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GENERAL NOTICE

NOTICE 1269 OF 2002



INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

NOTICE IN TERMS OF SECTION 29 OF THE TELECOMMUNICATIONS ACT (ACT 103 OF 1996) READ IN CONJUNCTION WITH SECTION 29 OF THE IBA ACT (ACT 153 OF 1993) INVITING REPRESENTATIONS WITH REGARD TO AMENDMENT OF NOTE 3.9.2 OF THE RADIO FREQUENCY BAND PLAN FOR FREQUENCY IN THE RANGE OF 20MHz TO 3 GHz (SABRE 1)

1. The Independent Communications Authority of South Africa (ICASA) (hereinafter referred to as "the Authority") hereby gives notice and invites representations on sharing of Broadcasting Frequency Spectrum with WLL systems and links in the frequency range 790 – 854 MHz.
2. The purpose of this document is to seek views from interested parties on the information in the Discussion Document attached hereto.
3. Persons submitting written representations are further invited to indicate whether they require an opportunity to make oral representations and the estimated duration thereof, which duration shall not exceed one hour.

4. Written representations shall be made publicly available, except where the Authority has declared any information confidential. A request for confidentiality on any information shall be submitted in writing. The request must outline why such information should be regarded as confidential. Respondents are requested to separate any confidential material into a clearly marked confidential annex. The respondent may withdraw such confidential material if the Authority refuses to declare it confidential. Any copyright attached to responses will be assumed to have been relinquished unless it is expressly reserved.
5. It would be helpful if hard copies of all written representations are submitted and an electronic version thereof, either on disk or e-mail, would be appreciated. Respondents are strongly encouraged to provide their comments in electronic format (WordPerfect, Microsoft Word, Adobe PDF or ASCII TXT) to facilitate posting on the Authority's Web site. Documents submitted should be sent with a note specifying the software and version number used.
6. Written representations or queries may be emailed, faxed, posted or hand delivered for the attention of:

The Project Manager
Mr. Frank Awuah

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The closing date and time for the submission of written comments is 17 August 2002 at 16h00.

**MANDLA LANGA
CHAIRPERSON
ICASA**

DISCUSSION DOCUMENT

1. Intention

The purpose of this Notice is to invite public views and comments on the need to share Broadcasting Frequency Spectrum, so determined in terms of section 29 of the IBA Act, with telecommunication WLL systems and link equipment, in the frequency band 790 – 854 MHz, and whether the need is economically justified and significant to warrant a full scale feasibility study and field tests to establish sharing criteria.

In considering the justification for the study, it also needs to be determined how the cost of the study will be recovered. Should sharing be adopted, migration of existing broadcasting transmission and reception will be required. The financial compensation for the migration cost incurred, would have to be determined in advance.

2. Definitions

WLL (Wireless Local Loop) is an access network technology based on coded division multiple access principle, used in providing wireless telephone connection in areas where provision of landline telephone connection is not feasible.

FWA (Fixed Wireless Access) is a fixed radio connection between a radio user and a core network.

3. Background

SABRE 1 noted that there are a number of WLL systems, which are currently available to operate in the upper end of the UHF broadcasting band ranging from 790MHz to 854MHz. It was therefore proposed in SABRE 1, that in order to allow the introduction of such WLL systems, sharing of WLL and broadcasting is allowed in at least one of these 8MHz channels in particular channels 65 to 67 (822 – 846MHz) and more especially in the rural areas. It was further proposed that further discussions and study would be required to formulate the sharing details and in particular, the sharing criteria and the appropriate protection ratio that need to be established in order to ensure that the two services are able to co-exist effectively. SABRE 1 noted the necessity to coordinate with neighbouring countries.

Even though SABRE 1 indicated the possible candidates for sharing to be television channels 65 to 67, however, in reality, channels 64 and 68 would also be affected by transmissions for the WLL services operating in television

channels 65 and 67 respectively and including the need to establish guard bands between different services.

