Attempts should continue to find a technical solution, but until the matter has been resolved it will be necessary to prohibit the use of NICAM on channel 13. The longer term solution to avoid spillover from NICAM into the public trunking band is likely to involve some combination of (a) moving the vision down to 247.25 MHz from 247.43 MHz, (b) tighter filtering of the NICAM transmitters, and/or (c) reducing the width of the NICAM sound carrier.

3.7.3 254 - 259.4 / 262 - 267.4 MHz (public trunking)

This band is currently used by public trunking network operators. The licenses of these operators are due to expire in 2008, after which the spectrum will revert to mobile use. It is anticipated that the public trunking will by this date have migrated to digital trunking networks.

3.7.4 278 - 286 MHz (2-way paging)

It is proposed that 700 kHz from within this band should be allocated to 2-way paging (ie 600 kHz + 2 x 50 kHz guard bands). This is for the outbound leg, paired with 925 -

925.4 MHz for inbound (ie 300 kHz + 2 x 50 kHz guard bands). This is consistent with expected future availability of equipment for the FLEX system, especially for the large Asian market. The band is currently allocated to Government, and the exact location of the 700 kHz used will follow further discussion (278 - 278.7 MHz is a likely option).

3.7.5 300 - 380 MHz (20 MHz for wireless local loop)

This current government spectrum is potentially very useful for providing telecommunications to rural areas. It is proposed that a total of 20 MHz from within this band should be allocated to WLL on an exclusive basis, and that steps should be taken to allow WLL systems to begin being introduced as soon as possible. The exact frequencies to be used for WLL are the subject of ongoing discussions (336 - 346 / 356 - 366 MHz is a likely option).

3.7.6 380 - 400 MHz (use of government spectrum for digital trunked radio)

This military band has been designated in Europe for use for digital trunked mobile radio (CEPT T/R 22-05), in particular TETRA systems for use by the emergency services. In South Africa the band is currently used by government, and it is believed that the short term needs for digital trunking can be satisfied in spectrum above 400 MHz. Hence it is proposed that the current usage remain in the short term, but that the spectrum should be used for trunked mobile radio in the long term.

3.8 400 - 470 MHz

3.8.1 406 - 470 MHz (migration of fixed links)

Much of this band is currently used for fixed links. Throughout the world there is a strong trend for fixed links to be migrated to higher bands (above 3 GHz where possible), and the band is increasingly being used for mobile services, a purpose to which it is very well suited. For these reasons, a general transition away from fixed links and towards mobile radio is proposed for the band. Further details regarding specific sub-bands are given in the following paragraphs. The overall plan for the band is illustrated in the relevant figure in Appendix B of this document.

It is very difficult at this time to predict accurately what the take-up of trunked mobile radio in South Africa will be, and what the possibility of migrating fixed links to higher frequencies is. For this reason the plan is intended to incorporate some flexibility to allow adjustments to be made as the demand for different types of systems and services becomes clearer.

3.8.2 406.1 - 407.625 / 416.1 - 417.625 MHz (current ESKOM frequencies)

This spectrum is currently used by ESKOM for both mobile and fixed applications. The use of these frequencies for fixed links should be minimised as far as possible, by migration of links to higher frequencies where practical. Mobile usage of the band by ESKOM may continue in the short term where necessary, but mobile users should also be migrated if possible, for example to a trunked system elsewhere in the UHF

band.

As ESKOM move out of the band, other (single frequency) users can be introduced in 406.1 - 407.625 MHz. The other half of the band (416.1 - 417.625 MHz) is part of the band which is to be used for future public digital trunking networks, and hence any residual usage of the band by ESKOM will limit the spectrum available when such networks are introduced.

3.8.3 407.625 - 413 / 417.625 - 423 MHz (Government and Public Safety)

407.625 - 410 / 417.625 - 420 MHz is currently used by Government for a variety of fixed and mobile applications. The 2 x 3 MHz immediately above this (ie 410 - 413 / 420 - 423 MHz) is currently used for single frequency fixed links.

It is proposed that the band should be treated as a single block allocation to be used primarily for public safety and local/regional authorities. This should provide for more effective frequency planning, site management, co-ordination, etc, and would also give more flexibility regarding how the frequencies are used. The use of the band for fixed links should be minimised as far as possible, thus releasing additional spectrum for mobile use.

The band 407.625 - 413 / 417.625 - 423 MHz will provide spectrum for local and regional authorities for mobile radio (primarily trunked). It is envisaged that the band 410 - 413 / 420 - 423 MHz (together with 417.625 - 420 / 427.625 - 430 MHz) will be used primarily for digital trunked radio (the frequencies are within one of the bands designated for TETRA in Europe). Priority in migration of fixed links should be given to clearing the frequencies immediately above 410 / 420 MHz, in order to allow a rapid transition and provide the municipalities with frequencies in this block, which will be useful when co-operation with Government is required.

3.8.4 413 - 417.625 / 423 - 427.625 MHz

These frequencies are primarily used for fixed links at present, with the exception of the ESKOM frequencies 416.1 - 417.625 MHz (see note 3.8.2). It is proposed that these fixed links are migrated elsewhere, with the frequencies released to be used as follows:

- 413 - 413.7625 / 423 - 423.7625 MHz. Public mobile data network(s). This spectrum would enable the setting up of a number of public data networks in South Africa. The band would provide a total of 60 2x12.5 kHz frequency channels.
- 413.7625 - 417.625 / 423.7625 - 427.625 MHz. Public trunking network using digital trunked radio. It is proposed that in the longer term this band could be freed for use for digital trunking. The band is part of the spectrum which is designated for TETRA in Europe. It is envisaged that the band would most likely be used for public digital trunking networks, although other applications such as private radio systems could also be implemented in the band.

- 415 - 417.2 / 425 - 427.2 MHz. Wireless local loop sharing. In addition to the above mobile and fixed services, this band will also be shared with WLL in rural areas. There are a number of different WLL systems available from suppliers which are able to operate in this band.

3.8.5 427.625 - 430 MHz (trunked mobile radio and single frequency links)

The band 420 - 430 MHz is currently used primarily for single frequency links. Although these will where possible be moved to higher bands or changed to dual frequency, it is recognised that in practice it will be necessary to retain some single frequency links in UHF. It is proposed that the band 427.625 - 430 MHz should be used for single frequency links in rural areas.

It should also be possible in the long term for the band 417.625 - 420 / 427.625 - 430 MHz to be used for trunked mobile radio in urban areas. This application would need to share with usage of the band 417.625 - 420 MHz by Government, local and regional authorities (which should be concentrated in rural areas in the long term), as well as with the single frequency links in 427.625 - 430 MHz.

3.8.6 430 - 440 MHz (amateur band and low power applications)

This band is allocated to the amateur service in South Africa, as elsewhere in ITU Region 1. The sub-band 433.05 - 434.79 MHz, however, is also designated as an ISM band in Region 1, subject to the special authorisation of the administration concerned (see RR S5.138), and it has effectively been treated as an ISM band in South Africa for a number of years. Further, the Government Gazette of 17 November 1995 specifies the use of the band for low power devices on an unlicensed basis, subject to obligatory type approval. The consequence of this is that the amateur service may not claim protection from (in-band) emissions from ISM equipment operating in the band, nor can ISM equipment and low power devices claim protection from amateur users in the band. (Note that dedicated spectrum has been assigned at 464.375 - 464.425 MHz for the control of cranes and other hazardous equipment.)

Note that the European DSI recommended that the sub-band 430 - 432 / 438 - 440 MHz should be allocated to mobile and used for PMR. It is not proposed to adopt this recommendation in South Africa at this stage, but the situation will be reviewed periodically to assess developments elsewhere and the emerging needs in South Africa.

3.8.7 440 - 450 MHz (migration from fixed to mobile)

This band is currently used primarily for fixed links. The aim in the medium term is to use this band primarily for mobile services (PMR in particular). A 5 MHz Tx/Rx separation is to be used, in accordance with the European DSI. Fixed links currently in the band should be moved to higher frequencies (above 3 GHz where possible), although in some cases it may be necessary for the move to be to elsewhere in UHF (eg 427.625 - 430 MHz for single frequency or 450 - 470 MHz for dual frequency).

It is also proposed that part of this band (440 - 441 / 445 - 446 MHz) is used for fixed

point-to-multipoint data services such as scanning telemetry and dual frequency alarm systems. The nature of these systems is such that, although they provide communications between fixed stations, they are generally implemented using mobile radio technology to provide wide area coverage, and in many cases it will not be feasible to implement them at higher frequencies.

3.8.8 450 - 470 MHz

This band is currently used for a variety of fixed and mobile applications. The band includes the frequencies used for the C450 analogue cellular system (455.5 - 459.48 / 465.5 - 469.48 MHz), which is due to cease operation in 1999. It is proposed that the band should retain its current Tx/Rx separation of 10 MHz, and that the future use of the band should be as follows:

- 450 - 453 / 460 - 463 MHz. Fixed links and mobile data. This band should continue to be used for dual frequency fixed links where it is not practical to move to higher frequencies.
- 453 - 453.975 and 463 - 463.975 MHz. Single frequency mobile, as at present.
- 453.975 - 454.425 MHz. Block allocation for paging. Paging assignments from elsewhere in UHF should be migrated to this band. The sub-band 454.325 - 454.425 MHz is allocated specifically for on-site paging.
- 463.975 - 464.425 MHz. Block allocation for low power mobile radios, including short range business radio. The sub-band 464.375 - 464.425 is allocated exclusively for the control of hazardous equipment (eg cranes).
- 454.425 - 460 MHz / 464.425 - 470 MHz. Trunked mobile radio. It is proposed that this band should provide further spectrum for trunked mobile radio systems. This could be for a variety of applications, but it is envisaged that it will primarily be used for private trunked radio systems. The band includes spectrum currently used by Transtel for their trunked radio system (455 - 455.4875 / 465 - 465.4875), for which the BTX and MTX frequencies will need to be swapped in due course.

In addition to the above mobile and fixed services, it is also proposed that sharing with WLL would occur in the band 455 - 460 / 465 - 470 MHz, for rural areas. There are a number of potential WLL systems that can operate in this band.

3.9 470 - 960 MHz

3.9.1 470 - 854 MHz (digital TV experimentation)

The future introduction of digital TV is an important long-term spectrum management issue. In order to plan for this it is suggested that a single 8 MHz analogue TV broadcasting channel should be reserved for digital TV, to allow simultaneous broadcasting of digital signals when the technology becomes available.

3.9.2 790 - 854 MHz (sharing of broadcast channels with WLL and links)

The broadcast channels at the upper end of the UHF broadcasting range (790 - 854 MHz) are primarily used for TV broadcasting at present (they also contain some studio transmitter links). It is believed that there is scope for using these channels more effectively, either by re-planning of the way in which the UHF TV channels are utilised, or by sharing of this part of the spectrum with other services.

A number of WLL systems, in particular those based on US cellular technology such as CDMA and AMPS, are currently available to operate at these frequencies, in particular 824 - 849 MHz (paired with 869 - 894 MHz). Such WLL systems are available from a range of suppliers, and the ability to use them in South Africa could potentially bring significant social benefit to the country.

It is proposed that, in order to allow the introduction of such WLL systems, sharing of WLL with broadcasting is allowed in at least one of the UHF TV channels, primarily in rural areas. TV channels 65, 66 and 67 (822 - 830, 830 - 838 and 838 - 846 MHz) are the most likely candidates, which would need to be paired with 867 - 875, 875 - 883 and 883 - 891 MHz respectively. Further discussions and study will be required in order to work out the details of the sharing, and in particular sharing criteria will need to be formulated and appropriate protection ratios established in order to ensure that the two services are able to co-exist effectively with each other. The sharing will also need to be co-ordinated with neighbouring countries.

There is also a requirement for certain Government redeployable link equipment to be able to operate in the UHF TV band (and in other dedicated UHF link spectrum) on a shared basis. This equipment is to be migrated into the band in the immediate short term. Appropriate criteria for the sharing will need to be drawn up. In the long term it is intended that the link equipment will be moved to higher frequencies.

3.9.3 856 - 900 MHz (migration of fixed links to higher frequencies)

There are currently a range of fixed links within these frequencies, including point-to-point links in 856 - 888 MHz and troposcatter links in 862 - 900 MHz. In line with the international trends, the aim should be to migrate these links to higher frequencies at the earliest opportunity. The move should be to frequencies above 3 GHz if possible, with the possibility to move to frequencies around 1.5 GHz in the event that there is a sound case why they cannot be moved to higher frequencies. Such migration will be particularly important in cases where the band is to be used for another purpose and sharing with the new application is not possible. Note, however, that the existing fixed troposcatter systems can remain on their current frequencies in the medium-to-long term.

3.9.4 864.1 - 868.1 MHz (CT2)

The CT2 cordless telephony system has not to date become heavily used in South Africa. Furthermore, CT2 has not been a great success in Europe either, although it is heavily used in some densely populated areas of the Asia-Pacific region (eg Hong Kong and Singapore). However, there is no great pressure in South Africa to use the

CT2 spectrum for other purposes, and CT2 does provide a potential technology for short range WLL applications.

It is thus proposed that the allocation of the band to CT2 should be retained, for both cordless telephony and WLL applications. The situation will be reviewed periodically in order to monitor the growth in usage in South Africa, and determine whether any alternative uses would be beneficial. The use of CT2 is likely to be confined almost exclusively to urban areas, and hence sharing with CT2 may be possible in order to allow the use of the frequencies for other purposes in rural areas.

3.9.5 872 - 905 / 917 - 950 MHz (wireless local loop sharing)

It is proposed that spectrum should be allocated on a shared basis in rural areas for sharing of WLL with other services (primarily GSM and private mobile radio). There are a number of different WLL systems that could operate in this band, including systems based on TACS, GSM and CDMA.

3.9.6 876 - 880 / 921 - 925 MHz (possible use for digital PMR)

This band is currently proposed in Europe for digital private mobile radio for the railways using a PMR system based on GSM (GSM-R). In South Africa also, this band offers the possibility for large organisations (such as the railways) to use GSM-based PMR systems. The band might also be one in which TETRA-based equipment is available in the future. There may also be a possibility of WLL sharing these frequencies, particularly in rural areas.

A final decision on this band should not be taken until after the situation in Europe has become clearer, which will probably happen during 1998. It is proposed that the band should remain reserved in South Africa until the international situation clarifies and the local demand has become clear.

3.9.7 880 - 890 / 925 - 935 MHz (reserved for GSM extension)

This band is reserved within Europe for extended GSM. A final decision on the use of the band in South Africa should not be taken until the major European countries have clarified their position, which will probably occur during 1997 and 1998.

The extended GSM band would be required almost exclusively for use in urban areas. In rural areas the band could thus be shared with WLL, and there are a number of WLL technologies available for use in this band (eg based on TACS and CDMA).

