

Briefing Paper. By Guy Berger
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Research priorities for AfriMAP research into Public Service Broadcasting in Africa, with regard to digitisation.

Abstract:

Many state-owned broadcasters around Africa are faced with challenges of competition on the one hand, and transition to being properly public service broadcasters (PSBs) on the other. But parallel to all this are dramatic developments with respect to digitisation (and convergence), which affect all broadcast media and especially including state-owned broadcasters. There are major issues here – from the national environments with regard to policy, law and regulation, to institutional issues encompassing technical, content, etc. South Africa has wrestled with some of these complex issues, and yet there is still much to be done notwithstanding the pressures imposed by the 2010 Soccer World Cup to be staged in the country. It is presumed that most African countries are coming to grips with the issues much more slowly. A review of the issues reveals many issues that require further research.

1. Introduction

Digitisation in regard to broadcasting is often reduced to the question of transmission methods, to which sometimes is added the issue of the reception devices. These two elements are critical – and they are also somewhat distinct. A migration to digital TV broadcast transmission is not the same thing as the audiences migrating to actually view digitally – for a long time, many will still be watching an analogue conversion. Broadcasting in digital and viewing or even listening in digital are different matters. Migration of *broadcasting* may occur over five years – while migration of *reception* over 10 to 15.

Going beyond these two realms of digitisation, however, one also needs to look at the entire chain of broadcasting, starting with pre-production and going through to the actual use of the content by the receiver. A digital transmitter network, even if there are receiving devices, is worthless if there are no services to be broadcast. Thus, South Africa's Independent Communications Authority (Icasa) notes how digitisation impacts on three broad components of the broadcast value chain: content provision; signal distribution; and reception.

In addition, it is necessary to also see digital broadcasting in the context of global developments in manufacturing, content and frequency regulation. For instance, analogue equipment will increasingly be hard to source or replace; electronic content flows will be dominated by those who are digital; and the International Telecommunications Union (ITU) says it will not protect analogue use of frequency after 2015.

The move to digitisation of broadcast transmission and reception around the world has been motivated by different drivers. The key driver of digitisation of broadcast in Japan is said to be because of *scarcity*: almost all available frequencies are already in use to serve the country's existing analogue broadcasters. According to one study, the US transition is driven by *economics*: the spectrum is worth billions of dollars to a range of contenders (digitisation of transmission ultimately freeing up spectrum for additional use/rs). Digitisation also makes *HDTV feasible*, and this is an attractive proposition to US broadcasters (the same driver is a factor in Australia). In Canada, the main driver seems to be increasing demand for spectrum for *mobile Internet use*, and also – as with the USA – from pressure to accommodate advanced *law enforcement and security services*. In addition, there is a quest for common spectrum use with the US – indicating the international character of the issue. (Also evidence of the international component, in South Africa, the government delayed on finalising a frequency plan and switch-off date until a key ITU meeting this last August).

Research in the UK suggests that the single biggest driver for the take-up of services in that country has been access to a *wider variety of programming*. The UK government, like most European countries, has also had an incentive to *raise revenue* through spectrum sales to 3G service bidders, and three of its six new digital TV multiplexes were also auctioned off.

For African countries, it will ultimately be impossible to escape digitisation. It will be like the current situation where Africa does not necessarily need the current over-specifications of PCs and software capacities, but there is no real choice that would allow the continent to opt for lower powered and cheaper alternatives.

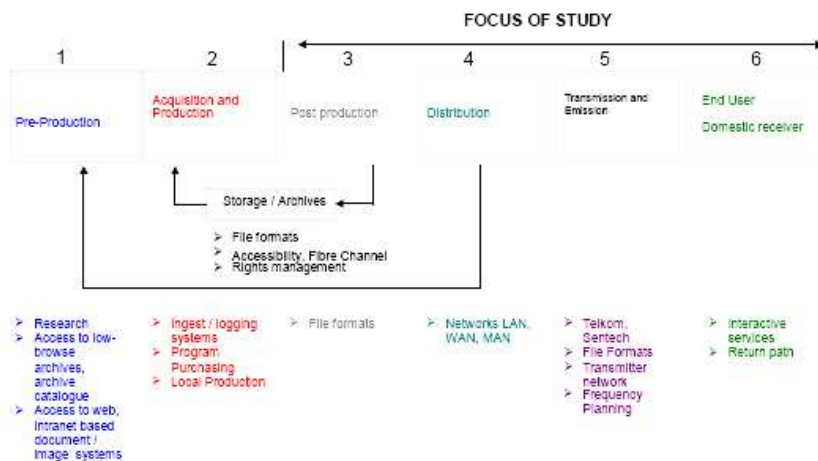
The drivers of digitisation of broadcasting in Africa will be rather different to those cited above in regard to the First World. First they will be exogenous drivers primarily, rather than determined by internal factors. Thus, digitisation will happen as a spin-off of the transitions taking place in First World markets, and to a large extent will also depend on technologies in those markets declining in cost over time. Second, to a great extent, African transitions will also probably be dependent on external resources: i.e. *donor-driven* migrations. It is unlikely that governments will push the process. In a minority of cases, it is likely to be private broadcasters who drive the take-up process in Africa; in others there will be a piecemeal reactive mix that includes state-owned broadcasters. In the unique case of South Africa, the hosting of the 2010 World Cup is proving to be the driver.

It is also likely that Africa will exhibit a tiered system, with a widening digital divide evident in digital broadcasting. Thus, digital TV in particular, will be largely a subscription model for a long time yet (even when operated by a PBS like SABC). Those citizens who cannot pay will have to remain condemned to analogue service for many years yet (not forgetting many do not even have analogue at this point in time). This differs for example from the Australian model, where digital terrestrial TV (as distinct from digital satellite TV) is supposed to be free-to-air.

