



**Open Spectrum for Development
South Africa Case Study**

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Introduction to Spectrum

The electromagnetic spectrum refers to the range of frequencies of electromagnetic radiation including radio waves, infrared, visible light, ultraviolet, x-rays, and others. In this paper we will use the term spectrum as shorthand for the electromagnetic spectrum between 30Mhz to 300GHz. This covers most of the usable spectrum for both telecommunications and broadband purposes, including AM/FM radio and terrestrial television broadcasting, satellite communication, mobile communication, and broadband services.

The principle purpose of spectrum management is to avoid interference among spectrum users. Central to spectrum management over the last hundred years or so has been the establishment of a document which defines what spectrum may be used for a given purpose e.g. radio, television, mobiles, etc. This process is referred to as spectrum allocation. While countries are at liberty to define their own uses for spectrum and hence their own spectrum allocation tables, most countries closely follow the standards for spectrum allocation established by the International Telecommunications Union (ITU).

Unfortunately there is no single ITU global standard for spectrum allocation. There are three, one for each of three regions defined by the ITU. South Africa falls into Region 1 which includes Africa, Europe, the Middle East west of the Persian Gulf including Iraq, the former Soviet Union and Mongolia. The reasons for the regional divisions are historical and largely relate to diverging national and international technological agendas in which countries failed to agree on common usages for a particular range of spectrum. This is why your dual band mobile phone works in Europe but not in North America or Japan. The ITU is now attempting to harmonise spectrum allocation globally but this process is likely to take a long time.

Along with 'allocation', the other key term in spectrum management is 'assignment'. Once allocated for a specific purpose, spectrum can be 'assigned' to specific users through a spectrum license. Alternatively, portions of spectrum may be opened up to any user by designating the spectrum as unlicensed.

Who is Responsible for Spectrum Management in South Africa

Prior to 1994, spectrum in South Africa was managed by the state body responsible for its implementation. Thus broadcast spectrum was managed by the South African Broadcasting Corporation (SABC) and telecommunications spectrum managed by the state telecommunications provider, Telkom. This was generally uncontentious because, prior to the rise of mobile telecommunications and wireless broadband, the availability of spectrum significantly exceeded its demand.

In 1993, the Independent Broadcasting Association (IBA) was established and in 1996 the South African Telecommunications Regulatory Authority (SATRA) was established. Among the responsibilities of these two bodies was the management of broadcast and telecommunications spectrum respectively.¹ In 2000,

¹ IBA Act (Act No 153 of 1993) and Telecommunications Act (Act No 103 of 1996) - <http://www.icasa.org.za/LinkClick.aspx?fileticket=1JATA5waO7I%3d&tabid=90&mid=652&forcedownload=true>

the functions of the IBA and SATRA were merged into a new body, the Independent Communications Authority of South Africa (ICASA)². As a result ICASA is responsible for planning, control, and management of all communication spectrum in South Africa.

The allocation of spectrum, that is, the choice of which spectrum bands may be used for which purposes, is determined by the Department of Communications. This includes the allocation of spectrum for government and for the security services. The Department of Communications is further responsible for international coordination and approval of regional radio frequency spectrum plans that are applicable to South Africa. Finally, the Minister of Communications is responsible for setting broad policy and policy directions regarding spectrum management.

ICASA is responsible for the administration and management of all spectrum that has not been allocated to government or security usage. ICASA is responsible for assigning radio spectrum through the licensing of its use and/or the technical regulation of radio devices.

From a policy perspective, if one were looking to gain access to unlicensed or licensed spectrum under the current allocation framework, ICASA is the organisation to approach. If one were interested in lobbying for re-allocation of spectrum, the Department of Communications is the key entity to approach.

Bodies involved in spectrum policy

- **Department of Communications** (DoC) is responsible for managing South Africa's involvement and commitments to the ITU as well as government requirements for spectrum.
- **Independent Communications Authority of South Africa** (ICASA) is responsible for the administration, management, and licensing of radio spectrum.
- **Department of Health** is involved in the establishment of safety standards related to electromagnetic radiation.
- **Department of Science and Technology** is involved through the Astronomy Geographic Advantage Act in the establishment of the Square Kilometre Array.

Spectrum Allocation in South Africa

South Africa follows quite closely the Region 1 guidelines set out by the ITU. Deviations are typically minor and can be found in the "Spectrum Table of Frequency Allocations for South Africa" in the Resources section at the end of this document.