3.9.8 914 - 915 / 959 - 960 MHz (CT1)

The system known as CT1 in South Africa (CT1 refers to a different system in other countries) uses frequencies which encroach on the band allocated in Europe to GSM. CT1 is widely used in South Africa, and no change to the usage of the band is proposed in the short term, although it is intended that CT1 will be phased out in the medium term. More immediate action should be taken, however, to stamp out the illegal usage by cordless telephones of GSM frequencies in the band 904 - 905 / 949 -

950 MHz so that these may be used for GSM.

3.9.9 915 - 921 MHz

This is part of Region 2 ISM band 902 - 928 MHz (centre frequency 915 MHz), and there has been some suggestion that at least part of this band (eg 915 - 919.5 MHz) should be adopted in South Africa as a general band for ISM equipment and low power devices. There would be several dangers in doing this, however:

- The fact that the Region 2 band extends outside 915 - 921 MHz will tend to mean that emissions from some of the equipment made for the band will not be well-confined within the sub-band available in South Africa. This may result in interference to neighbouring services, particularly below 915 MHz (ie existing CT1 and GSM assignments).
- The deregulated nature of ISM will make it difficult to control equipment entering South Africa, eg from the US, and to ensure that emissions from such equipment do not fall into other bands.
- Once an ISM band has been created and equipment has come into use, it is almost impossible to later clear the band of such equipment so that the spectrum can be used for other purposes.

It is thus considered to be inadvisable to allocate the spectrum immediately above 915 MHz as a general ISM / LPD band.

There are some specific low power applications, however, for which a case can be made for an allocation in this area of the spectrum. The Government Gazette of 17 November 1995 already allows for low power devices (eg anti-theft systems) in the band 915 MHz \pm 0.0015%, and it is further proposed that spectrum should be allocated to the following specific applications:

- vehicle location systems in 915.025 - 915.2 MHz (on a licensed basis);
- radio tagging systems in 915.2 - 915.4 MHz (with passive tags).

In general, however, further allocations in this band should be minimised as far as possible, since it is likely that in the medium-to-long term the spectrum will become valuable for mobile radio use, eg for further extension of cellular systems or for digital trunked radio.

3.9.10 925 - 925.4 MHz (2-way paging)

This is provisionally allocated to 2-way paging (inbound leg), paired with 700 kHz from 278 - 286 MHz, and is consistent with expected FLEX allocations in other countries (see note 3.7.4).

3.10 960 - 3000 MHz**3.10.1 1350 - 1375 / 1492 - 1517 and 1375 - 1400 / 1427 - 1452 MHz (fixed links)**

These bands are allocated in Europe (CEPT Recommendation T/R 13-01) for consolidation of fixed links around 1.5 GHz which cannot move to higher frequencies. The band 1427 - 1452 / 1492.5 - 1517.5 MHz is currently used for fixed links in South Africa, and these would need to migrate to the new plan over a period in order to implement this. The band 1350 - 1400 MHz is currently under-utilised in South Africa.

The use of the bands will be limited to low capacity links. For each of the two bands, the basic channel arrangement proposed in T/R 13-01 provides for 12 2×2 MHz channels, with channels with carrier spacings of 1000, 500, 250 and 25 kHz derived from this by means of subdivision. The precise channel plans to be adopted will follow after further analysis of the requirements for channels in these bands, but it is proposed that they should be primarily at the low capacity end of the range, since they are likely to be required mostly for low capacity links which are moving from UHF.

3.10.2 1400 - 2700 MHz (wireless local loop above 1 GHz)

Allocations are to be made in a number of bands in the range 1.4 - 2.5 GHz to enable sharing of WLL with other services in rural and in some cases urban areas. WLL will also be allowed on an exclusive basis in one area of this spectrum. Sharing will require sharing criteria to be established to ensure that WLL can coexist satisfactorily with the other services in the band. In some cases the WLL technology may be the same as that used for other services in the band (eg DECT, PCN), in which case the sharing will be relatively straightforward.

The spectrum above 1 GHz to be allocated for WLL on an exclusive basis is as follows (see note 3.10.11):

- 2025 - 2031.5 / 2200 - 2206.5 MHz;
- 2101.5 - 2110 / 2276.5 - 2285 MHz;
- 2285 - 2290 MHz.

The following bands will be allocated for possible use for WLL on a shared basis:

- 1429 - 1465 / 1477 - 1513 MHz;
- 1710 - 1785 / 1805 - 1880 MHz (PCN);
- 1880 - 1900 MHz (DECT);
- 1900.1 - 1918 MHz (PHS);
- 1850 - 1910 / 1930 - 1990 MHz;
- 1900 - 2300 MHz;
- 2300 - 2400 / 2400 - 2500 MHz (Rurtel band).

The decision as to whether a particular technology can be used in a shared band in a particular (eg urban) area will generally have to be taken on a per-case basis in order to judge properly whether the required sharing is feasible.

3.10.3 1427 - 1452 / 1492.5 - 1517.5 MHz (fixed links)

There is no immediate need to move the fixed links from within the band 1427 - 1452 MHz (paired with 1492.5 - 1517.5 MHz). In accordance with international trends, however, the medium-to-long term aim should be to move these links to frequencies above 3 GHz where possible, or to migrate to the new channel plans specified in CEPT T/R 13-01.

3.10.4 1452 - 1492 MHz (digital audio broadcasting)

This band has been allocated internationally for use for digital broadcasting (S-DAB and T-DAB). In South Africa the band is currently unused above 1464 MHz, but below 1464 MHz it is used for fixed links. The unused section of the band should be reserved for digital audio broadcasting (in particular S-DAB in 1467 - 1492 MHz), with the long term aim to migrate the fixed link users of the frequencies 1452 - 1464 MHz (paired with 1517.5 - 1529.5 MHz) to other frequencies, if possible above 3 GHz.

3.10.5 1610 - 1626.5 MHz (MSS)

These frequencies have been allocated worldwide for emerging mobile satellite systems (Earth-to-space links), such as Globalstar, Odyssey and Iridium. In the case of Globalstar and Iridium the band is paired with 2483.5 - 2500 MHz, while for Iridium the space-to-Earth links are also in 1610 - 1626.5 MHz. Mobile satellite communications have the potential to provide valuable benefits for South Africa, in particular in providing telecommunications to remote areas. These frequencies are largely unused in South Africa at present, and should be reserved for MSS use.

3.10.6 1670 - 1675 / 1800 - 1805 MHz (TFTS)

These frequencies have been reserved in Europe for the Terrestrial Flight Telephone System (TFTS). ERC decision ERC/DEC/(92)01 refers. Although TFTS may be of use in South Africa in the future, it is far from certain that it will be applicable, given South Africa's geographical location. Hence, no action is required in the immediate future, unless specific demand emerges.

3.10.7 1710 - 1785 / 1805 - 1880 MHz (PCN frequencies)

These are the frequencies at which the European PCN standard DCS1800 operates (CEPT Recommendation T/R 22-07 refers), which are currently used for fixed links in South Africa. The use of PCN in South Africa is likely to be important in order to increase the capacity of the current cellular networks (and to provide for the possibility of competition to the existing cellular operators). These frequencies are being allocated to PCN in countries around the world, although not necessarily the whole band in each country. Sharing of these frequencies by WLL applications is also likely to be possible, especially in rural areas.

No new fixed link assignments should be made in this band in South Africa, and the long term aim should be to move fixed links to frequencies above 3 GHz wherever possible. In the shorter term, the amount of spectrum that needs to be cleared for use

by public operators is an important telecommunications policy issue related to the number of PCN licenses to be granted, expansion of capacity for GSM operators, etc. It is unlikely that the whole of the band will be needed for PCN, at least for the medium term, but additional spectrum may also be required from within the band for WLL applications.

3.10.8 1880 - 1900 MHz (DECT)

These frequencies have been allocated to DECT. No new fixed link assignments are being made within the band, and the band will in due course be cleared of fixed links. DECT frequencies may be used for cordless telephony, office wireless PABXs, local telepoint systems, to increase the capacity of the cellular networks and to provide WLL systems in dense areas. For these reasons, the allocation to DECT is seen as important in South Africa.

3.10.9 1885 - 2025 and 2110 - 2200 MHz (FPLMTS/UMTS)

These bands are intended for use on a worldwide basis for the implementation of FPLMTS/UMTS. Within this, the bands 1980 - 2010 and 2170 - 2200 MHz are intended for the satellite component of FPLMTS. This is a long term requirement, and it will be well into the first decade of the next century before the system becomes available, and even then only a small part of the band will initially be needed.

The FPLMTS bands are currently used for fixed links in South Africa. The future of FPLMTS is still uncertain, and it would be premature at this stage to move any fixed links solely in preparation for FPLMTS. However, it would be wise to make as few new fixed link frequency assignments as possible in these bands, and to gradually move links to frequencies above 3 GHz when possible, in accordance with international trends. In this respect, the most immediate need in South Africa is likely to be for frequencies for the satellite components (ie 1980 - 2010 / 2170 - 2200 MHz), which are also the frequencies that have been assigned for the ICO-P system.

3.10.10 1895 - 1918.1 MHz (PHS)

This band may be used for the Personal Handyphone System (PHS), which is in widespread use in Japan and is being adopted in a number of other countries. The sub-band 1895 - 1906.1 MHz should be used for private applications, and the sub-band 1900.1 - 1918 MHz is allocated for public applications (cordless telephony and WLL), with 1900.1 - 1906.1 MHz shared by both private and public applications. Tests conducted on behalf of the Office of the Telecommunications Authority in Hong Kong have established that it is possible for DECT and PHS to co-exist satisfactorily in the overlapping sub-band 1895 - 1900 MHz.

3.10.11 2025 - 2110 and 2200 - 2290 MHz (fixed links and wireless local loop)

Channel arrangements for the use of this band for fixed services are described in both ITU-R Recommendation F.1098 and CEPT Recommendation T/R 13-01. These recommendations describe a channel plan in which the band is divided into dual-frequency channels with carrier spacing 14 MHz and Tx/Rx separation 175 MHz.

Carrier spacings of 7, 3.5 and 1.75 MHz are also possible by means of channel subdivision. It is proposed that this arrangement is adopted in the band for fixed services, with the unused parts of the band used for wireless local loop. Some of the fixed link channels may also be shared with WLL.

The proposed division of the band is as follows:

- the first 2 x 6.5 MHz (2025 - 2031.5 / 2200 - 2206.5 MHz) to be used exclusively for WLL;
- the next 2 x 70 MHz (2031.5 - 2101.5 / 2206.5 - 2276.5 MHz) to be used for fixed links;
- the next 2 x 8.5 MHz (2101.5 - 2110 / 2276.5 - 2285 MHz) to be used exclusively for WLL;
- the top 5 MHz of the band (2285 - 2290 MHz) to be used exclusively for WLL.

3.10.12 2500 - 2700 MHz

This band is currently used primarily for MMDS, but it is believed that the current MMDS plan does not utilise the spectrum at all efficiently. Hence it is proposed that the band is re-planned, with the MMDS links concentrated together in a smaller portion of the spectrum. The exact amount of spectrum needed for MMDS should be determined as part of the review. The radio astronomy band 2690 - 2700 MHz should be avoided in the resulting MMDS plan, and the remainder of the band should be allocated for fixed links, in accordance with the plan in CEPT Recommendation T/R 13-01 for the use for the fixed service of the band 2520 - 2593 / 2597 - 2670 MHz.

A List of abbreviations

APC	Aeronautical Public Correspondence
BEAPS	Business Equipment Association Paging Services Division
BTX	Base Transmit
CB	Citizens Band
CDMA	Code Division Multiple Access
CEPT	European Conference of Postal and Telecommunications Administrations
CT	Cordless Telephony
DECT	Digital European Cordless Telecommunications
DF	Dual Frequency
DPT	Department of Posts and Telecommunications
DSI	Detailed Spectrum Investigation
E-GSM	Extended GSM
E-to-s	Earth-to-space
EPIRB	Emergency Position Indicating Radio Beacon
ERC	European Radiocommunications Committee
ERMES	European Radio Messaging System
ERP	Equivalent Radiated Power
FPLMTS	Future Public Land Mobile Telecommunication System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
IBA	Independent Broadcasting Authority
ILS	Instrument Landing System
ISM	Industrial, Scientific and Medical
ITU	International Telecommunication Union
LEO	Low Earth Orbit
LMRA	Land Mobile Radio Association
LPD	Lower Power Device
MMDS	Multipoint Microwave Distribution System
MSS	Mobile Satellite Service
MTX	Mobile Transmit

NEAR	National Emergency Alarm Radio
NERA	National Economics Research Associates
NICAM	Near Instantaneous Compression And Multiplexing
OB	Outside Broadcast
PABX	Private Automatic Branch Exchange
PCN	Personal Communication Network
PHS	Personal Handyphone System
PMR	Private Mobile Radio
RR	Radio Regulation
s-to-E	space-to-Earth
S-DAB	Satellite Digital Audio Broadcasting
SABRE	South African Band Re-planning Exercise
SANDF	South African National Defence Force
SAPS	South African Police Service
SARL	South African Radio League
SF	Single Frequency
STL	Studio Transmitter Link
T-DAB	Terrestrial Digital Audio Broadcasting
TACS	Total Access Communications System
TETRA	Trans European Trunked Radio
TFTS	Terrestrial Flight Telephone System
UHF	Ultra High Frequency
UMTS	Universal Mobile Telecommunications System
VHF	Very High Frequency
WARC	World Administrative Radio Conference
WLL	Wireless Local Loop
WRC	World Radio Conference

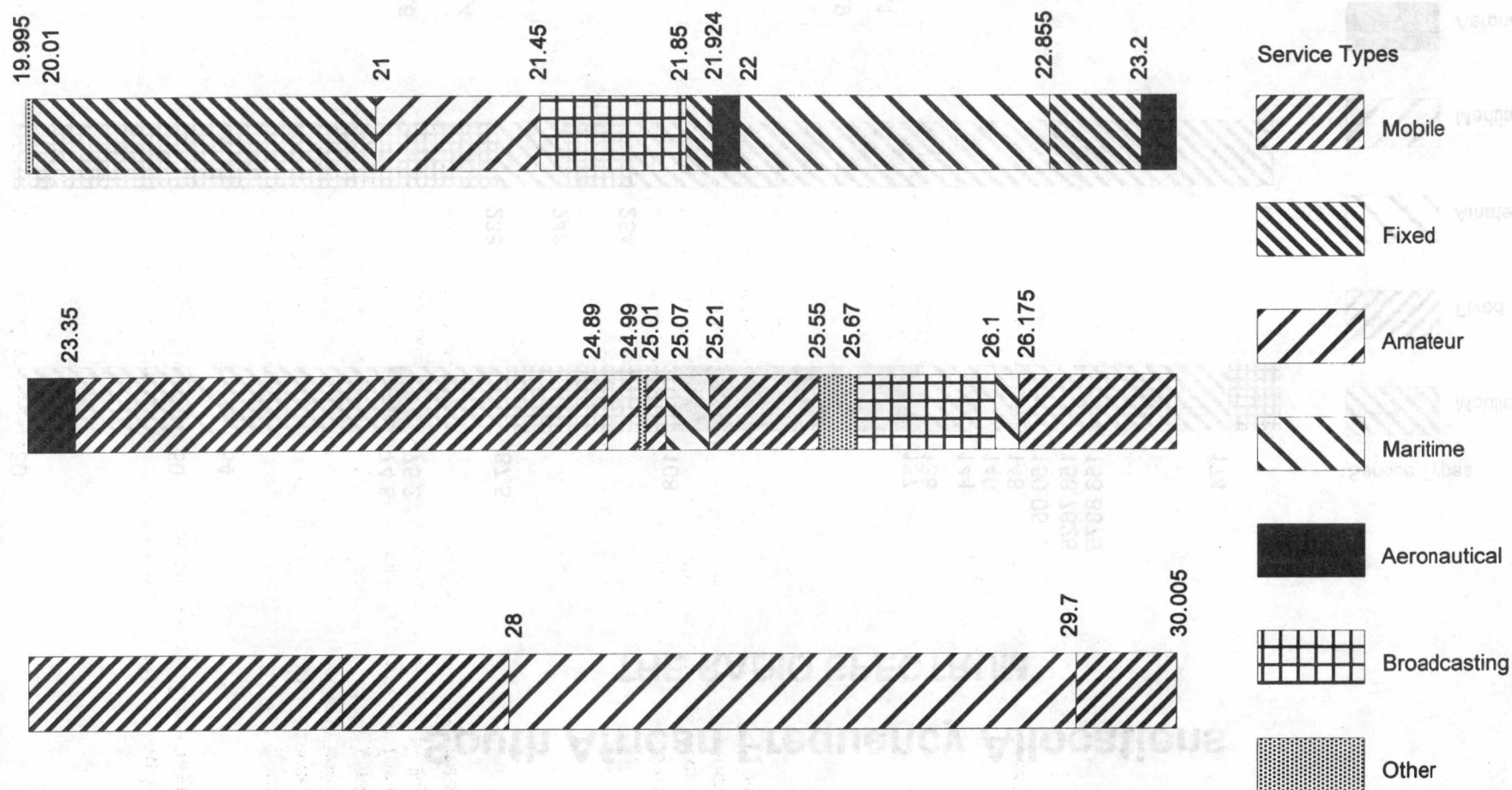
B Diagrammatic representation of band plan