2. Technology considerations

2.1 Digitalisation across all stages:

Digitisation of broadcasting, as noted earlier, extends across the whole chain, not just transmission although this phase is such a major component of the whole. The chain itself is well shown in regard to television (radio is simpler) in the following graphic from the Southern African Digital Broadcasting Association (SADIBA):



Interesting about this chain is that the digitisation of some parts does not require, nor necessarily lead to, the digitisation of others. For example, digital transmission is often (as in South Africa's DSTV) converted into analogue format through a set-top box, so that it can be then received on a conventional analogue TV set. Similarly, digital acquisition and production systems (that enable tapeless, computer-based editing), do not necessarily entail that there is digital technology prior to or post this stage of the chain.

However, an indication of the advantages of having the entire set of stages digitised is evident in a document by the BBC, pointing out how "metadata" can be captured to efficiently expedite the process if everything works on digital. In this example (elaborated by this author):

Commissioning stage: Metadata to be kept: Title, genre, contributors, Intellectual Property rights entailed.

Planning: eg. Storyboard and script kept in varying versions.

Capture: eg. GPS locations, annotations.

Ingest: eg. shot changes.

Logging: eg. can be made redundant through data entered at previous stages.

Editing: eg. different camera angles can be captured for interactive broadcasting.

Archive: eg. labelling can allow for easy search.

Playout: eg. customisation can be done according to the device being played out to (eg. PC, cellphone, HDTV set, standard TV set).

SADIBA discusses digitisation across the chain in South Africa as follows:

A - PRE-PRODUCTION

Researchers, producers and commissioning editors use computer based systems to initiate the program cycle, scheduling and offline preparation. SADIBA point out that most video archive material is in an analogue format at present, and this certainly applies to most of Africa.

B - ACQUISITION AND PRODUCTION

SADIBA says that production processes currently use a wide variety of analogue and digital equipment, usually manually controlled in real time, with varying degrees of automated assistance. But it is still basically an analogue process. Conversion equipment is needed to change or playback digital format material. In news, Electronic Newsgathering (ENG) now includes digital satellite news-agency feeds, and digital feeds from bureaux via ATM lines.

C - POST-PRODUCTION

Most post-production in South Africa at least is digital. SADIBA points to efficiency in workflow through faster than real-time transfer of material, and in access to centrally stored content. ATM and Ethernet networks are deployed to distribute content in the post-production environment.

D - DISTRIBUTION

The majority of distribution of broadcast video in Anglophone Africa is done in PAL-I analogue format. Microwave or ATM technology is used to onsend this material to transmitter station/s whether terrestrial transmitters. Alternatively there are uplinks to satellite.

E - STORAGE

The storage of material in much of Africa is done mainly in analogue form for post production and transmission. SADIBA says the condition of this material is deteriorating, and as production and acquisition migrate to digital formats, the efficiency with which this material is accessed and used decreases. (In contrast, access to digital archives can also even become part of an interactive service offering.)

F - TRANSMISSION AND EMISSION

In South Africa, most of the SABC and e-TV transmissions are done in PAL-I. Multichoice broadcasts a digital signal via satellite. SADIBA argues that “the greatest impact” for broadcasters and signal distributors occurs when this stage of the content chain migrates to digital broadcasting. This is because of the emergence of “multiplex operators” (see below).

G – RECEPTION

Ubiquitous in Africa is analogue reception at the terminal device level, even with respect to digital satellite delivery. This is a far cry from digital where, for example, metadata incorporated during earlier phases can be ‘read’ into electronic programme guides

(EPGs). Analogue receivers such as the MNet decoders in South Africa do allow for encryption and custom feeds. But even this is also a far cry from digital receivers offering sophisticated Conditional Access (CA), Subscriber Management Systems (SMS) and Application Programme Interfaces (APIs – relating to the portability of interactive content, and the amount of re-authoring and costly multiple versioning that is needed). These facilities could for example link with licence fees payment. What also becomes relevant here are issues of interactivity (and also of return-paths), and of Intellectual Property rights management (copy once, never, free copy, etc).

2.2 Digital multiplexing, digital radio and digital TV

To deal with the digital transmission stage in more depth, there are many technologies available and African countries will need to consider the advantages of each. In addition, radio and television are distinct – and, as we shall see below, also not so distinct! But what is shared in all digital broadcasting is the breaking down of content streams into (compressed) “bits” constituted by electronic or lightwave pulses, rather than waves, and this allows for “multiplexing”. According to wikipedia, this latter term means “combining several signals for transmission on some shared medium (e.g. a telephone wire). The signals are combined at the transmitter by a multiplexor (a "mux") and split up at the receiver by a demultiplexor. The communications channel may be shared between the independent signals in one of several different ways: time division multiplexing, frequency division multiplexing, or code division multiplexing.” In short, while African analogue broadcasting has one channel/service per frequency, digital transmission allows for multiple use of a given frequency.

2.2.1 Digital television:

Digital Television (DTV) sometimes refers to *TV formats*, SDTV (standard definition television); HDTV and ITV (interactive TV). These are all options that are not necessarily linked to any particular transmission mode or even to a given receiver device. Most, for example, could be received on a handheld device, a TV set with digital capacity, and personal computer. The issue of handheld is potentially very important in Africa in regard to advances in cell phones).