The first attempt to set up an independent spectrum table of allocations occurred in January 1996 with the launch of a spectrum re-planning project called SABRE (South African Band Re-planning Exercise). By December of 1996, a South Africa Frequency Allocation Plan and Migration Strategy was gazetted. The intention of the migration strategy was to see all fixed link services moved to above 3GHz, reserving the spectrum below 3GHz for mobile services.

Unfortunately the migration strategy was supplanted by other priorities and was never seen through to its conclusion. It is not clear to what extent the migration has been completed or whether full records exist of the changes that have taken place³.

² <http://www.icasa.org.za/corporate/Overview/tabid/56/Default.aspx>

³ [ICASA reviews frequency allocation table – 31 July 2008 - http://www.eepublishers.co.za/view.php?sid=13997](http://www.eepublishers.co.za/view.php?sid=13997) – Accessed on 1 June 2010

Spectrum Assignment in South Africa

As stated above, the historical assignment of spectrum in South Africa has largely taken place in a context where supply of spectrum exceeds demand. The initial 900MHz spectrum licenses were awarded directly to mobile operators by government. Thereafter spectrum was assigned by the newly formed ICASA.

GSM Mobile

Mobile services in South Africa began in 1993 when MTN South Africa Ltd. and Vodacom Group (Pty.) Ltd were granted licenses to operate and were granted spectrum licenses in the 900MHz band. A third operator (Cell C) was granted an operator license in 2001 and received a license in the 900MHz and 1800MHz bands. In 2003, access to the 1800MHz spectrum was given on a temporary basis to MTN and Vodacom in exchange for free SIM cards for the poor. Finally, in 2005, MTN and Vodacom were officially granted licenses to operate in the 1800MHz band.

3G

MTN and Vodacom were granted 3G spectrum licenses in the 2100MHz band in 2004. Since divesting its stake in Vodacom in 2009, Telkom has begun to offer 3G services in the 2100MHz spectrum.

CDMA

In October 2006, ICASA allowed telecoms operators to apply for 800MHz spectrum (TV channels 65 and 66) and in March 2007, Neotel was granted a license to operate fixed wireless services in the 800MHz band.⁴ Neotel currently offers CDMA-based fixed-wireless services in this band.

WiMax

To date ICASA has issued national spectrum licenses for commercial WiMAX services to iBurst, Sentech, Telkom, and the second network operator Neotel. iBurst and Sentech have spectrum in the 2.6GHz band and Sentech, Telkom, and Neotel have spectrum in the 3.5GHz band.

Microwave

A number of spectrum licenses have been granted for microwave back-haul in spectrum ranging from 1.4GHz range to ranges in 6-8Gz, 15GHz, and 38GHz.

4 http://www.3gafrica.org/graphical/images/winning%20with%203g/Angus_Hay_Neotel_Winning3G.pdf and <http://mybroadband.co.za/news/Telecoms/821.html>

Spectrum Auctions

Until very recently, South Africa has not offered any spectrum for auction. This changed with the recent announcement⁵ of an auction of spectrum in the 2.6GHz and 3.5GHz bands. On 28 May 2010, ICASA issued two invitations to bid on spectrum in the 2.6GHz and 3.5 GHz range respectively. Deadline for submission of bids was set for 25 June 2010. There is a non-refundable fee of R70,000 for participation in either auction.

2.6GHz Spectrum

The 2.6GHz spectrum is being auctioned nationally in blocks up to a maximum of 30MHz. This will allow for up to three new spectrum licenses to be granted. Constraints placed on bidders included a requirement for 30% Historically Disadvantaged Individuals (HDI) ownership of any company bidding on spectrum. There is also a requirement that the successful bidder should roll out a network covering 50% population coverage within two years.

Given the greater density of towers required at 2.6GHz as opposed to mobile spectrum that is lower down in the spectrum band, rolling out to 50% of the population within two years is likely to be both expensive and challenging. It is likely to encourage successful bidders to focus on more densely populated urban areas than rural roll-out. ICASA have clearly stated that the spectrum is to be awarded on a use-it-or-lose-it basis. Failure to achieve 50% penetration in two years would constitute grounds for forfeiting a spectrum license.

The 30% HDI requirement is also seen as a challenge for existing mobile operators Vodacom and MTN, as they do not meet this requirement. It is speculated that this may be addressed through the creation of a Special Purpose Vehicle (SPV)⁶. A reserve of R750,000 has been set for the auction, . This will be refundable to unsuccessful bidders. The auction is a conventional ascending price process where the highest qualified bids will receive spectrum licenses.