In terms of SABRE 1:

- Sharing is proposed in at least one 8 MHz UHF TV channel within channels 64 to 68
- Sharing is proposed in the rural areas
- Studies are required to establish sharing criteria
- Regional co-ordination is essential

4. Current Utilisation of the Band by the Broadcasters

The broadcasting services in the channels 64 to 68 comprise of high power television transmission of various power levels, STL's (station to transmitter links), and self-help stations. The table below indicates the current utilisation of the band.

	Channel Numbers					
	64	65	66	67	68	Total
Operational Channels (High power and Gap fillers)	12	8	3	10	13	46
Operational Channels (Self-Helps)	21	9	7	14	10	61
Spare Channels assigned for future use	9	15	14	12	11	61

The spare frequencies in these channels constitute 24.5% of the planned frequencies in the whole band.

4.1 High Power Transmitters

Frequency assignment planning for high power UHF television transmissions is done on a regular lattice approach. The UHF television frequency band from 470 to 854 MHz contains 48 channels, each of 8 MHz bandwidth arranged into 12 groups of 4 channels on a basis that would allow common transmitting antennas and single receiving antennas to be used at any one site. The 12 groups were used to form the lattice with 12 node points and were allocated to minimise co-channel, adjacent channel, image channel and local oscillator interference. This means that 4 channels are available for assignment at any one transmitting site on a national basis. In areas of greater demand (demand for all of the 3 SABC stations, etv stations, M-Net and CSI stations), two UHF lattice node points have been combined or both VHF and UHF channels have been assigned to a particular area. When the first assignments were done in the ITU Africa Plan established in 1963, and when it was revised in 1972, compromises were made to release spectrum to telecommunications, i.e. television band 1 (40 to 70 MHz)

and the spectrum between 854 and 960 MHz, while the television VHF band III was extended from 238 to 254 MHz. The television broadcasting bands were to be used on an exclusive basis.

The UHF TV channel arrangement is as shown below:

CHANNEL GROUPS	A	21	25	29	33
	B	22	26	30	34
	C	23	27	31	35
	D	24	28	32	36
	E	37	41	45	49
	F	38	42	46	50
	G	39	43	47	51
	H	40	44	48	52
	I	53	57	61	65
	J	54	58	62	66
	K	55	59	63	67
	L	56	60	64	68

The channel groups I, J, K and L would be affected by sharing with telecommunications services referred to. Orderly lattice planning as per ITU practice (Final Acts GE 89) would no longer be possible for the 46 transmitters in groups I, J, K and L. The only option is hybridised planning (retaining unaffected frequencies in the affected channel groups and replacing the affected frequencies (channels 64 to 68) with frequencies from unaffected groups). Hybridised planning would have the following negative consequences:

- One particular station would consist of frequencies from different channel groups. This will result in different levels of interference for the different channels within the same coverage area of a particular station. This will amount to different coverage areas for the different television services. To resolve the obvious problem of competition among the different television stations, a smaller coverage due to higher interference will have to be supplemented with "gapfiller" coverage. Frequency assignment for these additional "gapfillers" would place a further strain on the spectrum leading to even higher levels of mutual interference and hence an inefficient management of the national scarce resource. The result is a clear vicious circle.
- It is highly probable that viewers will require a second receiving antenna or may need to replace the existing receiving antenna in order to be able to view all available programs. Viewers would therefore incur some cost

in acquiring extra antenna and this may not be in the interest of the public. The broadcasters and signal distributors will have to conduct extensive communication campaigns to assist the public.

- The use of common transmitting antenna may be affected, requiring a second antenna to be installed or that the existing antenna may have to be replaced. If the mast cannot carry a second antenna, then another mast will have to be put up. These activities will generate additional cost that will have to be recovered.

4.2 Self-help

A self-help station is defined as a community owned and funded relay station, which transmits the signal of a broadcaster within the licensed area of that broadcaster in cases where high power broadcasting signal distribution is not economically viable. Self-help stations are recognised by the Authority as an ideal way of extending broadcasting services to disadvantaged communities where individual satellite reception is not affordable. With 61 self-help stations currently operating in channels 64 to 68, these disadvantaged communities would have to incur some equipment cost to effect the frequency changes.