However, usually the meaning of “digital TV” is in regard to *digital transmission of TV signals* and to the modes of delivery of this transmission – which may be by satellite, terrestrial signals (of which one is Digital Terrestrial Television, DTT) or various types of cable. It seems that cable still remains the most powerful: allowing for greater numbers of services than the other modes. However, it should also be noted that cable is also the most uncommon infrastructure in Africa. Satellite is potentially the most ubiquitous, but also very expensive given that there is very limited ownership of satellite in Africa (only Egypt, Algeria and Nigeria are players here). In South Africa, the Minister of Communications has proposed the use of digital terrestrial broadcasting as the main network, with digital satellite to be used only for “gap-filling”.

As regards digital terrestrial television (DTT), there are three major technical standards around the world: DVB-T, ATSC and ISDB-T. Less common at this point seems to be a fourth format, IPTV (internet protocol TV). IPTV can be via satellite, such as the Mindset educational programming on DSTV in South Africa, and could increasingly be via broadband connections to a range of devices. IP video (in Flash player format) is also a growing phenomenon being distributed via websites such as YouTube in the USA where broadband internet connectivity is available – a far cry from most African countries. Least common at present is 3G cellular technology, which although it can run IPTV, is vulnerable to network congestion. South Africa's Vodacom cellular operator offers this service, however.

Most likely for Africa, is the European Digital Video Broadcasting (DVB) transmission standard. Less likely is Advanced Television Systems Committee (ATSC) standard developed in the US, and even less so the Integrated Services Digital Broadcasting - Terrestrial (ISDB) standard developed in Japan. SADIBA points out that the ATSC standard was developed with an emphasis on HDTV (a very distant prospect in Africa in that new wide-screen TV sets are required), while Japan focused on finding a common standard for both radio and television for fixed and mobile reception. (DVB-T can, however, provide for mobile services and for HDTV.)

The further advantage is that DVB is that it enables inter-operable variants for satellite, cable, terrestrial and handheld (eg. DVB-S, DVB-T, DVB-H). In DVB, each component is broken down - into audio description, audio, video, text and interactive streams. The effect is that DVB can as easily carry pure audio (i.e. digital radio) as it does TV – breaking down the distinction between these media as regards separate frequency use at least. In addition, DVB can carry enhanced text for translation or deaf viewers, as well as video feeds of hand-sign translators (important considerations for public broadcasters).

The adoption of DVB means that there can be a common receiver specification, which enables all broadcasters to deliver content via the same receiver. However, this does not mean only one functionality in the receiver: SADIBA says these can range “from simple free to air units (that will target the low end market) to interactive multimedia personal video recorder units (that will target the high end market)”. Such devices may be set-top boxes, or digital TV sets, or receiver-enabled devices such as next-generation cellphones just entering the market.

On each digital receiver device, there can in theory also be alternative receiver platform modules such as satellite or cable (eg. ADSL); return channel capabilities for interactivity (either by modem or radio frequency), and hard disk storage capability. South Africa's SABC, MultiChoice, Sentech and all three mobile operators, are currently conducting trials of the DVB-H technology to cellphone hand-sets. MultiChoice has advised that it will be investing about R200 million with Sentech in DVB-H. The likely evolution here is that cellphones can offer an instant return path through SMS or WAP (making digital broadcast content integrat-able with e-commerce and even e-governance). In addition, such smart phones could even operate as set-top boxes to deliver a DVB format to analogue TV sets.

2.2 Digital radio:

There are two main terrestrial types here. Digital Audio Broadcasting (DAB), based usually on the Eureka 147 standard, is the most common, and is designed to replace analogue FM. Digital Radio Mondiale, though still in a relatively early phase, is designed to replace analogue AM, Shortwave and Longwave radio.

DAB is nearly 15x more efficient than FM. It can carry seven multiplexes in less spectrum, with each of these carrying 10 radio and data services. The UK has 20 simultaneous national services on two multiplexes, compared to six national services on FM. (Another five multiplexes there are for regional and local use). Some mobile phones today have DAB receiving capacities, and these may become more standard overtime. Combined with built-in storage and MP3 players, such phones become a formidable device – with podcast downloads becoming a real prospect in Africa. Depending on the device, digital radio can also converge somewhat with visual media in that it is able to send parallel text streams, and even images, becoming thereby “enhanced radio”.

Significantly, digital radio – unlike TV – requires an entirely new device: a set-top box linked to an analogue receiver is not a viable option. This characteristic may mean a substantial lag by in consumer migration to digital radio in comparison to digital TV. The negative knock-on effect in terms of building sufficient audience to attract advertising to digital radio is also a serious disincentive for radio broadcasters to pay for digital streams of their content via DAB.

2.3 Differences between digital radio and digital TV

The main difference lies less in the difference between pure audio (“radio”), and audio-visual (“TV”), (given the potential convergence between these services), than in the frequencies used. Essentially, digital TV (with audio channels) will operate in the existing TV frequency bands – which also means that there are more limited possibilities available, especially in the transitional period when both digital and analogue services co-exist. However, digital radio requires a different part of the spectrum to be opened up, and it also seems that the closure of analogue radio – unlike TV – will therefore not actually free up more spectrum for broadcasters. Another difference is that consumers tend to experience radio as free-to-air, and so digital subscription broadcasting is less likely in audio than in audio-visual. According to SADIBA, it is important that digital radio offers something more than just improved audio quality of the services already available on analogue.

In general, it seems the attention-grabbing priority in digital transition thinking is television, rather than radio. In the medium term, however, there is not only likely to be optional convergence within each of the two genres as they are transmitted (creating hybrids of each), but also possibly in regard to a single receiver device that accesses and displays either digital radio or digital TV.

One thing is clear in all this: the digital watershed is exactly that. The world has only just begun the crossing, and in years to come, numerous other digital technologies and standards will emerge. In some cases these can be expected to render obsolete or incompatible, current digital modes like DVB, DAB and DRM. For example, in the UK, DAB radio sets were built to receive MP2 compressed audio – an unsatisfactory format from a quality point of view, but they cannot now be customised to take MP3 or 4. This of course complicates any long-term planning.