The figures presented on the following pages illustrate the proposed future band plan in diagrammatic form, in order to aid comprehension of the plan. The diagrams illustrate the following:

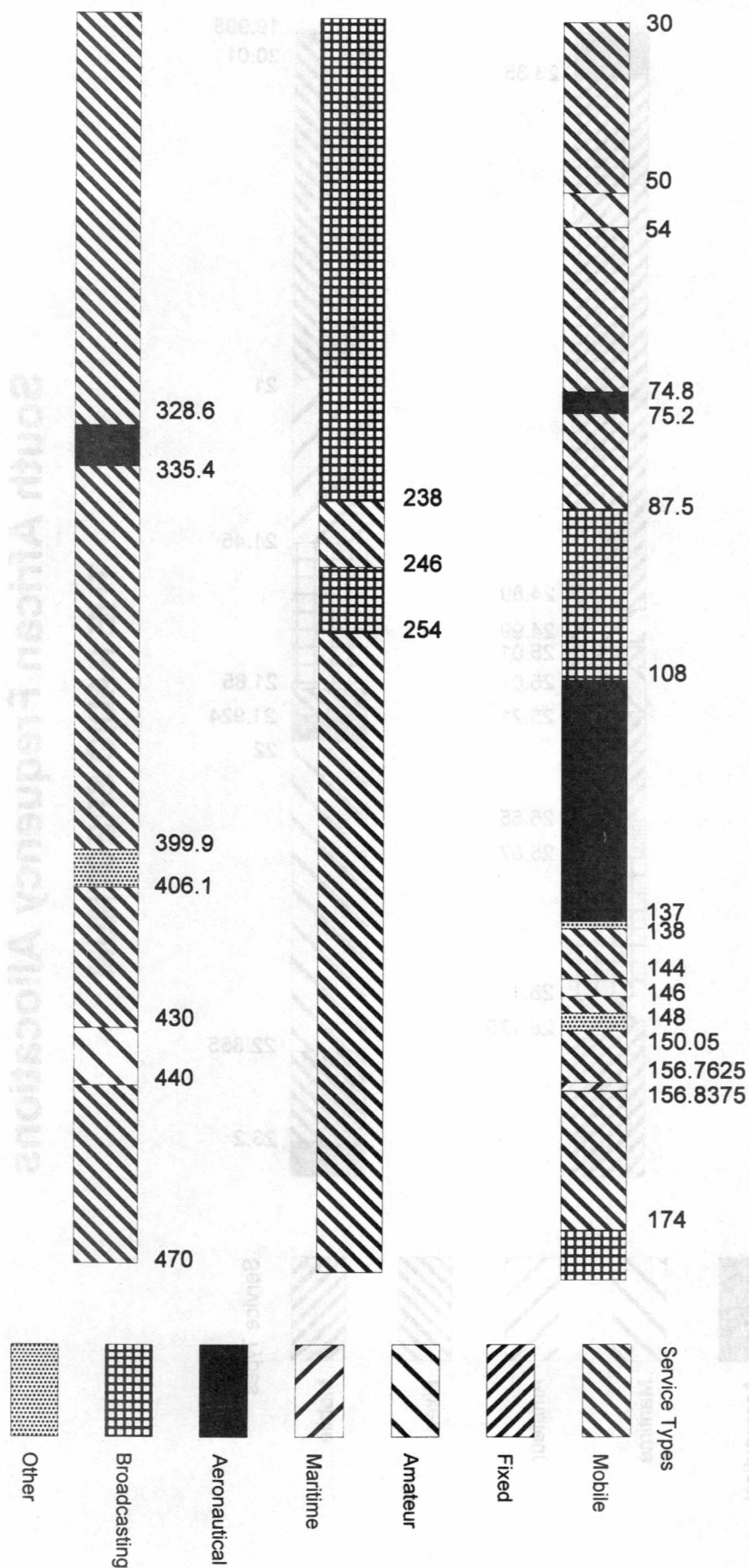
- The first 3 diagrams show the division of the band 20 MHz to 3 GHz between service types, which is in most cases in accordance with ITU Region 1 allocations. For clarity, only a limited number of colour-coded service types are used (ie mobile, fixed, amateur, maritime, aeronautical, broadcasting and 'other'), rather than the full set of services defined by the ITU. The service type shown for each sub-band corresponds to the future use of the band which is expected to be the most widespread in the future. The whole frequency range is divided into the following 3 sections:
 - 20 - 30 MHz;
 - 30 - 470 MHz;
 - 470 - 3000 MHz.
- The next 5 diagrams "zoom in" on the most important and congested areas of the spectrum, in particular those which are allocated to the mobile service. The diagrams show features such as single and dual frequency bands, Tx/Rx pairings, and allocations to particular systems, applications and user groups. The bands shown in the 5 diagrams are as follows:
 - VHF Low and Mid bands (30 - 87.5 MHz);
 - VHF High band (137 - 174 MHz);
 - UHF mobile band (406.1 - 470 MHz);
 - 800 / 900 MHz band (806 - 960 MHz);
 - 1.35 - 2.7 GHz.
- The final diagram indicates the bands that are to be allocated on a shared basis to wireless local loop.