3.5GHz Spectrum

In the 3.5GHz spectrum range, ICASA will auction two licenses of 30MHz each. ICASA has chosen, however, to offer these regionally, and auction them individually in every district and municipality in South Africa. This amounts to 104 licenses being offered

Similar to the 2.6GHz auction, a use-it-or-lose-it principles will apply, and successful applicants will be required to cover 50% of the municipal area within two years. The reserve price for this auction is set at R250,000 and again is refundable for unsuccessful applicants.

5 Icasas broadband spectrum auction: all the details - <http://www.techcentral.co.za/icasa-spectrum-auction-all-the-details/14669/> - Accessed on 1 June 2010

6 MyBroadband - 2.6 GHz spectrum battle: Potential winners and losers - <http://mybroadband.co.za/news/telecoms/12741-GHz-spectrum-battle-Potential-winners-and-losers.html> - Accessed on 1 June 2010

Back to the Drawing Board

On 21 July 2010, ICASA canceled⁷ the 2.5GHz and 3.5GHz spectrum auction citing the need to ensure technology neutrality and to consult auction rules from around the world. The reference to technology neutrality refers to the fact that the 2.6GHz spectrum has two existing spectrum holders, Sentech and iBurst. If spectrum is to be auctioned in a manner which allows for both TDD and FDD uses of the spectrum, the spectrum held by Sentech and iBurst will need to be relocated within the band.

On 10 September 2010, ICASA issued an invitation to tender for an auctioneer to assist in designing a process with rules for auctioning of radio frequencies for 2.6 GHz band and 3.5 GHz band. The tendering process closed on 4 October 2010 and as of the writing of this document, no appointment had been made.

National Spectrum Audit

To understand the potential for expanding spectrum usage in South Africa, one must first know what spectrum is currently in use. Estimates from elsewhere in the world suggest that even in the United States, not much more than 10% of the practically usable spectrum is in use in at any one place, at any one time. One can reasonably hypothesise that even less spectrum is in use in South Africa.

For more than ten years, there have been various announcements concerning planned spectrum audits in South Africa⁸. Such an audit has yet to take place but there have been recent signs of hope. In 2006, the Minister of Trade and Industry referenced plans⁹ to undertake a national spectrum audit. It is likely that this process was delayed with the unexpected death of Minister Ivy Matsepe-Casaburi. However, hope bloomed anew when the new Minister of Communications, General Sipiwe Nyanda affirmed that "an audit on the spectrum occupancy and usage will also be conducted" in his budget vote speech in 2009¹⁰. A tender to carry out the spectrum audit of the current national radio frequency bands from 9 Khz to 3GHz closed on 11 September 2009¹¹.

According to the Department of Communication's workplan¹², the audit was to have been completed and presented to the Department of Communications by March 2010. However, nothing has been published

7 Statement from Media Briefing on the Invitation to Apply for High Demand Bands 2.6GHz and 3.5GHz <http://www.icasa.org.za/Corporate/MediaReleases/tabid/280/ctl/ItemDetails/mid/1067/ItemID/459/Default.aspx> – Accessed on 22 November 2010

8 Vodacom calls communication body to court - 7 November 2000 - <http://www.thestar.co.za/index.php?fSectionId=128&fArticleId=qw97357398056I220> – Accessed on 1 June 2010

9 Parliamentary Briefing By The Minister of Trade and Industry, Mr Mandisi Mpahlwa -14 November 2006 - <http://www.dpe.gov.za/home.php?id=581> – Accessed on 1 June 2010

10 Budget Vote Address by Minister of Communications General (Ret) Simphiwe Nyanda – 23 June 2009 - <http://www.info.gov.za/speeches/2009/09062408151001.htm> – Accessed on 1 June 2010

11 Green Gazette - Tender Bulletin No 2595 of 14-Aug-2009, Volume 530, page 19 <http://www.greengazette.co.za/pages/2009/08/Tender%20Bulletins/20090814%20-%20Tender%20Bulletin%20No%202595%20of%2014-Aug-2009,%20Volume%20530,%20019.pdf> – Accessed on 22 November 2010

12 Department of Communications & Presidential National Commission on Information Society & Development: Strategic Plan & Budget 2009/12 - <http://www.pmg.org.za/report/20090709-department-communications-presidential-national-commission-informatio> Accessed on 22 Nov 2010

to date. Since then, the Ministry has come under new leadership and there is hope that the audit will be taken up with more urgency.