3. The big picture

There are two important phases in digital transition: the switch-on of digital broadcasting on the one hand, and the switch-off on the other.

The World DAB Forum points out that switch-on depends on “attractive licensing regimes, adequate spectrum allocations, synchronized timetables . . . , and a co-ordinated market approach of content/network/equipment providers, including promotion campaigns”. A major objective is the raising of consumer awareness and interest. In their view, market affordability follows the normal price curves. It is also “technical innovations and innovative services that will then drive the takeup . . . , which becomes a market-driven process”. According to SADIBA, “The critical aspect of migration is . . . not the establishment of digital infrastructure (although such digital networks and services will be the catalysts for the migration) but rather the market uptake of new digital receivers and STB.” The part played by governments and regulators in all this is discussed below.

SADIBA also points out, the deployment of digital broadcast services necessitates a migration plan that would indicate how digital services will be rolled out, co-exist with analogue and share spectrum, and then take on board the eventual closure of analogue services. This involves a timetable with difficult judgements, for example whether to have a moratorium on new analogue services, even before there are adequate digital transmitters and receiving capacities. It is a version of the chicken-and-egg story: which should come first?

A switch-off strategy as regards analogue broadcasting needs to have a timetable and a set of criteria. In 1999, the UK set three criteria before switch-off would happen: first, the content on analogue had to be available on digital; second, it had to be accessible in terms of 95% universal service; and third; the change to digital had to be affordable to vast majority.

In 2007, the UK will begin switching off some of its analogue infrastructure; the same year Sweden and the Netherlands are expected to close all of theirs. It is safe to say that for almost all African countries, digital broadcasting (at least terrestrially) has yet to commence – and probably won't be during 2007. The international digital divide in broadcasting, in other words, is becoming a chasm.

There is also the question of the extent to which existing infrastructure such as transmission sites, masts and antennas can be used to keep deployment costs low. However, in many African countries, these facilities are already inadequate in terms of universal service of analogue service distribution. Even in South Africa, according to SADIBA, some six million people (in varying degrees) do not have access to terrestrial radio and television signals. (It is estimated by some that 40% of households do not have their own TV set – let alone receive prime time content in their mother tongues).

SADIBA highlights that although digital broadcasting is more efficient than analogue, there are major costs in introducing it – especially at the transmission and receiving stages. The cost to the viewer will increase, and in addition the cost per viewer will increase. What this means is a need to look at the feasibility, rather than only the necessity, of digital broadcasting. In the period of what is called “dual elimination”, someone has to pay for digital transmission alongside the existing analogue transmission. Many African broadcasters, not least community radio, would find this impossible on their current resources.

A particularly TV issue pointed out by SADIBA is that as receiver equipment progresses to include personal video recorders, the advertising market and advertising revenue driven operations could face the threat of declining ‘advert viewer’ numbers as viewers would have the option of disabling adverts.

In short, there is a critical interdependency between switch-on and the length of time it takes before switch-off can be completed. Central to this is money and public awareness.

4. Governments and policy

Governments have a pivotal role in creating an environment for digital broadcasting, whether or not there is an independent regulator (uncommon in most African countries). This is because governments at least have to take a view on standards, interoperability, models of licensing regimes, spectrum management policies, and public subsidies. For example, even in the free-market ideology USA, a set-top subsidy has been voted by Congress and the Senate, providing a "digital-to-analog converter box" voucher that will help viewers without DTV receivers to continue receiving broadcast signals. In Japan, it appears that there are tax incentives and interest-free or low-interest loans to ease transition for the operators. Korea's government has created a fund for R&D into next-generation digital broadcast technology, and its Ministry of Information and Communication is setting up "Digital Broadcast Research Centers" in universities. Governments can also decide on discounted rates on audiovisual license fee for households who have switched to digital, and general VAT reduction on purchases of equipment.

In Southern Africa, SADIBA is an industry-wide body, including at least one commercially-driven state-owned broadcaster (the SABC). Despite the participation of private-sector players in it, the association is not naïve enough to think that digital broadcasting can be left to the market alone. Instead, it points out that while this could

prove attractive to pay TV services and smaller niche and regional operators, this situation would not be linked to other national objectives to create an information society in South Africa. In consequence SADIBA calls for “a managed market”. To this end, the organisation proposes that the South African regulator Icasa establish a standing committee that includes industry. It also calls for government to play various other roles: to impose a moratorium on analogue services (this is also Icasa’s position in the case of new subscription services); announce a tentative switch-off date for analogue; and to promote digital networks as a means to provide access to state services including education. At base, SADIBA says that the South African government should act to promote accessibility, affordability and take-up, in a context where there is no major market demand for digital broadcasting transition.

SADIBA has specifically proposed that areas with high roll-out priorities should be metropolitan areas, educational institutions and learning centres. On the other hand, it also recognises that a faster and forced universal migration would yield significant savings in double illumination transmission costs as analogue services could then be switched off sooner. It adds: “A managed / forced approach also induces economies of scale benefits the most obvious of which is the driving down of costs through greater market penetration. ... Subsidised receiver equipment for consumers could be used as an incentive and catalyst. In addition government would have to subsidise the migration for the public broadcaster as the existing funding model... would not be able to cater for digital broadcasting.”

Fiscal policy priorities have major bearing on digital.

The first big issue here is paying for conversion to digital transmission. In South Africa, the main signal distributor is state-owned Sentech. After many fears that the company would not be able to do this in time for the 2010 World Cup in South Africa, the government finally seems to have agreed to pay for the conversion. The estimated bill is R1bn, of which however only R208m has been given by government so far.