South African Frequency Allocations

THE RADIO SPECTRUM

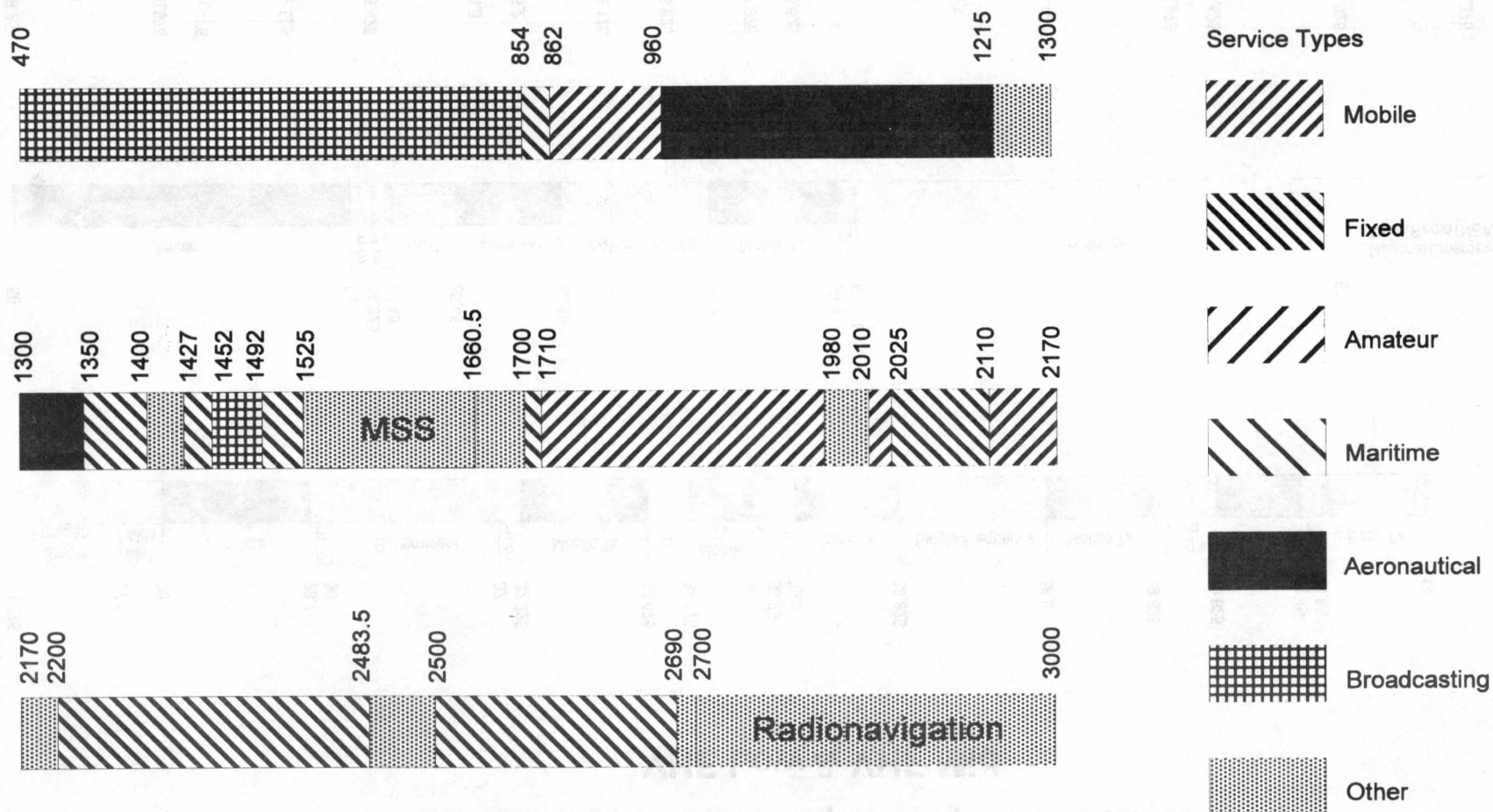


South African Frequency Allocations THE RADIO SPECTRUM



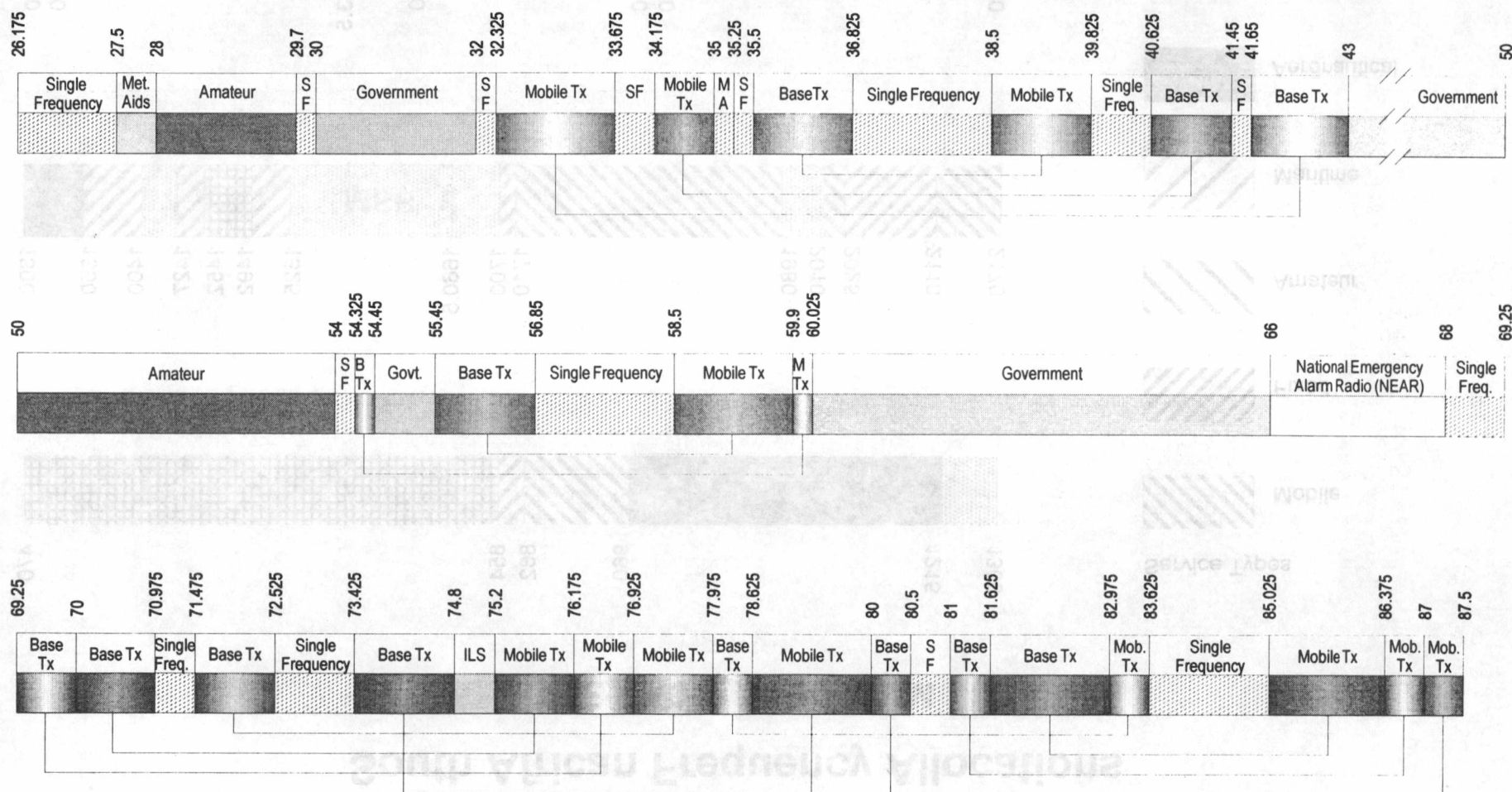
South African Frequency Allocations

THE RADIO SPECTRUM

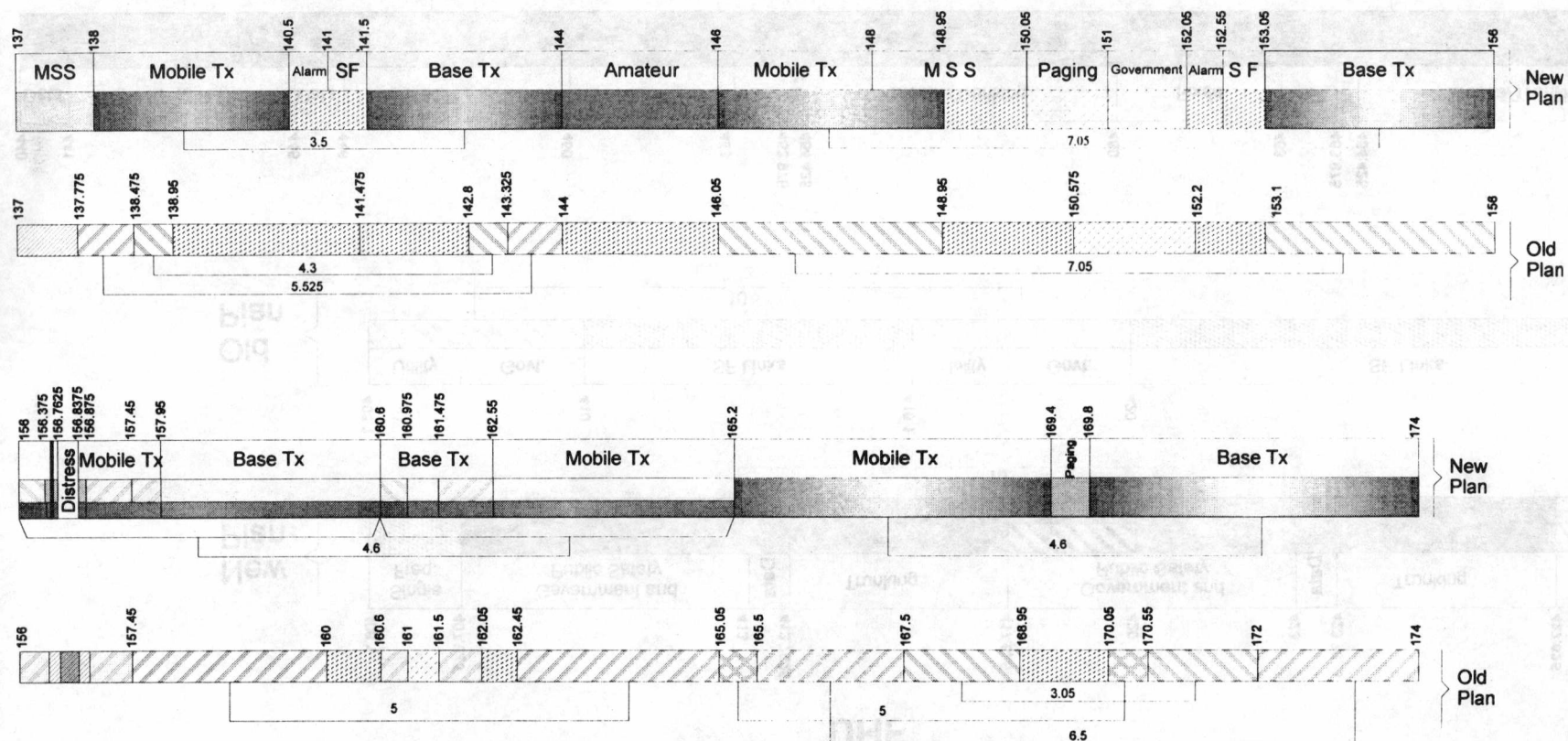


South African Frequency Allocations

VHF Low & VHF Mid

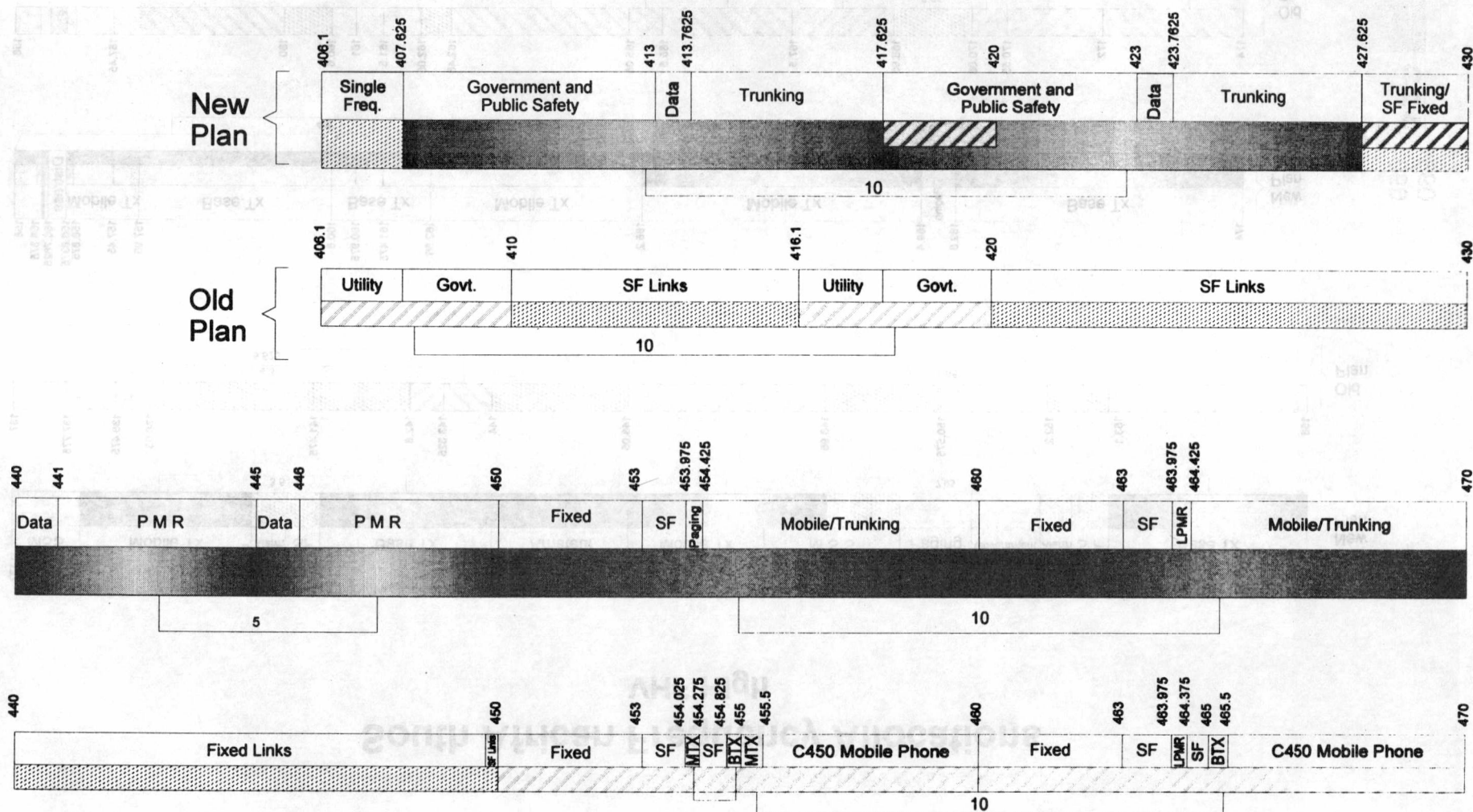


South African Frequency Allocations VHF High



South African Frequency Allocations

UHF



South African Frequency Allocations 800 MHz

	806
TV 63	814
TV 64	822
TV 65	830
TV 66	838
TV 67	846
TV 68	854
	856
Links	864.1
CT2	868.1

	868.1
Links	876
Trunk MTX	880
E-GSM	890
GSM	914
	915
CT1	915.4
Reserved	921
Trunk BTX	925
Paging	925.4
E-GSM	935
GSM	959
CT1	960

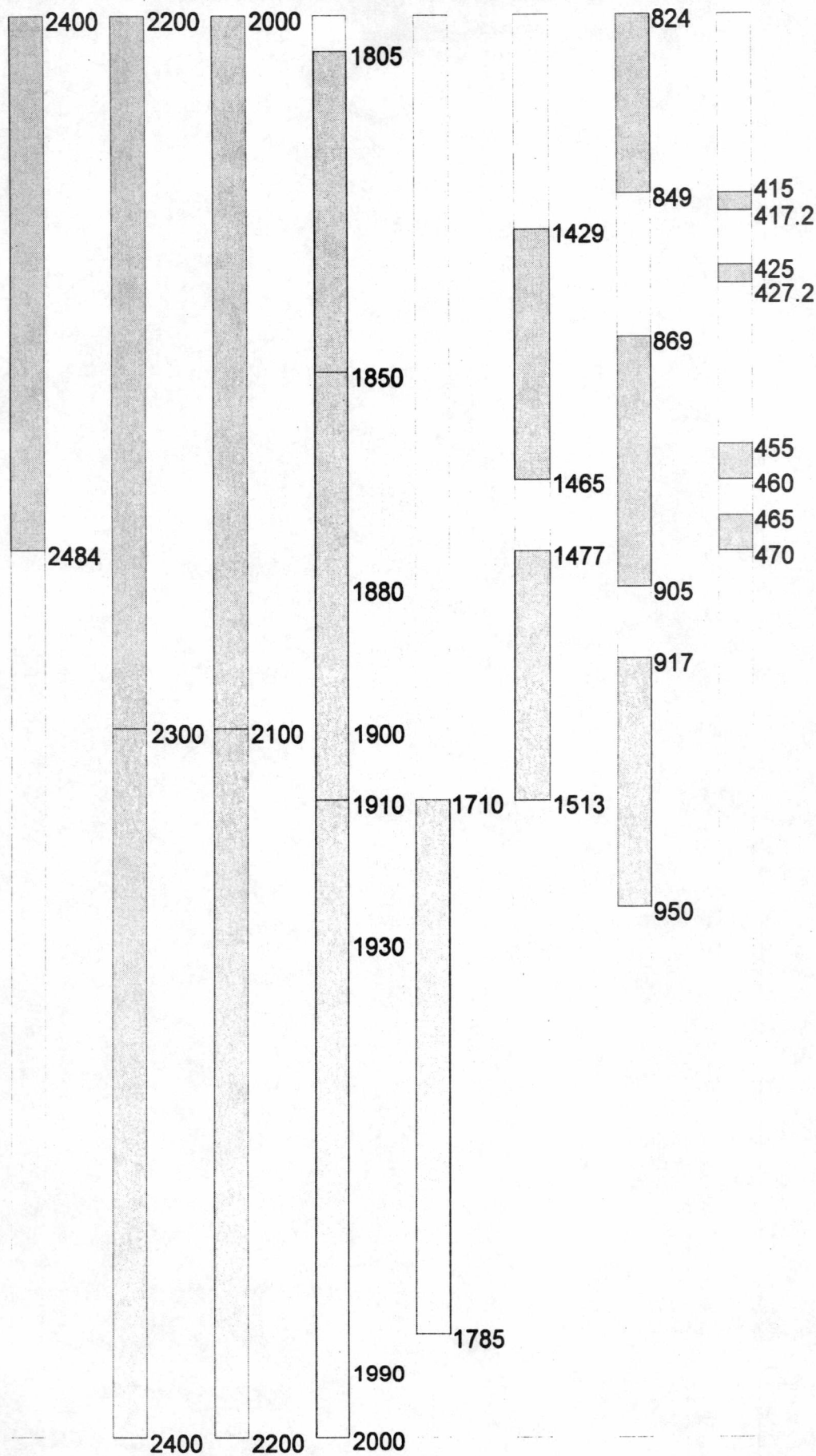
South African Frequency Allocations

1.35 - 2.7 GHz

Fixed	2200	Fixed	1700	Fixed	1710
Fixed	2290	PCN	1785	Reserved	1800
Fixed	2400	PCN	1880	TFTS	1805
ISM	2483.5	DECT, PHS	1918	PCN	1885
MSS	2500	FPLMTS /UMTS	1980	MSS	1980
Fixed (MMDS)	2690	FPLMTS /UMTS	2010	FPLMTS /UMTS	2025
Astron.	2700	Fixed	2110	Fixed	2110
Fixed	2290	Fixed	2170	Fixed	2170
Fixed	2400	Fixed	2200	Fixed	2200
ISM	2483.5	MSS	1350	MSS	1350
MSS	2500	FPLMTS /UMTS	1375	FPLMTS /UMTS	1375
Fixed (MMDS)	2690	MSS	1400	MSS	1400
Astron.	2700	FPLMTS /UMTS	1427	FPLMTS /UMTS	1427
Fixed	2200	Fixed	1429	Fixed	1429
Fixed	2290	Fixed	1452	Fixed	1452
Fixed	2400	Fixed	1467	Fixed	1467
ISM	2483.5	MSS	1492	MSS	1492
MSS	2500	FPLMTS /UMTS	1517	FPLMTS /UMTS	1517
Fixed (MMDS)	2690	MSS	1525	MSS	1525
Astron.	2700	FPLMTS /UMTS	1535	FPLMTS /UMTS	1535
Fixed	2200	Fixed	1544	Fixed	1544
Fixed	2290	Fixed	1559	Fixed	1559
Fixed	2400	Fixed	1610	Fixed	1610
ISM	2483.5	MSS	1626.5	MSS	1626.5
MSS	2500	FPLMTS /UMTS	1645.5	FPLMTS /UMTS	1645.5
Fixed (MMDS)	2690	MSS	1660.5	MSS	1660.5
Astron.	2700	FPLMTS /UMTS	1670	FPLMTS /UMTS	1670
Fixed	2200	Fixed	1700	Fixed	1700
Fixed	2290	Fixed	1710	Fixed	1710
Fixed	2400	Fixed	1785	Fixed	1785
ISM	2483.5	MSS	1800	MSS	1800
MSS	2500	FPLMTS /UMTS	1805	FPLMTS /UMTS	1805
Fixed (MMDS)	2690	MSS	1880	MSS	1880
Astron.	2700	FPLMTS /UMTS	1918	FPLMTS /UMTS	1918
Fixed	2200	Fixed	1980	Fixed	1980
Fixed	2290	Fixed	2010	Fixed	2010
Fixed	2400	Fixed	2025	Fixed	2025
ISM	2483.5	MSS	2110	MSS	2110
MSS	2500	FPLMTS /UMTS	2170	FPLMTS /UMTS	2170
Fixed (MMDS)	2690	MSS	2200	MSS	2200