In the mean time, the regulator, ICASA, has published an audit of two radio spectrum bands. The 450MHz to 470MHz¹³ band which is often used for CDMA 450 fixed-wireless services in other parts of the world and the 790MHz to 862MHz¹⁴ band which is shaping up as a global IMT band in the aftermath of the transition to digital terrestrial broadcasting.

Spectrum Fees

In 2009, ICASA published a draft Draft Radio Frequency Spectrum Fee Discussion Document which outlined their intent to revise the policy for annual spectrum license fees according to an Administrative Incentive Pricing (AIP) scheme. This approach has been adopted with some success by OFCOM, the UK communications regulator. Under this approach:

“Licences are issued by an administrative means but they carry with them an obligation to make a payment to the regulator or government which is designed to promote efficient spectrum use – not simply to recover spectrum management costs. The idea is that if a user has unused spectrum, it will choose to return it rather than pay the charge. Also, if a user can pay a lower fee by using spectrum more efficiently, that user may adopt more spectrum-efficient operations.¹⁵”

AIP is calculated via a formula which is intended to set spectrum fees high enough to discourage spectrum hoarding and inefficient spectrum usage but low enough so as not to create a barrier to market entry.

In September 2009, ICASA held public hearings on the draft spectrum fee policy which attracted submissions from 19 organisations¹⁶. As of June 2010, no policy has been published on spectrum fees.

13 450MHz – 470MHz Consolidated Audit Report - <http://www.icasa.org.za/LinkClick.aspx?fileticket=AZ5L54DV9Ys%3d&tabid=38&mid=501&forcedownload=true> – Accessed on 22 November 2010

14 790MHz – 862MHz Consolidated Audit Report - <http://www.icasa.org.za/LinkClick.aspx?fileticket=ekjF40bVRKw%3d&tabid=38&mid=501&forcedownload=true> – Accessed on 22 November 2010

15 Infodev ICT Regulation Toolkit - 5.7 Administered Incentive Prices
<http://www.ictregulationtoolkit.org/en/Section.1297.html> – Accessed on 2 June 2010

16 Ellipsis - Draft Radio Frequency Spectrum Fee Discussion Document and Regulations – Hearings
<http://www.ellipsis.co.za/draft-radio-frequency-spectrum-fee-discussion-document-and-regulations/> – Accessed on 2 June 2010

Digital Terrestrial Broadcasting Switch-over

South Africa is part of a global movement to transition from analogue to digital terrestrial broadcasting. Digital terrestrial broadcasting uses the same broadcast infrastructure as analogue broadcasting but has the advantage of being much more efficient and the potential to offer clearer reception for television viewers. Perhaps the biggest benefit of the move to digital terrestrial broadcasting, however, is the amount of spectrum that is freed up for other uses through this process. Referred to as the "Digital Dividend", plans for the use of this spectrum is a subject of much debate.

To achieve the switch-over to digital broadcasting, it is not only necessary to broadcast a digital signal but also each television must also have a digital set-top box to decode the digital signal for display on an analogue television.

In September 2008, the Minister of Communications approved the Broadcasting Digital Migration Policy¹⁷ which created the policy framework for the switch-over. The cost of manufacturing set-top boxes for South Africans is to be underwritten¹⁸ by funds from the Universal Service and Access Agency of South Africa (USAASA). Published plans indicated that the switch-over would be completed by November 2011.

Recently that deadline has become less certain¹⁹ as a debate has arisen regarding the standard for digital broadcasting. The contenders are the European digital video broadcasting terrestrial (DVB-T) standard and Japan's integrated services digital broadcasting terrestrial (ISDB-T).

The spectrum that will be freed up through the switch-over is the range from 174-230 MHz and 470-862 MHz. This spectrum is currently assigned to the South African Broadcasting Corporation (SABC). ICASA has indicated that it plans to release the band from 790-850 MHz for the emerging global IMT standard, effectively creating a new block of spectrum for mobile operators. The rest of the approximately 300MHz of additional freed spectrum could be used for "additional broadcasting services, high definition TV, return paths for interactive TV, and others."²⁰

17 Dept. of Communications – Broadcasting Digital Migration Policy <http://www.info.gov.za/view/DownloadFileAction?id=88342> – Accessed on 2 June 2010

18 Universal Services Access Fund to be used for set-top boxes - <http://www.engineeringnews.co.za/article/universal-services-access-fund-to-be-used-for-set-top-boxes-2009-09-25> – Accessed on 2 June 2010