Second, there is also then the question of digitising state-owned broadcasters, and who pays for this. In South Africa, this transition will cost, according to SABC, R1.3bn. A government grant in 2005 provided R400m towards this. The expenses will cover digitising studio infrastructure, digitising the radio main controls, replacing videotape, setting up ATM contribution networks, final control centres and studios, and the archive – a total of 96 projects. Presumably, the grant will also need to cover HDTV cameras in order to meet FIFA requirements at the World Cup.

Third, there is the matter of financing reception of digital transmissions. According to South Africa’s Sentech, although its estimate is not broken down, the total cost to the country of moving to terrestrial digital TV will be about R10 billion. Thus, besides the components on the infrastructure side of dissemination, there are also those on the reception side. In other words, a major part of this R10b bill, is likely to include set-top boxes and digital TV and radio sets. Government, having paid for technology upgrades on the supply side, will need to help subsidise the consequences for the demand side if

the whole scheme is to make sense. What is of interest is that the beneficiaries from migration are the signal distributors and equipment manufacturers (and those securing the freed-up spectrum, who are different entities to those which must bear the costs (broadcasters, consumers and government). Government has a role in spreading cost and benefit sharing amongst the diverse stakeholders – itself included.

Fourth, comes the matter of paying for “dual illumination”. Link Centre researchers Armstrong and Collins in South Africa argue that SABC’s existing revenue streams will not cover the costs of dual signal distribution, and further that government’s reluctance to fund SABC indigenous language programming is a sign that a subsidy for “dual illumination” will not be forthcoming. (These researchers also predict that the transition period in South Africa, with “double illumination” period would be perhaps five to 10 years. This could be a time of “extreme spectrum crowding and scarcity (particularly in Cape Town)”). For Icasa, however, licensees themselves should pay for digital transmission, incurring the costs to themselves. This, it argues, is the way to develop a sustainable broadcast business. Clearly, governments have to take a policy stand on who pays for “dual illumination”.

Another area where government policy is called for, however, is in regard to local content on digital broadcasting. Australia, Canada and the UK are just some of the countries that require this. It is not exactly clear for example whether government policy in South Africa would apply existing quotas for analogue broadcasting, willy nilly to digital. The point is that governments are again called upon to take a position with digital broadcasting.

One issue facing governments is spectrum management - re-arranging spectrum use to enable transition to digital. This is closely tied to licensing, and the question is therefore whether it is handled within the licensing agency – or another body. Africa has many diverse arrangements in this regard. In South Africa, Icasa has set aside 2 frequencies – each to be used as a DTT multiplex.

In South Africa, the government certainly sees itself as playing a major part in the whole process. To this end, the Department of Communications created a “Digital Broadcasting Advisory Body” (DBAB) in 2001, whose limited-circulation report is believed to have been approved by Cabinet in 2002. Of concern to the South African National Association of Broadcasters (NAB), attention is needed to the recommendation of the DBAB that “in developing new policy, government has a responsibility to protect the interests of existing licensees and service providers while creating an enabling environment for the introduction of new services and market entrants”. NAB said it was thus important that all existing broadcasters have a future in digital and thus that they have access to digital spectrum and may participate on a digital multiplex. The politics of existing vested interests in other words has to be taken into account by governments.

In response to government consultation on switch-off, the NAB said that there was a difference in policy approaches to radio as opposed to television. “Switch off is a key concept in regard to television but not to the same degree in regard to radio. This is

because of the differences in market structures and spectrum requirements for radio and television.” It added that analogue switch off is not a once-off event where all analogue services are abruptly terminated. Rather, the switch to digital is a process in which analogue services are gradually migrated to digital once digital coverage is available. The NAB is probably correct, but it has also been pointed out, however, that by government putting a firm deadline on analogue turn-off, market players and consumers will be pressured to adopt technology faster. In this regard, South Africa’s Minister of Communications has proposed making 2008 the last year for the sale of analogue TV sets in her country. (Sentech plans to roll out DTT in the metropolitan areas in 2008).

Following DBAB, the South African government set up a “Digital Migration Working Group” of various stakeholders in 2005. A “strategy paper” from this body is expected in October 2006, reflecting four sub-groups, technical standards and frequency planning; policy and regulatory affairs; broadcasting content and culture; and economic analysis and finance. “Content and culture” is expected to cover production strategies for the digital domain; promotion of languages, diversity and South African content; and copyright and intellectual property issues. The “policy and regulatory affairs” group is supposed to:

- * Determine public policy objectives of transition from analogue to digital broadcasting.
- * Examine public interest issues in broadcasting against backdrop of transition to digital and determine impact.
- * Recommendations on policy approach to new services, digital broadcasting on non-traditional networks and ICT activities within the traditional broadcasting spectrum.
- * Identify approaches to the role of public broadcasting in the new digital environment.
- * Investigate the impact of transition on existing broadcasting services.
- * Examine the existing policy environment and licensing regime against broadcasting policy and licensing requirements in a digital environment.
- * Role of the regulator in implementing digital broadcasting.
- * Examine ownership, control and cross-media ownership in digital broadcasting.
- * Make recommendations on implementation and roll-out of transition to digital transmission networks and broadcasting in SA.

On a final note, Gillwald notes that government intervention can be in varying degrees - via setting the rules of the market place; determining who enters the market place; and the state itself as a player in this space (owner of national broadcaster and of signal distributor). She recommends a move away from the latter towards the former. However, many African countries – driven by either “developmental state” thinking and/or centralising and control-oriented governments – are exactly in the third model. There is little likelihood that states will voluntarily relinquish their role as owners of a large sector of the national information infrastructure. What then becomes critical in this regard is the dangerous contradiction between the state being referee (rules setter), coach (selector of the players) and the major player as well on top of all this. One way to ameliorate conflicts of interest here is where there is regulation of the whole terrain that is independent of government interests (even if not divorced from government broad policy). If anything then, digital broadcasting could help give some impetus to the

development of independent regulators around Africa. This brings us on to the next section.