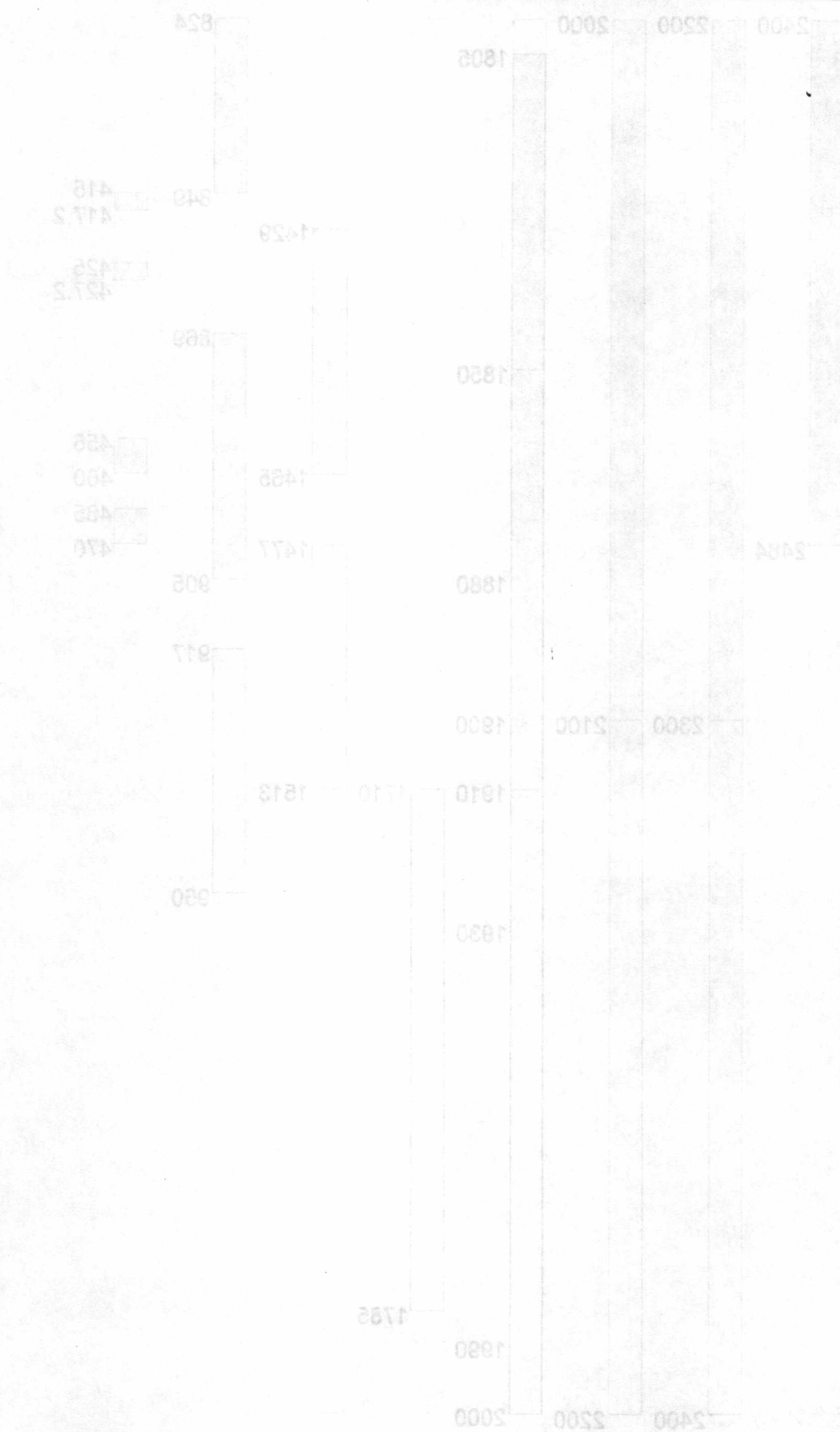
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
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Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
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Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat	1535	MSS	1544	GPS L1	1559	MSS	1610	Inmarsat	1626.5	MSS	1645.5	Astron.	1660.5	TFTS	1670	Mobile	1675
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Fixed	1350	Fixed	1375	Radio Astronomy	1400	Space Ops	1427	Fixed	1429	T-DAB	1452	S-DAB	1467	Fixed	1492	Fixed	1517	MSS	1525	Inmarsat																	

South African Frequency Allocations Shared Spectrum for Wireless Local Loop



South African Frequency Allocations

Shared Spectrum for Wireless Local Loop



Department of Communications

Project SABRE
(South African Band Re-planning Exercise)

Migration strategy

Version 1.2

11 December 1996

Contents

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3	Migration of particular services	15
A	Submissions on Draft Migration Strategy received	28

1 Introduction

1.1 General

This document presents the migration strategy for aligning existing radio communications systems with the South African Band Plan for the frequencies 20 MHz to 3 GHz. This document should be read in conjunction with the final band plan (Version 1.61) as approved by Cabinet on 6 November 1996 and released for general distribution on 11 November 1996.

1.2 Project SABRE

The need for Project SABRE emerged over a period of time, in response to factors such as the increased demand for radio spectrum and developments elsewhere in the world that could potentially benefit South Africa. The project was established in 1995 in order to re-plan the radio frequency spectrum between 20 MHz and 3 GHz. The project is being conducted by the Department of Communications, together with an international team of consultants, led by Smith System Engineering from the UK and including the CSIR in South Africa, the UK Radiocommunications Agency and the economic consultants NERA.

The principal aims of the project are as follows:

- to review the usage of the radio spectrum between the frequencies 20 MHz and 3 GHz;
- to produce a band plan for the future use of the spectrum, which is both agreed nationally in South Africa and consistent with international trends.

In order to achieve these aims, the project is divided into four phases:

- Phase 1 - 'Current spectrum usage', has reviewed the current spectrum usage in South Africa.
- Phase 2 - 'Requirements capture', has identified the requirements for the future use of the spectrum in South Africa.
- Phase 3 - 'International trends', has examined relevant international trends, both in technology and services and in the usage of the spectrum in other countries.
- Phase 4 - 'Band plan', has taken as input the results of the previous three phases, and has balanced these in order to produce the final band plan. As supplement to the band plan, a 'Migration strategy' has been developed which is presented in this document.

1.3 Principles of migration

In implementing a migration strategy the following points should be considered:

- Precisely what are the systems presently operating in the proposed spectrum and what geographic areas are served by them?
- What spectrum will be available for incumbents to relocate to?
- What impact will different propagation characteristics of the new band have on the incumbent's new replacement system?
- Will existing infrastructure support a band change?
- The approximate costs of replacement systems, providing same type and quantity of units, and same coverage area.
- Will other inducements be required to expedite band clearing?
- How will cost to incumbents who must relocate from one band to a different band be funded?
- How will the relocation of the incumbent systems be accomplished and what timeline issues pertain thereto?
- If an incumbent who must relocate chooses instead to use commercial services in lieu of relocating its previous system to another band, what financial consideration for band clearing is appropriate and how would it be funded?
- If temporary use of commercial services is a viable method of expediting band clearing prior to an incumbent's cut over to a new system, how should that be funded?

Similar exercises in other countries have shown that deadlines for migration are very important. If they are not imposed, the existing operations can/will go on indefinitely. For that reason, mandatory transition is required.

Keeping the above mentioned points in mind, especially the cost of migration and the opportunity for better spectrum utilisation, certain general principles were applied.

In the period 1990 - 1996 many of the LMR bands were migrated from 25 kHz channel spacing to 12.5 kHz. The interleaved channels that were created by this process can now be used for the migration. Where the mobile transmit, base transmit and transmit-receive arrangements have not changed, the process of assigning the interleaved channels can start immediately. In some cases guard channels were also reserved between different transmit-receive blocks which can also be subdivided.

Any new assignments will be based on the new bandplan. Frequencies not intended for certain services, will not be assigned for those services.

If the transmit-receive separation has changed, the interleaved channels can be used (with the new transmit-receive separation), if new mobile transmit overlaps with old mobile transmit, and new base transmit overlaps with old base transmit or simplex.

In general dual frequency operations are more spectrally efficient than single frequency operations, because of restrictions on single frequency operations at high-sites due to intermodulation products. For this reason many single frequency blocks will be migrated to dual frequency. If a continuous block of single frequencies were reserved for a high site, only the channels with adequate adjacent channel separation and no interfering intermodulation products could be used. This is because both transmit and receive is used in the same frequency block in the same geographic area. In the case of dual frequency blocks, the transmit and receive parts are separated and there are less restrictions on the number of frequencies in a block that can be used at a high site.

1.4 About this document

This document is divided into the following sections:

- Section 2 presents, in tabular format, the proposed migration strategy for aligning use of the radio spectrum between 20 MHz and 3 GHz with the new South African Band Plan.
- Section 3 provides a more detailed strategy for particular services, in particular fixed links, mobile services in VHF-High, paging and alarms.

2 Migration strategy for bands

2.1 Introduction

The tables in this section provide an indication of which bands have changed and the timescales for implementing those changes. N/C in the second column indicates no significant changes have been made to that specific band.

Time for migration is indicated by Year x - y, where year x is included and year y excluded. Year 0 begins on 1 January 1997.

The term migrate is used where systems in one frequency band will move to a different frequency band, or to different frequencies within the band. The term assign is used where a band is available for assignment to new licenses, which is not part of the migration process.

2.2 20 - 50 MHz

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
20 - 26.957	Various	N/C	
26.957 - 27.283	Low power paging	N/C	Migrate low power paging from 40.68. (Year 0-5)
27.283 - 29.7	Various	N/C	
29.7 - 30	Mobile	Mobile / Amateur	Available for assignment to Amateur on secondary basis for use during emergency situations. (Immediate)
30 - 35	Mobile	N/C	
35 - 35.25	35 - 35.15 MTX paired with 41.45 - 41.6 35.2 - 35.25 Single Frequency	Model Aircraft	Migrate mobile users to adjacent blocks. (Year 0 - 3) Available for assignment to model aircraft. (Year 3+)
35.25 - 40.675	Mobile	N/C	Restricted assignment in 38 MHz block due to interference on television intermediate frequencies.
40.675 - 40.685	ISM	Amateur	Migrate low power paging at 40.68 to 27.12 MHz, 53 MHz or UHF paging. (Year 0 - 5) Available for assignment to Amateur for propagation study, max. ERP 10 W. (Year 3+) Accept mutual interference in Year 3 - 5.
40.685 - 41.45	Mobile	N/C	
41.45 - 41.6	Mobile BTX paired with 35 - 35.15	Single Frequency	Migrate with block 35 - 35.15 MHz. (Year 0 - 5) Available for Single Frequency assignments. (Year 5+)
41.6 - 50	Various	N/C	

2.3 50 - 87.5 MHz

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
50 - 60.025	Various	N/C	
60.025 - 60.225	Model Aircraft	Mobile	Migrate to 35-35.25 (Year 0 - 8)
60.225 - 66	Mobile	N/C	
66 - 68	Mobile	NEAR	Migrate from 25 kHz to 12.5 kHz channel spacing for increased capacity.
68 - 70	Mobile	N/C	
70 - 70.3	70.025 - 70.3 BTX paired with 75.225 - 75.525	Mobile/ Amateur	Available for assignment to Amateur (Year 3+) on shared basis.
70.3 - 87.5	Various	N/C	Assignment to dual frequency alarms in 81 - 81.625 BTX paired with 86.375 -87 MTX. (Immediate)

2.4 87.5 - 108 MHz

No change in this part of the spectrum. (FM Broadcasting)

2.5 108 - 137 MHz

No significant change in this part of the spectrum. (Aeronautical mobile). Reduced channel spacing (from 50 kHz to 25 kHz) should be used to alleviate congestion where necessary.

2.6 137 - 174 MHz

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
137 - 137.75	Various	N/C	
137.75 - 138	MSS / Space Operations 137.775 - 138 MTX	MSS / Space Operations	Migrate mobile users to 138 - 144 mobile bands. (Year 5 - 7) See detailed VHF-high migration (section 3.3).
138 - 144	Mobile	New mobile arrangement	7 Year migration. See detailed VHF-high migration (section 3.3).
144 - 146	Amateur	N/C	
146 - 148	Mobile	N/C	Immediately available for assignment.
148 - 149.95	MSS 148 - 148.9 MTX paired with 155.05 - 156 148.9 - 149.95 SF	N/C	No new assignments, pending development of MSS.
149.95 - 152.2	Mobile	Mobile (Government and Paging)	5 Year migration. See detailed VHF-high migration (section 3.3).
152.2 - 155.05	Mobile	N/C	Immediately available for assignment.
155.05 - 156	155.05 - 156 BTX paired with 148 - 148.95	N/C	Migration with 148 - 148.9, ie no new assignments, pending development of MSS. See detailed VHF-high migration (section 3.3).
156 - 174	Various	New mobile arrangement	10 Year migration. See detailed VHF-high migration (section 3.3).

2.7 174 - 400 MHz

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
174 - 238	Broadcasting	N/C	
238 - 240	Mobile / Fixed	Digital Audio Broadcasting	Migrate links. (Year 0 - 5) Available for DAB assignments. (Immediate)
240 - 246	Mobile / Fixed	Digital Audio Broadcasting	Migrate links. (Year 0 - 5) Available for DAB assignments (Year 5+), pending equipment availability.
246 - 254	Broadcasting	N/C	
254 - 286	Mobile		Government to clear 700 kHz for 2-way paging paired with 925 - 925.4. (Clear as required)
286 - 335.4	Various	N/C	
335.4 - 380	Mobile/Fixed		Government to clear 2x10 MHz for WLL use.(Clear as required)
380 - 400	Mobile		Migration towards TETRA in long term. (Year 10 - 15)

2.8 400 - 470 MHz

Frequency Band (MHz)	Old	New	Migration
406.1 - 407.625	BTX paired with 416.1 - 417.625.	SF	Migrate links according to link plan. (Year 0 - 3) Migrate ESKOM to 455 - 460, 465 - 470 utilities band (Year 3 - 5)
407.625 - 413	SAPS : 407.625 - 410 BTX paired with 417.625 - 420	407.625 - 413 MTX paired with 417.625 - 423 <i>Government and Public Safety</i>	Migrate links according to link plan. (Immediate) Migrate SAPS to Government and Public Safety block with MTX low. (Immediate) Migrate Local and Regional Authorities from VHF Low, Mid and High. (Year 0 - 5)
413 - 413.7625	Links	Mobile Data MTX paired with 423 - 423.7625 <i>Private and Public Networks</i>	Migrate links according to link plan. (Immediate)
413.7625 - 416.1	Links	Trunked Mobile MTX paired with 423.7625 - 426.1 <i>Public Trunking</i>	Migrate links according to link plan. (Year 0 - 3)
416.1 - 417.625	BTX paired with 406.1 - 407.625	Trunked Mobile MTX paired with 426.1 - 427.625 <i>Public Trunking</i>	Migrate ESKOM to 455 - 460, 465 - 470 utilities band. (Year 3 - 5)
417.625 - 423	SAPS : 417.625 - 420 BTX paired with 407.625 - 410. SF Links : 420 - 423.	417.625 - 423 BTX paired with 407.625 - 413. 417.625 - 420 MTX paired with 427.625 - 430 in urban areas. <i>Government and Public Safety</i>	Migrate links according to link plan. (Immediate) Migrate SAPS to Government and Public Safety block with BTX high. (Immediate) Migrate Local and Regional Authorities from VHF Low, Mid and High. (Year 0 - 5) As soon as SAPS is on new plan, band 417.625 - 420 would be available for trunking in urban areas.