19 Fin24.com - Setback for digital switch-over - <http://www.fin24.com/Business/Setback-for-digital-switchover-20100601> – Accessed on 2 June 2010

20 South Africa - Final Terrestrial Broadcasting Plan 2008 - <http://www.scribd.com/doc/32383563/South-Africa-Final-Terrestrial-Broadcasting-Plan-2008> – Accessed on 2 June 2010

Unlicensed or Licence-exempt Spectrum

License-exempt or unlicensed spectrum refers to spectrum bands that do not require a license from the telecommunications regulator in order to operate devices in that spectrum. Also referred to as Industrial, Scientific and Medical (ISM) radio spectrum, these bands were originally intended for experimentation rather than commercial use. In South Africa, the terms unlicensed, license-exempt, or ISM can be used more or less interchangeably when referring to this spectrum. These bands have drawn more attention in recent years thanks to the success of WiFi technology.

Occasionally people mistakenly assume that unlicensed spectrum implies unregulated spectrum. This is not the case. Unlicensed spectrum is regulated but not through a license for use. Rather it is regulated through the technical behaviour of the devices allowed to operate within those bands. Devices must conform to technical standards set down by the regulator for devices within each license-exempt spectrum band. In particular they must not exceed the rated power output for the given spectrum band. Power output for wireless devices is calculated according to Equivalent Isotropically Radiated Power (EIRP) which combines the power of the transmitter with the sensitivity of the antenna to establish a combined power output for the device.

With minor exceptions, South Africa follows the ITU Region 1 norms for license-exempt spectrum. See Appendix 2 for a full list of spectrum bands that are listed as license-exempt in South Africa.

Most important for the purposes of communication infrastructure are the 2.4GHz and 5.8GHz bands, popularly known as WiFi spectrum. The unlicensed nature of this spectrum has enabled an explosion of wireless communication devices from wireless hotspots, to broadband backhaul, to WiFi enabled phones. The growth of WiFi technology is unprecedented.

Within the 2.4GHz spectrum, devices must not exceed EIRP of 100mW. In the 5.8GHz spectrum devices must not exceed an EIRP of 1000mW.

Until 2008, it was difficult for any organisation or service provider in South Africa to take full advantage of WiFi infrastructure because the regulations governing the use of the WiFi did not permit WiFi networks to cross public boundaries. This meant that most WiFi hotspots, corporate WiFi networks, wireless ISPs were operating illegally. In 2008, ICASA issued revised regulations regarding unlicensed electronic networks which establish the category of Small Electronic Communications Network (SECN). This refers to:

“an Electronic Communications Network (ECN) that lies within a limited spatial area, used by a specific user group, has a specific topology and is not an ECN of national, provincial, district or local municipal scope, but may be connected to one which is licensed or license exempt. For example Local Area Network (LAN) or wireless LAN (WLAN).²¹”

This change in regulation makes it feasible for small-scale WiFi networks to legally exist for commercial or non-commercial purposes without requiring a spectrum license. It does not exempt organisations from requiring a license to deploy communication infrastructure at municipal or larger scales, or from needing a license to deliver commercial services over that infrastructure.

21 ICASA - License Exemption Regulations (2008) <http://www.scribd.com/doc/32277987/ICASA-Licence-Exemption-Regulations-2008>

Network Infrastructure and Service Licenses in South Africa

To operate a commercial wireless network in South Africa that offers retail services, two licenses are typically required: an “infrastructure” license and a “services” license, known as an Electronic Communications Network Service (ECNS) license and an Electronic Communication Services (ECS) license respectively. An ECNS license refers to the actual communications infrastructure e.g. masts, transmitters, etc. while an ECS license refers to the services e.g. voice that would run over the infrastructure. The intention in creating these two licenses was to establish layer separation in the market, to create a space for infrastructure wholesalers and service retailers. In practice that separation has not been achieved as no ECNS holders have chosen to offer wholesale-only services. All of the the ECNS holders offer retail services as well. It is possible that this might change with the opening up of new spectrum.

ECNS and ECS licenses are further sub-divided into “individual” and “class” licenses which generally refer to the geographic scope of the license. Individual licenses are nation-wide and class licenses typically refer to districts or municipalities. Until 2008, individual ECNS licenses were unavailable unless one was specifically invited to apply for one by the Minister of Communications. A landmark court decision in late 2008 resulted in all Internet Service Providers (ISPs) having their Value-added Network licenses converted into individual ECNS licenses and individual ECS licenses . This change resulted in 400-500 national infrastructure and services licenses being issued. As of June 2008, it is still impossible to apply for an individual ECNS license but this obstacle can now be circumvented by working with one of the many new license holders.