4.3 STL

STL links for audio channels operate in the UHF television band and provide community broadcasters affordable and reliable means of linking the studio to the nearest broadcasting transmitter. This was done to save using other frequency spectrum reserved for telecommunications purposes, such as the 400 MHz mobile radio frequency band and as it also provided for easier administration within one user group.

4.4 Television Reception by the Public

In consideration of sharing the television broadcasting band, it must be taken into account that the interference will be experienced by the public on their reception and not by the transmission side. Reception of broadcasting services in a mass media market is pervasive where any location has to be taken into account and not only certain fixed points. Reception can occur at fixed locations (homes), on a portable basis and on a mobile basis.

5. Future Utilisation of the Band by the Broadcasters

International stakeholders, including South Africa, are in agreement that transition from analogue to digital terrestrial television is inevitable. Before analogue transmission can be replaced by digital transmissions, when less frequency spectrum may be used depending on the growth of electronic media, a long transition period, during which both current analogue and digital services are transmitted, will be necessarily. During this period, digital television transmission

will utilise the spare capacity in the UHF television frequency band and thus more spectrum will be used in the transition period.

Universal television coverage has not yet been achieved in South Africa. The spare capacities in the band, which is not limited to the planned future assignments as recorded in the Broadcast Frequency Plan, shall have to accommodate the required coverage expansion and other additional broadcasting services in the future.

The spare capacity in the UHF television broadcasting frequency band shall also have to accommodate SENTECH's Multimedia Services according to SENTECH's Multimedia spectrum license conditions.

6. Protection of Television Assignment in South Africa

The ITU has specified sharing criteria between broadcasting television services and the fixed and mobile services (Final Acts GE 89) to ensure acceptable reception by the public. The ITU Agreement stipulates that the minimum values of field strength for television reception in band V, which requires protection from the fixed and mobile services is 58dB μ V/m.

The agreement further stipulates that in order to avoid interference to television services from fixed and mobile services, the following protection ratios shall apply:

	Frequency difference (MHz) (separation between wanted and unwanted carriers)												
	-2.5 - 1.5	-1.25	-0.5	0.0	0.5	1.0	2.0	3.0	3.6 - 4.8	5.7 - 6.0	3.6 - 4.8	5.7 - 6.0	6.2 - 15
Protection Ratios (dB)	11	40	50	54	58	58	54	44	45	30	45	30	-2

For minimum quality of reception, the calculated Protection Margin (PM) shall be positive at all locations where a television service is required.

The protection margin (PM) in dB at any point is obtained by using the formula:

$$PM = FS - \text{Combined value of } (NF + AF) \text{ for all interfering sources;}$$

where:

FS: field strength value in dB μ V/m for the television signal

AF: adjustment factor in dB, intended to deal with antenna discrimination
and
clutter loss

NF: Combined nuisance field in dB μ V/m

The combined nuisance field is determined as stated below. The individual nuisance field is a function of the protection ratio (dB), the propagation loss and the effective radiated power of the interfering transmitter (dB μ V/m).

The interference arising from the multiple co-sited sources should be combined by the use of the power-sum method. The interference arising from multiple non-co-sited sources should be combined by the use of the simplified multiplication method.

If it is desirable that both television and WLL and links are to co-exist, then the Authority would have to embark on extensive research and field tests to meet the above sharing criteria.

Television assignments in the neighbouring countries which have been registered in the Master International Frequency Register should also be protected from assignments to stations in the fixed and mobile services.

7. Frequency Spectrum Sharing Options

In considering sharing options, the nature of the services wishing to share spectrum must be taken into account. The closer the services are in their nature, the more likely sharing is with a lower level of protection. The further apart they are, for example high power point to multi-point transmissions versus low power two way transmission, which could both be fixed, or transportable or mobile, the more unlikely is sharing and the higher the level of protection would be. Sharing between broadcasting and mobile services generally presents difficulties, as terminals in both services are ubiquitously deployed.