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
423 - 423.7625	SF Links	Mobile Data BTX paired with 413 - 413.7625 <i>Private and Public networks.</i>	Migrate links according to link plan. (Year 0 - 3)
423.7625 - 427.625	SF Links	Trunk Mobile BTX paired with 413.7625 - 417.625 <i>Public Trunking</i>	Migrate links according to link plan. (Year 0 - 5) Sub-band 423.7265 - 426.1 available for public trunking. (Year 5+) Sub-band 426.1 - 427.625 available for public trunking (Depends on clearing of 416.1 - 417.625) (Year 5+)
427.625 - 430	SF Links	Trunking BTX paired with 417.625 - 420 in urban areas. Rural : <i>SF Links</i> Urban : <i>Government and Public Safety</i>	Migrate links in urban areas according to link plan. (Year 0 - 5) Available for Government and Public Safety in urban areas. (Year 5+). Assignments will be in 407.625 - 413/417.625 - 423 or 410 - 413/420 - 423, 417.625 - 420/427.625 - 430 depending on user requirements.
430 - 440	Amateur	N/C	
440 - 445	Links	Telemetry / Data BTX 440 - 441 paired with 445 - 446 Mobile BTX 441 - 445 paired with 446 - 450	Data block available for dual frequency alarms. (Immediate) Migrate links according to link plan (Immediate) Migrate mobile from 450 - 470 MHz. (Year 0 - 5)
445 - 450	445 - 449.7 Links 449.7 - 450 SF	Telemetry / Data MTX 445 - 446 paired with 440 - 441 Mobile MTX 446 - 450 paired with 441 - 445	Data block available for dual frequency alarms. (Immediate) Migrate links according to link plan. (Immediate) Migrate SF mobile to adjacent mobile band or alternative mobile bands. (Year 0 - 5) Migrate mobile from 450 - 470 MHz. (Year 0 - 5)

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
450 - 453	Fixed	Paired with 460 - 463.	Migrate links according to link plan. Migrate Swiftnet to 440-441. (Year 0 - 7)
453 - 453.975	SF Mobile	N/C	
453.975 - 454.425	454.025 - 454.125 MTX 454.275 - 454.725 SF Mobile	Paging Upper 4 channels for on-site paging.	Migrate low power paging from 40.68 MHz. (Immediate) Migrate single-site paging from VHF-High. (Immediate) Migrate current SF and DF assignments to 440 - 450 MHz or alternative mobile bands. (Year 0-5)
454.425 - 460	454.875 - 454.975 BTX 455.5 - 458.98 C450 BTX 459 - 460 BTX	MTX paired with 464.425 - 470 <i>Private Trunking, including utilities</i>	C450 Licence expires in 1999. Migrate current DF mobile assignments to 440 - 450 MHz or alternative mobile bands. (Year 0 - 5) Migrate Transtel from VHF High. (Year 0 - 5) Migrate Eskom from 406.1 - 407.625 / 416.1 - 417.625. (Year 3 - 5)
460 - 463	Fixed	Paired with 450 - 453.	Migrate Swiftnet to 445 - 446 MHz. (Year 0-7)
463 - 463.975	SF Mobile	N/C	
463.975 - 464.425	SF Mobile	Low Power Mobile Radio (LPMR)	Migrate current SF assignments to 463 - 463.975 MHz (SF), DF or LPMR (ERP=500 mW). (Year 0 - 5)
464.425 - 470	464.525 - 464.975 SF 465.5 - 468.98 C450 MTX 469 - 469.975 MTX	BTX paired with 454.425 - 460 <i>Private Trunking, including utilities</i>	C450 Licence expires in 1999. Migrate current DF mobile assignments to 440 - 450 MHz or alternative mobile bands. (Year 0 - 5) Migrate current SF assignments to 463 - 463.975 MHz, DF or LPMR.

2.9 470 - 960 MHz

No significant changes to these bands. Links within this band should migrate according to the link migration plan.

2.10 960 - 3000 MHz

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
960 - 1350	Various	N/C	
1350 - 1400	Mobile / Radiolocation	Fixed links (CEPT T/R 13-01)	Migrate Radar to 960 - 1350 MHz. (Immediate)
1400 - 1427	Various	N/C	
1427 - 1452	Fixed	Fixed Links (CEPT T/R 13-01)	Migrate links according to link plan. (Year 0 - 3)
1452 - 1467	Fixed	Terrestrial Digital Audio Broadcasting	Migrate links according to link plan. (Year 0 - 5)
1467 - 1492	Fixed	Satellite Digital Audio Broadcasting	No migration
1492 - 1525	Fixed	1492 - 1517 Fixed links. (CEPT T/R 13-01) 1517 - 1525 Single Frequency Fixed links.	Existing links to migrate according to link plan. (Year 0 - 3) Migration of SF links from other bands (Year 0 - 3)
1525 - 1710	Various	N/C	
1710 - 1785	Fixed links	Personal Communication Networks (PCN)	Migrate links according to link plan (Immediate) Migrate Radar to radiolocation block (Immediate)
1785 - 1805	Various	N/C	
1805 - 1880	Fixed links	Personal Communication Networks (PCN)	Migrate links according to link plan (Year 0 - 3)
1880 - 1918.1	Fixed links	1880 - 1900 DECT 1895 - 1918.1 PHS	Migrate links according to link plan (Immediate)

Frequency Band (MHz)	Old Allocation	New Allocation	Migration
1918.1 - 2025	Various	N/C	
2025 - 2110	Fixed links	2025 - 2031.5 WLL 2031.5 - 2101.5 Fixed links (CEPT T/R 13-01) 2101.5 - 2110 WLL	Migrate links according to links plan (Immediate)
2110 - 2200	Various	N/C	Migrate radar to radiolocation blocks (Immediate)
2200 - 2290	Fixed links	2200 - 2206.5 WLL 2206.5 - 2276.5 Fixed links (CEPT T/R 13-01) 2276.5 - 2290 WLL	Migrate links according to links plan (Immediate) Migrate radar to radiolocation blocks (Immediate)
2290 - 2500	Various	N/C	
2500 - 2700	Fixed links	2500 - 2690 MMDS 2690 - 2700 Radio Astronomy	Replan MMDS frequency plan. Migrate links according to links plan.
2700 - 3000	Aeronautical Radionavigation	N/C	

3 Migration of particular services

3.1 Introduction

This section provides more detailed strategies for migration of particular services:

- fixed links (section 3.2);
- mobile services in VHF High Band (section 3.3);
- paging (section 3.4);
- alarms (section 3.5).

3.2 Fixed links

One of the fundamental long term aims that is encompassed within the future bandplan is the migration of fixed links to higher frequencies, in particular from bands below 1 GHz, and to frequencies above 3 GHz where possible. This has a number of effects:

- UHF (400 - 470 MHz) links should be moved above 3 GHz where possible. However, spectrum in 427.625 - 430 MHz is reserved for single frequency links in rural areas, and spectrum in 450 - 453 paired with 460 - 463 MHz is reserved for dual frequency links.
- Links in the 800 MHz band (854 - 960 MHz) should in general also be moved above 3 GHz where possible, although in some cases it may be possible for these to remain where this can be justified.
- Links in the range 1.3 - 2.5 GHz should be moved above 3 GHz where possible. However, in some cases the links can remain unchanged, or be moved to the new channelling plan in 1.3 - 2.5 GHz, if a case can be made why they should not move higher.
- New allocations for fixed links will be made in the band 1350-1525 MHz, in accordance with the plans in CEPT Recommendation T/R 13-01. These frequencies will be used in cases where a user is migrating fixed links from the UHF band, or from other frequencies around 1.5 GHz, but for some well-justified reasons it is unreasonable to insist that the links are moved above 3 GHz.

Currently links exist in the following bands below 470 MHz:

- VHF High. This is a very valuable part of the spectrum for mobile services and should definitely not be restricted by fixed links.
- 238 - 246 MHz. Relatively few links have been assigned frequencies in this band. These will have to move to a higher frequency band for the roll-out of digital audio broadcasting.
- 406.1 - 420 MHz. Some medium-capacity links exist which should be moved to frequencies between 1 and 3 GHz.

- 420 - 430 MHz. Most of the low capacity single frequency links are in this part of the band. These will mainly have to migrate to the band 1517-1525 MHz, to be assigned from the lower frequencies upwards.
- 440 - 450 MHz. Some single and dual frequency links are used in this part of the spectrum. They will be migrated out of this band and assigned in the appropriate bands for the capacity required.
- 450 - 453 MHz paired with 460 - 463 MHz. Users would be required to rationalise their use of frequencies in these bands and motivate why they should not move. Spectrum will be provided for dual frequency, low capacity systems in 1350 - 1375 MHz paired with 1492 - 1517 MHz or 1375 - 1400 MHz paired with 1427 - 1452 MHz.

In evaluating the necessity of maintaining a lower frequency link the following factors will be taken into account:

- alternative possibilities (eg landlines, shared links, etc);
- link capacity;
- distance to be covered;
- area of use (rural or urban);
- relevant ITU recommendations.

The following pages presents two tables: the bands that links will have to migrate out of and the bands that links will migrate to.

440 - 450	Links	Year 0 - 3
450 - 453	Links	Year 0 - 3
453 - 455	Links	Year 0 - 3
455 - 458	Links	Year 0 - 3
458 - 460	Links	Year 0 - 3
460 - 463	Links	Year 0 - 3
463 - 465	Links	Year 0 - 3
465 - 468	Links	Year 0 - 3
468 - 470	Links	Year 0 - 3
470 - 473	Links	Year 0 - 3
473 - 475	Links	Year 0 - 3
475 - 478	Links	Year 0 - 3
478 - 480	Links	Year 0 - 3
480 - 483	Links	Year 0 - 3
483 - 485	Links	Year 0 - 3
485 - 488	Links	Year 0 - 3
488 - 490	Links	Year 0 - 3
490 - 493	Links	Year 0 - 3
493 - 495	Links	Year 0 - 3
495 - 498	Links	Year 0 - 3
498 - 500	Links	Year 0 - 3
500 - 503	Links	Year 0 - 3
503 - 505	Links	Year 0 - 3
505 - 508	Links	Year 0 - 3
508 - 510	Links	Year 0 - 3
510 - 513	Links	Year 0 - 3
513 - 515	Links	Year 0 - 3
515 - 518	Links	Year 0 - 3
518 - 520	Links	Year 0 - 3
520 - 523	Links	Year 0 - 3
523 - 525	Links	Year 0 - 3
525 - 528	Links	Year 0 - 3
528 - 530	Links	Year 0 - 3
530 - 533	Links	Year 0 - 3
533 - 535	Links	Year 0 - 3
535 - 538	Links	Year 0 - 3
538 - 540	Links	Year 0 - 3
540 - 543	Links	Year 0 - 3
543 - 545	Links	Year 0 - 3
545 - 548	Links	Year 0 - 3
548 - 550	Links	Year 0 - 3
550 - 553	Links	Year 0 - 3
553 - 555	Links	Year 0 - 3
555 - 558	Links	Year 0 - 3
558 - 560	Links	Year 0 - 3
560 - 563	Links	Year 0 - 3
563 - 565	Links	Year 0 - 3
565 - 568	Links	Year 0 - 3
568 - 570	Links	Year 0 - 3
570 - 573	Links	Year 0 - 3
573 - 575	Links	Year 0 - 3
575 - 578	Links	Year 0 - 3
578 - 580	Links	Year 0 - 3
580 - 583	Links	Year 0 - 3
583 - 585	Links	Year 0 - 3
585 - 588	Links	Year 0 - 3
588 - 590	Links	Year 0 - 3
590 - 593	Links	Year 0 - 3
593 - 595	Links	Year 0 - 3
595 - 598	Links	Year 0 - 3
598 - 600	Links	Year 0 - 3
600 - 603	Links	Year 0 - 3
603 - 605	Links	Year 0 - 3
605 - 608	Links	Year 0 - 3
608 - 610	Links	Year 0 - 3
610 - 613	Links	Year 0 - 3
613 - 615	Links	Year 0 - 3
615 - 618	Links	Year 0 - 3
618 - 620	Links	Year 0 - 3
620 - 623	Links	Year 0 - 3
623 - 625	Links	Year 0 - 3
625 - 628	Links	Year 0 - 3
628 - 630	Links	Year 0 - 3
630 - 633	Links	Year 0 - 3
633 - 635	Links	Year 0 - 3
635 - 638	Links	Year 0 - 3
638 - 640	Links	Year 0 - 3
640 - 643	Links	Year 0 - 3
643 - 645	Links	Year 0 - 3
645 - 648	Links	Year 0 - 3
648 - 650	Links	Year 0 - 3
650 - 653	Links	Year 0 - 3
653 - 655	Links	Year 0 - 3
655 - 658	Links	Year 0 - 3
658 - 660	Links	Year 0 - 3
660 - 663	Links	Year 0 - 3
663 - 665	Links	Year 0 - 3
665 - 668	Links	Year 0 - 3
668 - 670	Links	Year 0 - 3
670 - 673	Links	Year 0 - 3
673 - 675	Links	Year 0 - 3
675 - 678	Links	Year 0 - 3
678 - 680	Links	Year 0 - 3
680 - 683	Links	Year 0 - 3
683 - 685	Links	Year 0 - 3
685 - 688	Links	Year 0 - 3
688 - 690	Links	Year 0 - 3
690 - 693	Links	Year 0 - 3
693 - 695	Links	Year 0 - 3
695 - 698	Links	Year 0 - 3
698 - 700	Links	Year 0 - 3
700 - 703	Links	Year 0 - 3
703 - 705	Links	Year 0 - 3
705 - 708	Links	Year 0 - 3
708 - 710	Links	Year 0 - 3
710 - 713	Links	Year 0 - 3
713 - 715	Links	Year 0 - 3
715 - 718	Links	Year 0 - 3
718 - 720	Links	Year 0 - 3
720 - 723	Links	Year 0 - 3
723 - 725	Links	Year 0 - 3
725 - 728	Links	Year 0 - 3
728 - 730	Links	Year 0 - 3
730 - 733	Links	Year 0 - 3
733 - 735	Links	Year 0 - 3
735 - 738	Links	Year 0 - 3
738 - 740	Links	Year 0 - 3
740 - 743	Links	Year 0 - 3
743 - 745	Links	Year 0 - 3
745 - 748	Links	Year 0 - 3
748 - 750	Links	Year 0 - 3
750 - 753	Links	Year 0 - 3
753 - 755	Links	Year 0 - 3
755 - 758	Links	Year 0 - 3
758 - 760	Links	Year 0 - 3
760 - 763	Links	Year 0 - 3
763 - 765	Links	Year 0 - 3
765 - 768	Links	Year 0 - 3
768 - 770	Links	Year 0 - 3
770 - 773	Links	Year 0 - 3
773 - 775	Links	Year 0 - 3
775 - 778	Links	Year 0 - 3
778 - 780	Links	Year 0 - 3
780 - 783	Links	Year 0 - 3
783 - 785	Links	Year 0 - 3
785 - 788	Links	Year 0 - 3
788 - 790	Links	Year 0 - 3
790 - 793	Links	Year 0 - 3
793 - 795	Links	Year 0 - 3
795 - 798	Links	Year 0 - 3
798 - 800	Links	Year 0 - 3
800 - 803	Links	Year 0 - 3
803 - 805	Links	Year 0 - 3
805 - 808	Links	Year 0 - 3
808 - 810	Links	Year 0 - 3
810 - 813	Links	Year 0 - 3
813 - 815	Links	Year 0 - 3
815 - 818	Links	Year 0 - 3
818 - 820	Links	Year 0 - 3
820 - 823	Links	Year 0 - 3
823 - 825	Links	Year 0 - 3
825 - 828	Links	Year 0 - 3
828 - 830	Links	Year 0 - 3
830 - 833	Links	Year 0 - 3
833 - 835	Links	Year 0 - 3
835 - 838	Links	Year 0 - 3
838 - 840	Links	Year 0 - 3
840 - 843	Links	Year 0 - 3
843 - 845	Links	Year 0 - 3
845 - 848	Links	Year 0 - 3
848 - 850	Links	Year 0 - 3
850 - 853	Links	Year 0 - 3
853 - 855	Links	Year 0 - 3
855 - 858	Links	Year 0 - 3
858 - 860	Links	Year 0 - 3
860 - 863	Links	Year 0 - 3
863 - 865	Links	Year 0 - 3
865 - 868	Links	Year 0 - 3
868 - 870	Links	Year 0 - 3
870 - 873	Links	Year 0 - 3
873 - 875	Links	Year 0 - 3
875 - 878	Links	Year 0 - 3
878 - 880	Links	Year 0 - 3
880 - 883	Links	Year 0 - 3
883 - 885	Links	Year 0 - 3
885 - 888	Links	Year 0 - 3
888 - 890	Links	Year 0 - 3
890 - 893	Links	Year 0 - 3
893 - 895	Links	Year 0 - 3
895 - 898	Links	Year 0 - 3
898 - 900	Links	Year 0 - 3
900 - 903	Links	Year 0 - 3
903 - 905	Links	Year 0 - 3
905 - 908	Links	Year 0 - 3
908 - 910	Links	Year 0 - 3
910 - 913	Links	Year 0 - 3
913 - 915	Links	Year 0 - 3
915 - 918	Links	Year 0 - 3
918 - 920	Links	Year 0 - 3
920 - 923	Links	Year 0 - 3
923 - 925	Links	Year 0 - 3
925 - 928	Links	Year 0 - 3
928 - 930	Links	Year 0 - 3
930 - 933	Links	Year 0 - 3
933 - 935	Links	Year 0 - 3
935 - 938	Links	Year 0 - 3
938 - 940	Links	Year 0 - 3
940 - 943	Links	Year 0 - 3
943 - 945	Links	Year 0 - 3
945 - 948	Links	Year 0 - 3
948 - 950	Links	Year 0 - 3
950 - 953	Links	Year 0 - 3
953 - 955	Links	Year 0 - 3
955 - 958	Links	Year 0 - 3
958 - 960	Links	Year 0 - 3
960 - 963	Links	Year 0 - 3
963 - 965	Links	Year 0 - 3
965 - 968	Links	Year 0 - 3
968 - 970	Links	Year 0 - 3
970 - 973	Links	Year 0 - 3
973 - 975	Links	Year 0 - 3
975 - 978	Links	Year 0 - 3
978 - 980	Links	Year 0 - 3
980 - 983	Links	Year 0 - 3
983 - 985	Links	Year 0 - 3
985 - 988	Links	Year 0 - 3
988 - 990	Links	Year 0 - 3
990 - 993	Links	Year 0 - 3
993 - 995	Links	Year 0 - 3
995 - 998	Links	Year 0 - 3
998 - 1000	Links	Year 0 - 3