5. Regulators/ions and licensing

Whether regulated by governments or (preferably) independent regulators, digital broadcasting raises a host of licensing issues. Among these are:

1. *Who gets licensed?* Besides for existing analogue broadcasters, and green fields players or services, this question also raises the issue of whether new license categories are needed for “multiplex operators”. These are described as agencies that stand between content providers and network/transmission providers. In South Africa, Icasa seems to suggest that, legally-speaking, any “multi-channel distributor” is really a subset of broadcasting signal distribution. However, it also notes that “a broadcaster’s prime obligations lie in the area of programming, such as fulfilling local content obligations and complying with advertising limits. Broadcasting signal distribution by contrast mainly concerns itself with, amongst other, engineering and technical activities...” South Africa’s NAB notes that “in the analogue environment spectrum is assigned to a particular broadcaster but in the digital environment this might change, for example, spectrum might be assigned to a signal distributor.”

In addition to this matter, there is also the question of the “bundling” of services to consumers. As the NAB points out, “full line forcing” requires consumers to pay for channels that they do not necessarily watch. Bundling can also have anti-competitive behaviour where a dominant operator ties the sale of a service or product where it has a market power to a product or service to one where it faces competition. Bundling can also be an effective deterrent to the entry of a free-standing product or service which competes with products or services within the bundle. On the other hand, bundling can also make for market growth economies of scale. Icasa argues that adding channels to a bouquet needs licensing permission.

There is also the question of whether IPTV or DVB-H will be licensed: current regulatory uncertainty is a disincentive to investment in these services.

These are all issues that licensing regulation needs to sort out.

2. *Who in the whole chain gets licensed for what?* There are CA Conditional Access (CA) (“the heart of the digital broadcasting business” – SADIBA), Subscriber Management System (SMS), Electronic Programme Guides (EPGs) and Programme Associated Data (PAD). SADIBA says there are advantages offered to consumers by a common CA, SMS and billing system as was negotiated between the stakeholders in Sweden. However, it recommends that market forces are to be left to determine the applicability and need for a single CA and SMS. However, regulation comes in because licences may or may not specify these matters.

3. *The length of licence issued for digital broadcasting.* SADIBA argues that digital broadcasting will not become commercially viable in the short to medium term, and meanwhile large capital investments will be required in order to establish the infrastructure that will initially serve only very few people. “In order to thus secure a return for investors in digital broadcasting the licence period should extend beyond the run-up or migration period. ... SADIBA supports the position that long-term licences (10 to 15 years) are granted for digital broadcasting.” NAB takes the same position. Under previous SA law, there was a dual regime, whereby television licences were valid for eight years while sound broadcasting had only six years. Whether a single regime ought to be considered, given the multi-capacity of digital broadcasting, is something needing resolution in regulation.

4. *Whether there should be auctioning or fees (and at what level?) for licences.* SADIBA opposes auctions and recommends that licence fees become payable once a significant market penetration is achieved and operations become profitable. NAB argues that broadcast spectrum is currently not charged for in South Africa, and that implementing spectrum charges for broadcasting and more so for digital broadcasting would significantly discourage investment. “(A) system that encourages investment in infrastructure rollout and in which only an administration fee is charged for a licence is favoured.” However, South Africa’s Minister of Communications has raised the question whether licence fees for new frequencies could be used to fund the manufacturing of basic set-top boxes for poor people. South African regulator Icasa says that existing broadcasters should not have to pay more for a digital license during the period of “double illumination”, only if they wish to introduce new digital services. Again, this is an area that would require regulation.

5. *Analogue licence extensions.* Regulation will need to assess conditionalities in regard to this.

6. *Return path issues:* Regulations may be needed on frequency return channel paths, ADSL / GSM – 3G technology, or PTSN networks.

7. *Frequency issues:* where to accommodate digital broadcasters, and whether bandwidth for digital radio in particular needs to be re-allocated away from eg. Security services, to this end. (This may well overlap with government prerogatives discussed in the previous section).

8. *The set-top box.* One issue here can be seen in the fact that regulators such as the FCC in the US have required that by 2007, digital TV tuners must be built into all new TV sets sold in that country. Among other regulatory issues, are the standards for set-top boxes. There are dangers of proprietary systems for set-top boxes such as that of WorldSpace or DSTV, and there also also issues of regulating interconnect or leasing charges of such systems. SADIBA has proposed that there should be a single set-top box in South Africa with a recommended minimum specification receiver to allow for the reception and decoding of free to air DVB-T television services. The most basic of these might be subsidised, more advanced capability versions could be sold at market rates. It is not

clear, however, if this kind of issue is more of an industry, governmental or statutory character (for example, more relevant to a Bureau of Standards), than a regulator.

9. *Ownership and control.* SADIBA members recommend that in order to encourage investment in digital broadcasting, ownership and control stipulation be limited to prescribing a minimum local and empowerment shareholding level whilst at the same time ensuring fair competition. This is a tricky issue, especially but not only in South Africa, given that many African countries have restrictions the promote indigenous ownership of broadcasting.

10. *Advertising issues.* One issue here is whether digital subscription broadcasting may compete for advertising and sponsorships, against rival players in analogue or digital free-to-air broadcasting. There may also be regulations on the types and times and durations of advertising.