So-called frequency spectrum sharing ranges from band planning where adjacent spectrum ranges (band segmentation) are allocated to different services including an adequate guard band, to geographically separated band allocations and to a frequency range shared by different services in the same area.

8. Results of ITU-Sponsored TRASA's Sharing Study

The Telecommunications Regulatory Association of Southern Africa (TRASA) study was carried out by Linden Petzer Consulting CC and was published in a report dated August 2001. The scope of the study included a review of international trends and procedures, development of sharing criteria, identifying affected SADC countries and the impact of digital UHF television. The relevant findings of the study were in abbreviated form as follows:

- 8.1 Spectrum will have to be subdivided to accommodate sharing.
- 8.2 Guard bands will be necessary.
- 8.3 With the exception of South Africa, the UHF television broadcasting frequency band in the SADC countries are not intensively used and makes sharing by band segmentation possible.
- 8.4 Studies on Fixed Wireless Access (FWA) systems are still in progress within the ITU-R.

- 8.5 Sharing studies between television broadcasting and FWA systems have yet to be undertaken by the ITU-R.
- 8.6 The ITU GE 89 Television Broadcasting Plan will be revised by the ITU to make provision for digital television broadcasting.

According to TRASA's study, the protection ratio requirement that has to be implemented in order to prevent harmful interference to analogue broadcasting services is simply impractical. TRASA therefore recommended band segmentation to be implemented for the different services instead of band sharing. It was further recommended that due to the greater intensity of use of broadcasting spectrum in South Africa, sharing or band segmentation criteria should be determined through field tests.

ICASA notes that:

- Sharing criteria between television broadcasting services and the fixed/mobile services are set out in the "Final Acts of the Regional Administrative Conference for the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries" (GE 89) and the Recommendation ITU-R IS.851-1, "Sharing between the Broadcasting Service and the Fixed and/or Mobile Services in the VHF and UHF Bands.
- Extensive research and field test has to be conducted to satisfy the sharing criteria set out by the ITU.
- Current utilisations of channels 64 to 68 are extensive on a national basis.
- Sharing would result in a hybridised planning of high power television assignment resulting in an even higher demand for broadcasting frequencies and hence higher levels of interference and the ultimate result of inefficient spectrum management.
- Hybridised planning would result in a high probability of viewers having to acquire a second antenna (with cost) in order to receive all available programs at a particular site.
- The spare planned frequencies in these channels will have to accommodate digital broadcasting and multimedia telecommunication services
- Additional costs will be incurred by the broadcasters, signal distributors and the public.
- The current and future utilisation of these channels leave little or no opportunity for the roll-out of a national WLL and links even if sharing criteria is established through research

9. Needs for a Comprehensive Sharing Study

In order to make a determination on the feasibility of frequency band sharing in the UHF television broadcasting band, a comprehensive study will have to be carried out. This would consume considerable human and financial resources. A comprehensive study that would be required in South Africa where the UHF

television broadcasting band is intensively used, would consist of the following phases:

- 9.1 Extensive survey of literature and details of existing and planned transmissions (This has at least partly been attended to in the ITU/TRASA/Petzer Study).
- 9.2 Development of technical sharing criteria for FWA for each of the technologies that may be used.
- 9.3 Determination of minimum geographic separation distances around all points where one of the designated frequencies is used or is planned to be used.
- 9.4 Determination of the geographic areas that will be unusable for FWA on these shared frequencies
- 9.5 Study of which television transmissions will have to migrate to new frequencies to provide space for FWA.
- 9.6 Determination of the spectrum that will be required for digital television broadcasting

10. Invitation to Comment

ICASA invites comments on but not limited to the socio-economic, technical and administrative feasibilities and implications on the need for sharing channels 64 to 68 of the UHF television band currently used for television broadcasting services with WLL and links and on the question of whether it is necessary to carry a sharing study, or whether the current demand for sharing does not justify it.