Bands that links will have to migrate out of

Frequency Band (MHz)	New Allocation	Existing Capacity	Time for migration
238 - 240	DAB		Year 0 - 3
240 - 246	DAB		Year 3 - 10
406.1 - 407.625	SF Mobile		Year 3 - 5
407.625 - 413	Government and Public Safety		Immediate
413 - 413.7625	Mobile Data		Immediate
413.7625 - 416.1	Public Trunking		Year 3 - 10
416.1 - 417.625	Public Trunking		Year 3 - 10
420 - 423	Government and Public Safety		Immediate
423 - 423.7625	Mobile Data		Immediate
423.7625 - 426.1	Public Trunking		Year 3 - 10
426.1 - 427.625	Public Trunking		Year 3 - 10
427.625 - 430	Urban : Government and Public Safety		Year 5 - 10
440 - 449	Mobile		Year 0 - 3
854 - 864.1	Links		Migrate to shared Broadcasting spectrum or higher frequencies where possible (Year 0 - 5)
868.1 - 876	Links		Migrate to shared Broadcasting spectrum or higher frequencies where possible (Year 0 - 5)
876 - 880	Digital Trunking		Year 3 - 5
880 - 890	E-GSM		Immediate
915 - 921	Reserved		Year 3 - 5
921 - 925	Digital Trunking		Year 3 - 5
925 - 925.4	Two-way Paging		Year 0 - 3
925.4 - 935	E-GSM		Immediate

Frequency Band (MHz)	New Allocation	Existing Capacity	Time for migration
1427 - 1464.5	1427 - 1452 Low Capacity Links 1452 - 1467 T - DAB	74 x 500 kHz	Year 3 - 5
1492.5 - 1530	1492 - 1525 Low Capacity Links 1525 - 1535 Maritime Mobile Satellite (s-to-E)/Fixed/ Space Operation (s-to-E)	74 x 500 kHz	Immediate
1710 - 1784	1710 - 1785 PCN MTX	22 x 3.5 MHz	Immediate
1829 - 1903	1880 - 1900 : DECT 1895 - 1918.1 : PHS	22 x 3.5 MHz	Immediate
1911.5 - 2067	1885 - 1980 FPLMTS (Satellite) 1980 - 2010 Mobile-Satellite (E-to-s) / Fixed / Mobile 2010 - 2025 FPLMTS (Terrestrial) 2025 - 2067 Low Capacity Links	8 x 7 MHz and 3 x 29 MHz	Year 5 - 10
2124 - 2280	2110 - 2170 FPLMTS (Terrestrial) 2170 - 2200 FPLMTS (Satellite) 2200 - 2280 Low Capacity Links	8 x 7 MHz and 3 x 29 MHz	Year 5 - 10 2200 - 2280 MHz Immediate
2308 - 2390	2290 - 2483.5 Links	42 x 2 MHz	No immediate migration
2402 - 2484	2400 - 2484 ISM	42 x 2 MHz	No immediate migration
2500 - 2690	MMDS band	8 MHz	Immediate replanning
2690 - 2700	Radio Astronomy		Immediate

Bands that links will migrate to

Frequency Band (MHz)	Current Usage	New Link Allocation	Capacity	Time when new band is available
427.625 - 430	SF Links	Rural : SF Links	12.5 kHz	Immediately available for Rural SF links
450 - 453	DF Links	Paired with 460 - 463	12.5 kHz	Immediately available for DF links
460 - 463	DF Links	Paired with 450 - 453	12.5 kHz	Immediately available for DF links
1350 - 1375	Various	Paired with 1492 - 1517	500 kHz	After 1493 - 1529.5 is cleared
1375 - 1400	Various	Paired with 1427 - 1452	25 kHz	Immediate
1427 - 1452	Various	Paired with 1375 - 1400	25 kHz	Immediate
1492 - 1517	Various	Paired with 1350 - 1375	500 kHz	After 1493 - 1529.5 is cleared
1517 - 1525	Various	SF Links	25, 250 and 500 kHz	Immediate
2025 - 2110	Various	Paired with 2200 - 2290	1.75 and 3.5 MHz	After 1922 - 2067 is cleared
2200 - 2290	Various	Paired with 2025 - 2110	1.75 and 3.5 MHz	After 2135 - 2280 is cleared
2500 - 2692	MMDS band	MMDS band	8 MHz	After replanning

3.3 VHF High

This section proposes a strategy for migrating systems in the VHF high (137 to 174 MHz) band to the new band plan for that part of the spectrum. The band is broken up into four sub-bands:

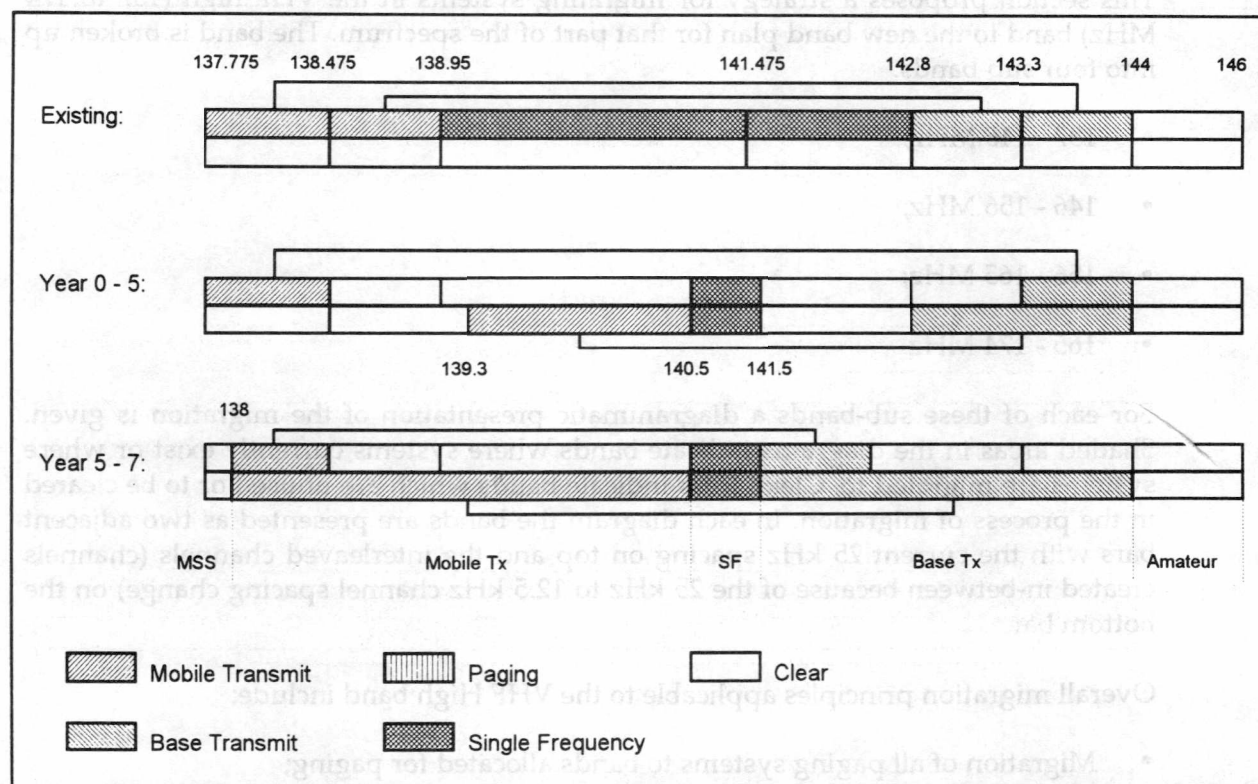
- 137 - 146 MHz;
- 146 - 156 MHz;
- 156 - 165 MHz;
- 165 - 174 MHz.

For each of these sub-bands a diagrammatic presentation of the migration is given. Shaded areas in the diagrams indicate bands where systems currently exist or where systems are migrated to. Clear areas indicate bands which are unused or to be cleared in the process of migration. In each diagram the bands are presented as two adjacent bars with the current 25 kHz spacing on top and the interleaved channels (channels created in-between because of the 25 kHz to 12.5 kHz channel spacing change) on the bottom bar.

Overall migration principles applicable to the VHF High band include:

- Migration of all paging systems to bands allocated for paging;
- Migration of all alarm systems to bands allocated for alarms;
- Migration of all municipality, local and regional authorities to Government and Public Safety band in UHF.

137 - 146 MHz



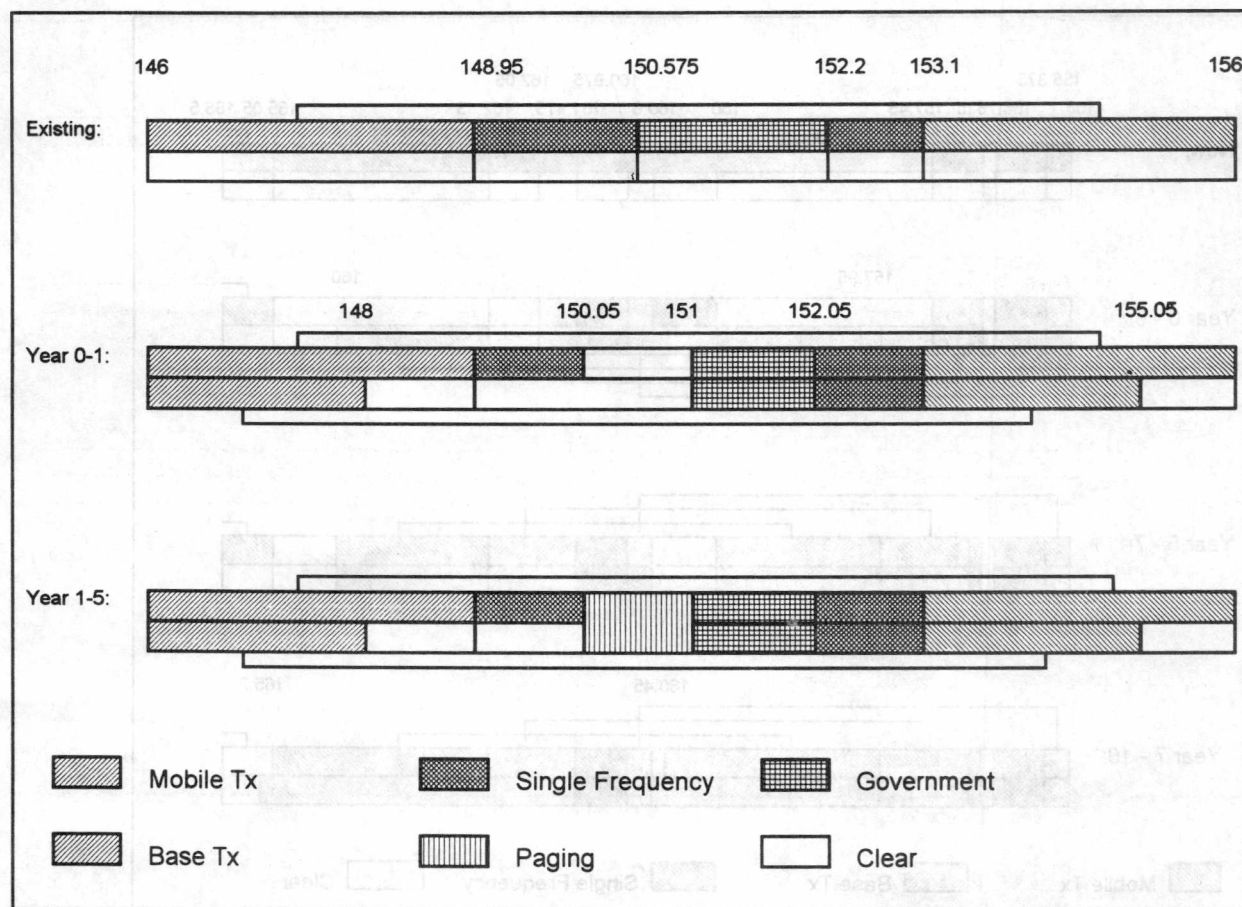
Phase 1: Year 0 - 5

- Transtel move their systems (MTX 138.475 - 138.95, BTX 142.8 - 143.325, SF 138.95 - 141.45) to the utilities trunking band (UHF 450-470).
- Single frequency operations (SF 141.475 - 142.8) consolidate in (SF 141 - 141.5) by using interleaved channels or move to dual frequency systems.
- No new assignments to low power devices (141-142 MHz) in this band. Low power devices to naturally migrate to 402 - 406 MHz, 433.92 MHz or other ISM bands.

Phase 2: Year 5 - 7

- Clear MSS band (MTX 137.775 - 138 paired with BTX 143.325 - 143.525) by using interleaved channels in (MTX 138.45 - 139.3, BTX 141.975 - 142.8).
- Move (BTX 143.525 - 144) to (BTX 141.5 - 141.975) to achieve 3.5 MHz transmit-receive separation.