Types / Categories	ECNS (infrastructure)	ECS (services)	Frequency Spectrum
Individual	<ul style="list-style-type: none"> Commercial with provincial and national scope Where a state entity has an interest of > 25% Assessed as having a significant socio-economic development impact 	<ul style="list-style-type: none"> Voice telephony utilising numbers from the national numbering plan Where a state entity has an interest of > 25% Assessed as having a significant socio-economic development impact 	<ul style="list-style-type: none"> All spectrum licenses unless exempt.
Class	<ul style="list-style-type: none"> Commercial with district/local municipal scope 	<ul style="list-style-type: none"> Assessed as having no significant socio-economic impact. 	
Exempt	<ul style="list-style-type: none"> As prescribed including PTNs, LANs, etc 	<ul style="list-style-type: none"> As prescribed including non-for-profit and reseller services. 	<ul style="list-style-type: none"> As prescribed for uses permitted without a license e.g low-power uses, scientific, etc

Source: Justine White

Application fees for class ECNS and ECS licenses are R10000 . There is no application fee for individual ECNS and ECS licenses simply because it is not possible to apply for a new individual ECNS or ECS license.

The annual license fee for individual ECNS, ECS and BS licenses, and class ECNS and ECS licenses is set at 1.5 percent of gross profit. Gross profit is total revenue generated from the licensed services less total costs directly incurred in the provision of those services.

If operating as a non-profit, it is possible that license exemption might be achieved for ECNS and ECS licenses as long as the network was of a reasonably small scale.

If one wanted to become a commercial VoIP service provider in South Africa, at minimum one would require an ECS license (either individual or class) to deliver VoIP. An individual ECS license would be required if one wanted to gain access to banks of directly dialable South African phone numbers. If not using someone else's infrastructure, then an ECNS license would also be required.

Finally, if not operating in the the license-exempt band, then a spectrum license would also be required. The recent changes in the availability of ECNS and ECS licenses places a particular emphasis on spectrum licenses as a key barrier to increasing market competition.

Industry Associations

Wireless Access Providers Association (WAPA)

The Wireless Access Providers' Association (WAPA) was established in 2006 in South Africa to represent wireless access providers and to act as a collective voice for independent wireless operators in South Africa. Currently WAPA has over 85 members and is an active industry voice on spectrum and licensing issues in South Africa. Most of these providers are using unlicensed spectrum, either in part or exclusively, to deliver broadband services to their clientele. A complete list of WAPA members can be found at <http://www.wapa.org.za/members/>

Wireless User Groups in South Africa

South Africa has a number of thriving Wireless User Groups (WUGs). A complete list of Wireless User Groups in South Africa can be found at http://www.wug.za.net/wiki/index.php/Current_SA_WUGs. Some of the WUGs are actively engaged in policy work.

Internet Service Providers Association

The Internet Service Providers Association of South Africa (ISPA) is an active industry associate representing 174 Internet Service Providers (ISPs) in South Africa. ISPA has been the most actively non-telecommunications organisation to engage in communications regulatory policy in South Africa.

Open Spectrum Alliance

The Open Spectrum Alliance of South Africa (OSA) is a loose association of like-minded organisations and individuals working toward greater efficiency in the allocation, assignment and use of radio frequency spectrum in South Africa. Founders include the Wireless Access Providers Association (WAPA), the Shuttleworth Foundation, and the Association for Progressive Communications (APC).

Other Spectrum

- Are there other frequencies that the regulator is planning to make available to operators in the next five years? How (auction, etc.) and when?

The regulator will likely consider the range of spectrum freed up through the migration to digital broadcasting in the near future.

- Outside of the standard mobile and unlicensed frequencies, are there other significant frequencies that have been granted or auctioned to companies providing fixed or mobile telecommunication services.

The regulator is currently tendering for a company to manage the auction of the 2.6 and 3.5GHz range of spectrum.

- What opportunities exist in government spectrum re-use?

It is possible that spectrum in the 450MHz range could be considered. It is currently in use by police services but is being considered for mobile services. Another possibility is the 380-400MHz tetra systems – assigned to police and metropolitan councils.