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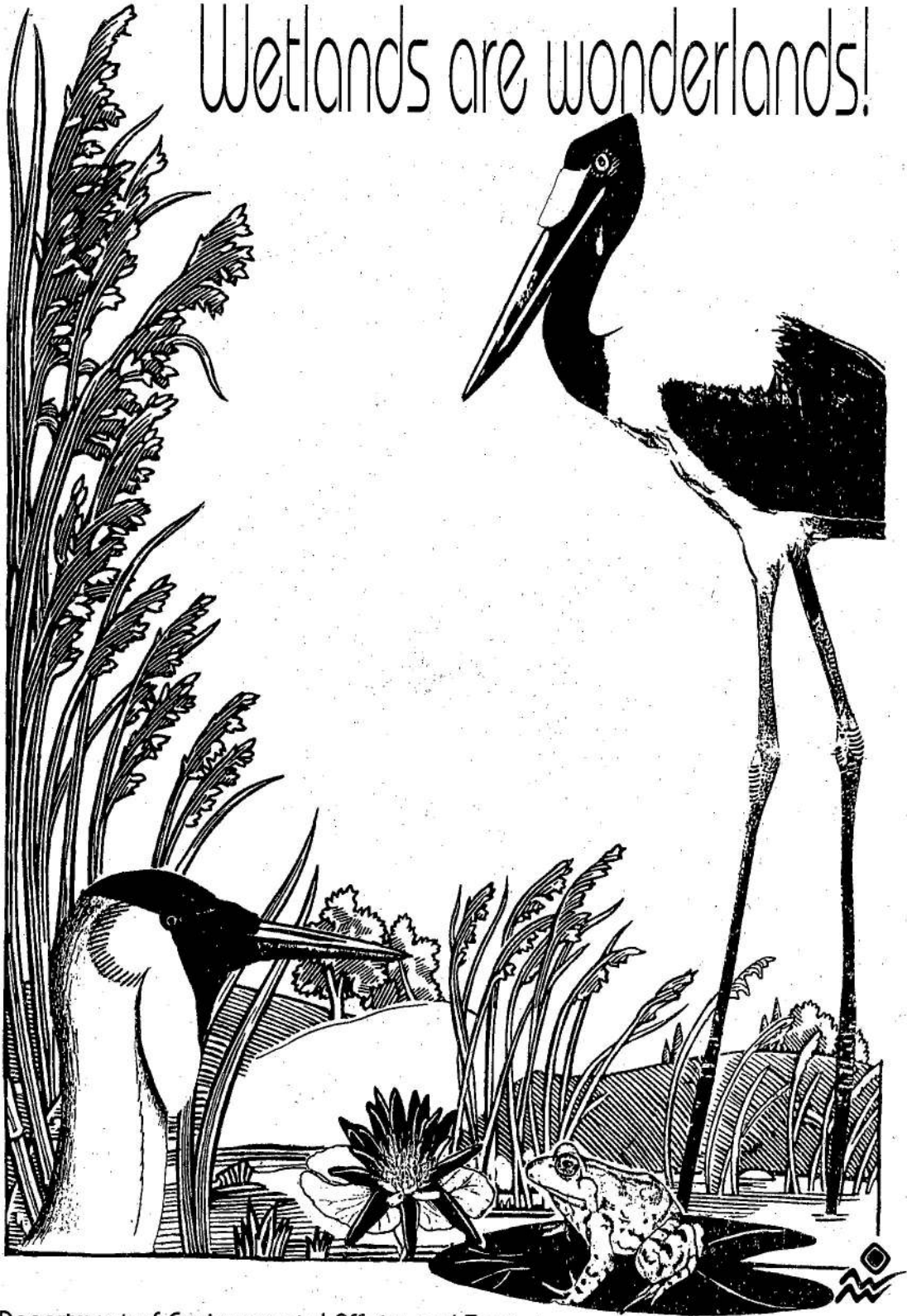
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