146 - 156 MHz



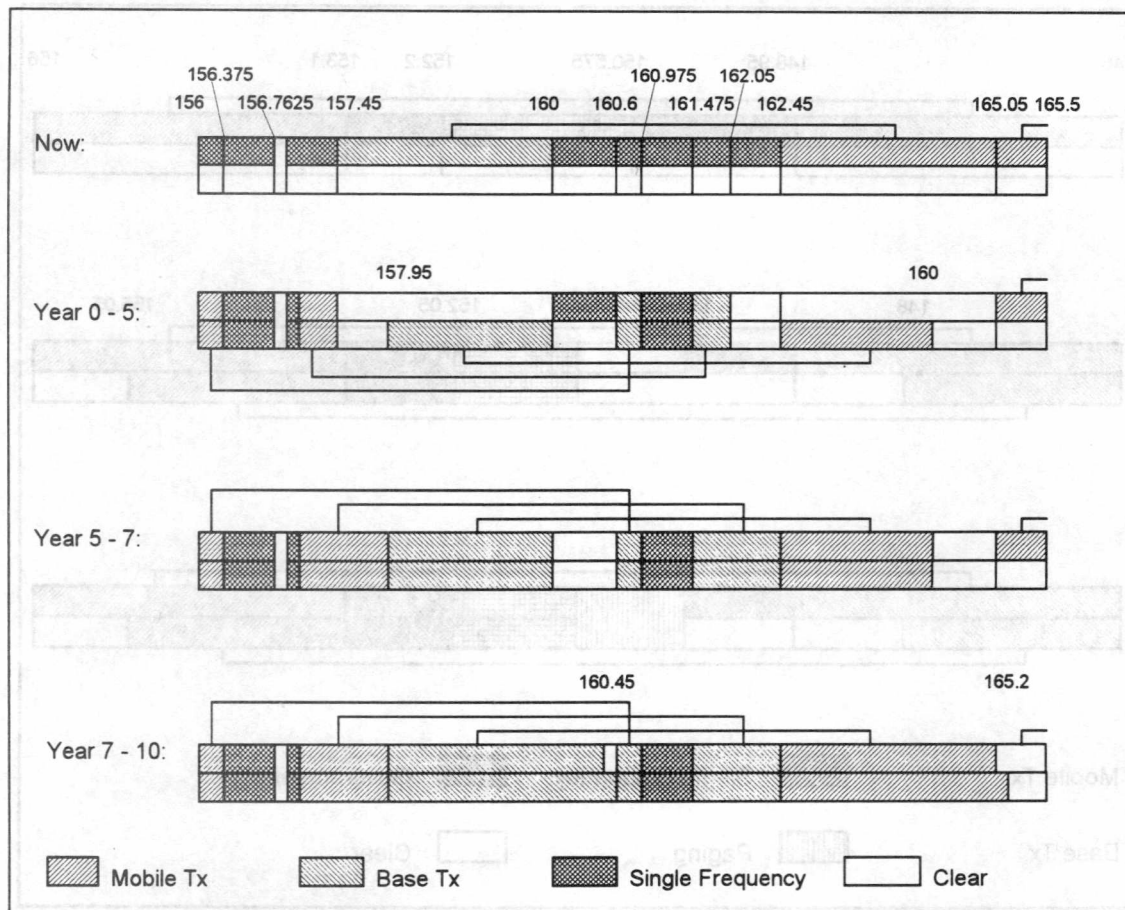
Phase 1: Year 0 - 1

- Consolidate Government in (150.575 - 152.2) in (151 - 152.05).
- Migrate (SF 150.05 - 150.575) to (SF 152.2 - 153.05) or DF systems.
- Migrate (SF 152.05 - 153.05) to DF systems where practical.

Phase 2: Year 1 - 5

- Migrate paging systems in the VHF high band to the paging band (150.05 - 151 MHz). See also 3.4 - detailed paging migration.
- Migrate alarms in 146 - 174 MHz to the alarm band (152.05 - 152.55).
- Migrate SF in 146 - 174 MHz to (SF 152.55 - 153.05).

156 - 165.5 MHz



Phase 1: Year 0 - 5

- Migrate (BTX 157.95 - 160, MTX 162.95 - 165) to (BTX 157.95 - 160, MTX 162.55 - 164.6) to re-adjust offset to 4.6 MHz. (BTX moves 12.5 kHz, MTX moves 387.5 kHz)
- Migrate (BTX 157.45 - 157.95, MTX 162.45 - 162.95) to (BTX 160.6 - 160.975, MTX 156 - 156.375) to clear 157.45 - 157.95 for BTX/MTX swap.
- Migrate (SF 156 - 156.375, 156.875 - 157.45, SF 160.6 - 160.975, SF 161.5 - 162.05, SF 162.05 - 162.45) to (SF 156.375 - 156.7625, SF 160.975 - 161.475) or DF bands.

Phase 2: Year 5 - 7

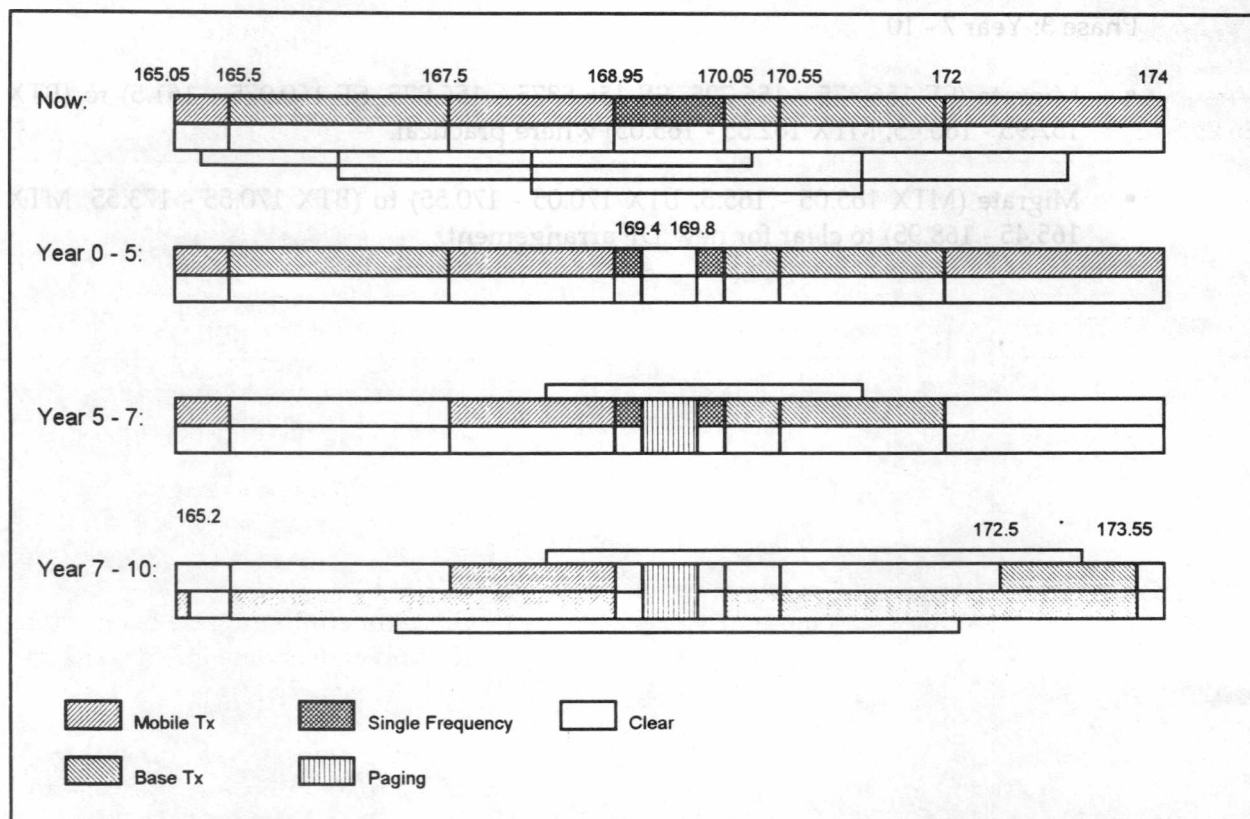
- Migrate (BTX 165.5 - 167.5, MTX 172 - 174) to (BTX 157.95 - 160, MTX 162.55 - 164.6) interleaved channels to clear blocks in upper bands for MTX/BTX swap.

- Migrate (SF 160 - 160.6) to (BTX 162.05 - 162.55, MTX 157.95 - 160.45, SF 160.975 - 161.475) to clear band for DF assignments.

Phase 3: Year 7 - 10

- Migrate (SF 156.375 - 156.725, SF 156.8375 - 156.875, SF 160.975 - 161.5) to (BTX 157.95 - 160.45, MTX 162.55 - 165.05) where practical.
- Migrate (MTX 165.05 - 165.5, BTX 170.05 - 170.55) to (BTX 170.55 - 173.55, MTX 165.45 - 168.95) to clear for new DF arrangement.

165 - 174 MHz



Phase 1: Year 0 - 5

- Migrate (SF 169.4 - 169.8) to other SF or DF bands to clear band for ERMES. ERMES protocol to be prescribed. Assignment to paging with other protocols pending changes in market.

Phase 2: Year 5 - 7

- Migrate (BTX 165.5 - 167.5, MTX 172 - 174) to (BTX 157.95 - 160, MTX 162.55 - 164.6) interleaved channels to clear blocks for MTX/BTX swap. Phase 3: Year 7 - 10
- Migrate (BTX 170.55 - 171.95) to (BTX 172.5 - 173.5) to adjust to new transmit-receive separation.
- Migrate (BTX 170.05 - 170.55, MTX 165.05 - 165.5, SF 168.95 - 169.4, SF 169.8 - 170.05) to (BTX 170.55 - 173.55, MTX 165.95 - 168.95) to clear blocks for new DF bands.
- Migrate (MTX 165.05 - 165.5, BTX 170.05 - 170.55) to (BTX 170.55 - 173.55, MTX 165.45 - 168.95) to clear for new DF arrangement.

3.4 Paging

Frequency Band (MHz)	New Allocation	Migration
26.995 - 27.195	Low power paging	Available for assignment
40.675 - 40.685	Amateur	Migrate existing low power paging to 26.12 MHz, 53 MHz or UHF Paging. (Year 0 - 5)
53.025 - 53.225	Low power paging	Available for assignment
137.775 - 174		National paging to migrate to 150.05 - 151 MHz. (Year 0 - 5) All other paging to migrate to relevant paging bands, mostly 453.975 - 454.425 MHz. (Year 0 - 5)
150.05 - 151	Wide area paging	Government to migrate from 150.5 - 151 and consolidate in 151 - 152.05 MHz. (Immediate) Single Frequency assignments in 150.05 - 150.5 migrate to adjacent blocks. (Immediate)
169.4 - 169.8	ERMES	Current SF assignments to migrate to adjacent mobile blocks. (Year 3 - 5)
278 - 286 (700 kHz)	FLEX Outbound leg	Government to clear 700 kHz. (Year 0 - 3)
453.975 - 454.425	Regional Paging On-site paging (top 4 channels)	Current MTX assignments in 454.025 - 454.125 to migrate. (Year 0 - 3)
925 - 925.4	FLEX Inbound leg	Migrate links according to link plan. (Year 0 - 3)

3.5 Alarms

Alarm systems are mostly used in VHF-High spectrum. These will be consolidated in the following blocks:

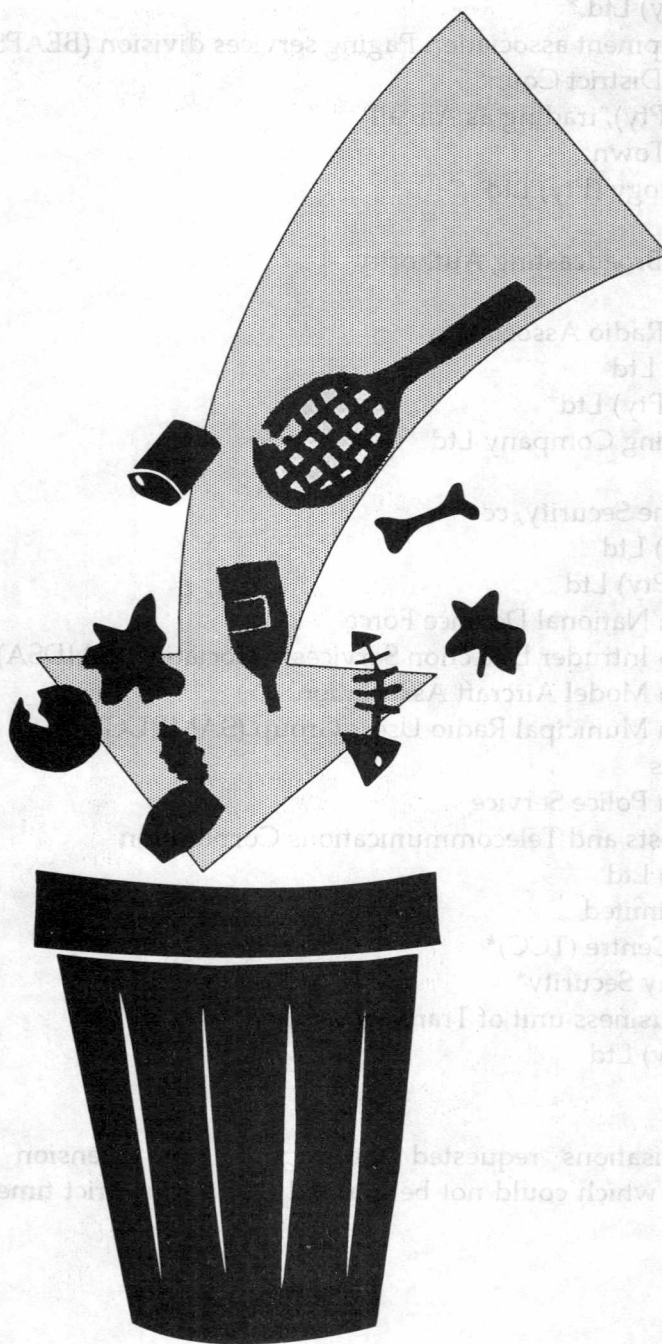
Frequency Band (MHz)	Allocation	Migration
81 - 81.625 BTX paired with 86.375 - 87 MTX	DF Alarms / Mobile	Interleaved channels immediately available for assignment.
140.5 - 141	Alarms (SF)	Interleaved channels immediately available for assignment. Non-interleaved channels available for assignment in Year 5+
152.05 - 152.55	Alarms (SF)	Interleaved channels immediately available for assignment. Non-interleaved channels available in Year 3+
440 - 441 BTX paired with 445 - 446 MTX	Telemetry / Data	Immediately available for assignment.

A Submissions on draft migration strategy received

Alcatel Altech Telecoms
Alcom Systems (Pty) Ltd
Arrow Burglar Alarms (Pty) Ltd
Astron Systems Pretoria cc*
Autopage (Pty) Ltd.*
Business equipment association Paging services division (BEAPS)
BREëRIVIER District Council
Call-a-Code (Pty), trading as Aircall
City of Cape Town
Daka Technology (Pty) Ltd
ESKOM*
Independant Broadcasting Authority
Infrasek cc
Land Mobile Radio Association
Pagenet (Pty) Ltd
Paging Plus (Pty) Ltd*
Palabora Mining Company Ltd
Parker Craft
Personal Home Security, cc
Q-Trunk (Pty) Ltd
Radiospoor (Pty) Ltd
South African National Defence Force
South African Intruder Detection Services Association (SAIDSA)
South African Model Aircraft Association
South African Municipal Radio Users Group (SAMRUG)
Sentry Alarms
South African Police Service
Swaziland Posts and Telecommunications Corporation
Swiftnet (Pty) Ltd
Telkom SA Limited
The Control Centre (TCC)*
Total Highway Security*
Transtel, A business unit of Transnet Limited*
Vodacom (Pty) Ltd

* These organisations requested meetings or an extension of the deadline for submissions, which could not be granted due to the strict timescales and urgency of the project.

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RECYCLE HERGEBRUIK



Department of Environmental Affairs
Departement van Omgewingsake



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