11. *Free-to-air windows.* This is whether subscription broadcasters are permitted free-to-air windows for self-promotional or public service purposes, given that rival broadcasters may refuse to carry their advertisements. (Icasa opposes this).

12. *Code of conduct.* This would include issues related to the watershed and protection of children, sometimes difficult to enforce in a digital and time-shiftable global environment.

13. *Consumer protection.* This could include quality of service, as well as regulation of tariffs charged to the consumer, and/or caps on the return on investment, and/or interconnection and facilities-leasing regimes fixed a cost or other prices.

14. *Unlicensed satellite broadcasting.* Regulations may relate to revenue collection by unlicensed broadcasters.

15. *Effective competition.* This may relate to the market power in both the broadcast and signal distribution market, and it may include the need to cross-regulate with national Competitions Boards.

16. *Must-carry obligations.* The issue here is whether to regulate that subscription digital broadcasters have a “must-carry” obligation to transmit free-to-air (television?) broadcasters in their bouquet. South Africa’s NAB has argued that the structure of the multiplex should be essentially a commercial decision of the broadcasters and they should determine the structure thereof, rather than being forced to carry free-to-air channels. It pointed out that all free-to-air television services are already broadcast on satellite in South Africa.

17. *Universal service.* Should steps be taken to ensure that rural and provincial areas are guaranteed access to certain digital services in the future? The NAB in South Africa has proposed that the initial introduction of digital broadcasting services is likely to be in heavily populated areas that can be covered by a few transmitters in order to keep capital

expenditure costs as low as possible. This is an approach supported by the Link Centre researchers. But regulators need to evaluate such approaches in regard to universal service objectives.

18. *Digital formats.* Australian TV broadcasters are being required to broadcast DTV in both high definition (HDTV) and standard definition (SDTV) formats. They must broadcast an SDTV signal at all times, and within two years of commencement must also provide at least 20 hours per week of HDTV. Canada's regulator specifies that transitional DTV licensees are allowed to broadcast a maximum of 14 hours per week of high definition programming that is not duplicated on the analog version of the service. A minimum of 50% of this unduplicated high-definition programming must be Canadian and all of the unduplicated programming must be in high definition television (HDTV) format. The licensees are encouraged to ensure that two-thirds of their schedules are available in a HDTV format by 31 December 2007. In contrast, SADIBA has argued (before SA won the World Cup hosting) that it was ignoring the HDTV question, largely due to the cost implications both in terms of content production for the broadcasters and consumer costs to purchase receiver equipment. In Africa, licences will need to specify conditions here.

6. Industry

Transition to digital has major implications not only for governments and regulation, but also for industry and consumers.

SADIBA points out that digital broadcasting technologies need to be acquired on the global market. The weakness in most African countries is a major barrier to acquisition, both to the consumer and the industry. The question therefore is whether at least local manufacturers can be encouraged to mass produce receivers (set-top boxes) for the local and international market. The NAB has called for an economic feasibility study to be conducted for digital broadcasting in South Africa so that a credible strategy for transition can be developed – including any subsidisation of receivers for poor people.

Also noted by SADIBA is the cost of marketing digital broadcasting. However, as can be expected of an industry association, it argues that this should be borne by “other stakeholders e.g. government or equipment manufacturers who have a vested interest in encouraging the take-on of digital broadcasting in South Africa.” Marketing, it suggests, would need to encompass these steps: 1. encourage existing TV set owners to migrate to digital sets; 2. entice new owners to invest directly in digital receivers or; 3. to cater for consumers wanting to use a use a set-top box with existing TV sets.

South Africa's Icasa notes a need for large public awareness campaigns about the whole transition, declaring “there should be public service announcements on analogue services providing information on digital migration, deadlines and reception equipment required”.

SADIBA further mentions the cost of training to operate and maintain digital broadcast equipment, and to digitise and store past archives. There are also costs involved in operating CA systems, and setting up Customer Support Centres - Call centres and managing customer databases as well as technical support for decoders. In these respects and more, the NAB has proposed that “each broadcasting entity would be responsible for drawing up their own business plans in response to the introduction of digital broadcasting”.

NAB argues that audience fragmentation enabled by digital broadcasting will only become relevant once a significant number of households are served with digital signals and have access to digital receivers. “Concerns about fragmentation are thus premature at this stage.” This is probably also applicable to African countries at large.

Another industry issue is the range of new institutions that enter what was traditionally the terrain of conventional broadcasters. Convergence is leading telecoms companies and signal distributors to offering television services on their networks, and in some cases “triple play”. The nature of “broadcasting” itself, as a one-to-many unidirectional activity, comes under question as the phenomenon becomes part of a network of interactive networks. According to SADIBA, “digital broadcasting elevates audiences to a critical stakeholder position in the decision-making process.” This is in relation to the increased choice available to the consumer (alternatives are just a channel-hop away), as well as interactivity.

7. Specifically Public Service Broadcasters

Within the much wider context discussed thus far are some considerations specific to state-owned broadcasters that function (in greater or lesser degrees) as PBS operators. Ultimately digital broadcasting will mean new and additional competitors. Unless state-owned broadcasters can offer credible and popular content, digital broadcasting will herald their deathknell. In addition, once digital signals integrate with (and often travel through) fixed and mobile IP networks, in a seamless web of communication, even quality PBS will be pressed to hold its own.

In South Africa, the NAB has called for a decision on what services of the Public Broadcasting Services can be channelled through online services and be delivered via other platforms such digital terrestrial, satellite, Internet, and mobile. This mapping also envisages the following calculation about switch-off: “It is possible to have a situation in which at least one SABC service remains available on analogue indefinitely to ensure basic public access to news and information”. These issues go to the heart of the role of PBS in a society.

Another issue raised by digital broadcasting is the mix between sectors.