- Are there particular bands of unused spectrum which might represent an opportunity for improved access in South Africa?

Television White Spaces devices capable of serendipitously re-using television spectrum for broadband holds great potential for South Africa. The recent approval of TV White Spaces technology in the United States means that

- Are there any light-licensed frequency bands in your country?

None to date.

- Are innovative approaches to spectrum management under consideration by the regulator, e.g. in the context of the digital switch-over?

Yes. Sub-leasing. WAPA is proposing a slice of the 5GHz band for “lite” licensing. WAPA has also called for the regulator to consider regulation regarding Television White Spaces²²

Debate

- What individuals or groups in South Africa are engaged in the spectrum debate?

Outside of the incumbent operators, the most outspoken groups on spectrum policy has been the Wireless Access Providers Association (WAPA) and the Internet Service Providers Association (ISPA). Both associations have made several submissions to the regulator as well as public statements on spectrum policy and regulation. The Association for Progressive Communications and the Shuttleworth Foundation have also contributed in this area.

²² White Space Spectrum Needs to be Addressed – WAPA - <http://mybroadband.co.za/news/wireless/16335-White-Space-spectrum-needs-addressed-WAPA.html> – Accessed on 22 November 2010

- Does a national broadband strategy exist? Is spectrum mentioned specifically?? in the strategy?

A national broadband policy for South Africa was published on 13 July 2010²³. Spectrum management is mentioned in the document but only to the extent that the government recognises its importance. Specifically, Section 4.1.4 entitled "Spectrum for Broadband" states:

"this policy recognises that the radio frequency spectrum is a scarce national resources and that the allocation shall be guided by the developmental objectives in the public interest."

That is the full coverage of spectrum in the document. In addition to this, the African National Congress have released a statement²⁴ on 12 November 2010:

"Consistent with the national targets to be articulated in policy, a decision to prioritise high capacity spectrum for wireless communications in rural and urban poor areas will be needed. National policy should thus prioritise scarce high capacity bands to achieve rural connectivity within a reasonable, short space of time. A long-term perspective is needed to ensure the sustainability of these rural ventures such that they don't disappear into thin air like previously licensed under-serviced area licensees (USALs).

Established players, on the other hand, should be incentivised to re-farm or use the current spectrum they use for voices services to provide broadband. Initiatives towards this direction are under-way in some parts of the country, and can only be given more impetus by national policy."

- Is there a specific policy which is in place regarding efficient use of spectrum, e.g. a use-it-or-lose-it policy? If so, what are its terms and are these terms enforced?

On 28 May 2010, ICASA published the "Regulations on the Procedures and Criteria for Granting Radio Frequency Spectrum Licenses for Competing Applications or Instances Where There is Insufficient Spectrum." In it, the regulator clearly lays out the intention to apply a Use-it- or- Lose- It principle to scarce spectrum. In section 10, it states:

ICASA shall review radio frequency spectrum utilisation by the licensee assigned in terms of this regulation after two years of a license being granted. Failure to meet 50% of the roll-out targets set out as a part of the license conditions prior to the second anniversary of the license is considered non-utilisation. In the event of non-utilisation ICASA shall withdraw the license.

23 Broadband Policy for South Africa - <http://www.scribd.com/doc/43794703/Broadband-Policy-for-South-Africa>

24 A universal broadband connectivity for all - <http://www.anc.org.za/docs/anctoday/2010/at42.htm#art2> Accessed on 22 November 2010

Spectrum Policy Resources

National Radio Frequency Spectrum Policy for South Africa - No. 33119

<http://www.scribd.com/doc/32278419/South-Africa-National-Radio-Frequency-Spectrum-Policy-2010> -
Published 16 April 2010

Electronic Communications Act, 2005

<http://www.icasa.org.za/LinkClick.aspx?fileticket=hVMvwf2qmj0%3d&tabid=86&mid=649&forcedownload=true>

Independent Communications Authority of South Africa Act, 2000

<http://www.icasa.org.za/LinkClick.aspx?fileticket=l2wtUAZmDig%3d&tabid=84&mid=499&forcedownload=true>

Independent Broadcasting Authority Act, 1993

<http://www.icasa.org.za/LinkClick.aspx?fileticket=1JATA5waO7I%3d&tabid=90&mid=652&forcedownload=true>

Spectrum Table of Frequency Allocations for South Africa

<http://www.scribd.com/doc/32266214/South-African-Table-of-Frequency-Allocations>

Spectrum Assignments in South Africa

<http://www.icasa.org.za/tabid/394/Default.aspx>

License Exemption Regulations (2008)

<http://www.scribd.com/doc/32277987/ICASA-Licence-Exemption-Regulations-2008>

Dept. of Communications – Broadcasting Digital Migration Policy (2008)

<http://www.info.gov.za/view/DownloadFileAction?id=88342>

South Africa - Final Terrestrial Broadcasting Plan 2008

<http://www.scribd.com/doc/32383563/South-Africa-Final-Terrestrial-Broadcasting-Plan-2008>

Consolidated Spectrum Audit 450MHz-470MHz

<http://www.scribd.com/doc/43791047/South-Africa-Consolidated-Spectrum-Audit-450MHz-470MHz>

Consolidated Spectrum Audit Report 790MHz-862MHz

<http://www.scribd.com/doc/43792291/South-Africa-790MHz-862MHz-Consolidated-Spectrum-Audit-Report-1>

Broadband Policy for South Africa

<http://www.scribd.com/doc/43794703/Broadband-Policy-for-South-Africa>

Appendix 1 – GSM Mobile Spectrum Bands

Vodacom

890.1 - 901.1 MHz // 935.1 - 946.1 MHz (GSM900 channels 1 - 55)

1760.3 - 1772.3 MHz // 1855.3 - 1867.3 MHz (GSM1800 channels 763 - 822)

1920 - 1935 MHz // 2110 - 2125 MHz (UMTS channels 1 - 3)

MTN

901.5 - 903.9 MHz // 946.5 - 948.9 MHz (GSM900 channels 58 - 69)

906.1 - 914.7 MHz // 951.1 - 959.7 MHz (GSM900 channels 81 - 123)

1722.7 - 1734.7 MHz // 1817.7 - 1829.7 MHz (GSM1800 channels 575 - 634)

1950 - 1960 MHz // 2140 - 2150 MHz (UMTS channels 7 - 8)

Cell C

882.7 - 889.5 MHz // 927.7 - 934.5 MHz (E-GSM channels 988 - 1021)

904.3 - 905.7 MHz // 949.3 - 950.7 MHz (GSM900 channels 72 - 78)

1747.9 - 1759.9 MHz // 1842.9 - 1854.9 MHz (GSM1800 channels 701 - 760)

1940 - 1950 MHz // 2130 - 2140 MHz (UMTS channels 5 - 6)

Appendix 2 – License Exempt Spectrum

40.66 - 40.7 MHz

Is international ISM band (RR 5.150 refers)

430 - 440 MHz (amateur band and short range radio devices (SRD) applications)

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.

915 - 921 MHz

This is part of ITU Radio Region 2 ISM band 902 - 928 MHz (centre frequency 915 MHz). In South Africa this band is allocated as follows.

- Vehicle location systems in 915.025 -915.200 MHz band on licensed basis.
- Band 915.2 to 915.4 MHz is allocated to single fixed narrowband (25 kHz channel spacing) passive tag RFID systems with power output of the reader not exceeding 4W EIRP.
- Band 915.4 to 919.7 MHz is allocated to passive RFID systems employing

Frequency Hopping Spread spectrum (FHSS) with 100 kHz guard band on either side with channels 200 kHz wide.

2300 - 2500 MHz

Within the range 2300 – 2500 MHz the frequency bands 2307 – 2387 MHz paired with 2401 – 2481 MHz is used extensively for terrestrial point-to-multipoint systems in line with ITU-R Recommendation F.746 Annex 1. PTMP systems are deployed extensively across the country, in particular in rural areas, and will have to be protected into the foreseeable future as they provide cost effective alternatives for rural communications.

The sub-band 2400 – 2483.5 MHz is used for WLAN and SRD type applications (Government Gazette No 26193, Notice 533 of 24 March 2004 refers..). The sub-band 2483.5 – 2500 MHz is allocated for mobile-satellite systems in the space-to-Earth direction. The band 2400 – 2500 is also allocated to ISM (Industrial, Scientific and Medical) equipment and has primary status over the other applications within the band. ISM equipment (e.g. microwave ovens, RF treatment used against cancer, etc) does not include any telecommunication equipment (e.g. WLAN, spread spectrum radios, etc.).

5725 – 5875 MHz

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

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

13 553-13 567 kHz

(centre frequency 13 560 kHz),

26 957-27 283 kHz

(centre frequency 27 120 kHz),

24-24.25 GHz

(centre frequency 24.125 GHz)