In South Africa *PBS radio* occupies 58% of available radio spectrum; commercial 16%, and community 26%. In television, 36% goes to PBS, 24% to commercial. A mere 3% is set aside for community, while 28% is for DTT. Another matter concerns the distinction

between national, regional and local service imbalances. The issue in all these is what proportions are envisaged when transmission goes digital? SADIBA has recommended wrt digital radio, that there should be two national commercial multiplexes – each with an estimated 9 services; and a commercial metropole multiplex with 5 national and 24 regional services. Likewise there should be one national PBS multiplex with 9 services; and six regional metropole multiplexes amounting to 54 services. Significantly, what this means is that the South African public broadcaster, which to date has had a monopoly on national radio, could face new competition on a national scale (and for national advertisements) – from for example, Gauteng youth station YFM.

In regard to *PBS TV* in South Africa, Icasa has planned to make provision for two multiplexes (based on two analogue television frequency allocations) at each current transmission site. An estimated 12 TV services could be carried on these – of which five would probably be PBS ones. The remaining analogue channels could be allocated for public regional services if the digital platform cannot be utilised, and thereafter, any remaining analogue assignments at the transmission sites would be re-categorised for commercial and community services to cater for analogue expansion. Such a hybrid system, entailing new analogue services, seems however to simply prolong a dying technology.

The point is, however, that the share-out of the digital spectrum between public and other sectors of broadcasting is a major issue, and likely to be highly contested. The matter goes to the core of the place of PBS digital broadcasting in the wider digital media-scape.

In regard to PBS specific obligations, note has been made earlier of the facility to cater for visually or audio impaired consumers. Other points are:

* As South Africa's NAB points out, digital allows for increased broadcasting in all official languages. Although it does not link this to PBS specifically, the likelihood is that minority languages or those dominant in poor and rural areas is likely to be a PBS responsibility.

* To the extent that state-owned broadcasters include a mandate to provide universal service (as does SABC for example), there is an intrinsic interest in universal access – and therefore in the price of set-top boxes or other receiver devices.

* Another responsibility, suggested by Icasa, is: “In the context of digital migration, the public broadcaster should be playing a leading role in the provision of interactive services to promote consumer take up of digital broadcasting”. The assumption here is one of classic PBS that, not being profit-driven, it can afford to take risks with experimental programming - unlike its commercial counterparts. This argument has little resonance with state-owned broadcasters around Africa. However, it is the case that in order to provide fully-fledged public service (i.e. the rich experience allowed for by interactivity), those institutions seeking to live up to the name of PSBs should try to take the lead.

* A further issue is the responsibility of PBS to community broadcasting. SABC in 1996 pledged to support joint projects with this sector regarding access to facilities, training and internship opportunities and other in kind support. The issue of rolling out DTT in priority urban areas, and the relegation of Africa's huge rural populations to analogue (if they are lucky!), is something that should be reversed by those state-owned broadcasters genuinely seeking to do a PSB job. Given the interactive access and "citizen journalism" opportunities enabled by digital broadcasting, there are potential overlaps and blurring between PBS and community broadcasting.

In conclusion, will African state-owned broadcasters and signal distributors (often the same institution), as often the dominant, and sometimes sole, players on the airwaves, lead the way to digital broadcasting? The answer is probably very much a function of their transition towards greater independence of government. It is when they face competition from other broadcasters, that their otherwise slow-moving and bureaucracy-style cultures will be stimulated to change to be responsive to technology imperatives. In addition, they are unlikely to find resources from governments to make the investments, and only a greater market-orientation (which can also undermine PBS obligations) or credibility to donors, will generate some of the requisite funding.

8. Elsewhere in Africa

SADIBA notes that DTT is operational in Namibia and Mauritius, and (through cable) in the Seychelles. There are trials in SA and Senegal. However, it argues that Southern African countries should migrate according to their own socio-economic circumstances, though within a broad common timeframe. The Southern African Broadcasting Association is beginning to take technology seriously, including the setting up of an IP-based content exchange system. However, the embryonic continental regulator's body, African Communication Regulatory Authorities Network (ACRAN), seems to be concentrating on the vital issues of independent regulation and promotion of pluralism and freedom of expression, with technology effectively taking a backseat.

9. Conclusion

Digital broadcasting is such a big and complex topic that it is not surprising that the more political issues of state broadcaster transitioning to PSB tend to occupy the limelight. However, what emerges from the review in this paper is that while such transitions have their own logics and dynamics, they are also occurring (or not, as the case may be) at the same time as a historic transition in broadcast technologies. The two transitions do not have to be linked, but it might also be prudent to see if there are synergies to be had, or contradictions to be noted. Progress in one respect could impact on progress in another. Digital migration could help PBSs, it is clear. On the other hand, resourcing for the technical transition may also well be subject to progress on the transition of government broadcasters into PBSs.

At any rate, the research agenda that emerges from this review is clearly that the topic of digitisation of broadcasting in Africa has to be set, first, within a context of international

imperatives and incentives (including aid); and second within the context of whether there are national policies and programmes to promote the development of digital broadcasting (and with what systems) – and not least in regard to signal distribution. The role of regulators and of state-owned signal distributors comes into play here.

Only after all this does one come to the level of broadcasters per se, and then ultimately to the state-owned broadcast institutions, in whatever stage of transition (or reversal) from PSB status. In this latter arena, one would want to gauge the drivers and the obstacles of digitisation. One would also want to study the state of digitisation of content provision and all its stages. Then, as time evolves, it would also be significant to examine the extent to which this content is shovel-wared onto transmitters as if it were analogue in character – or whether it is customised for various digital (and thus potentially interactive) platforms delivered to by DVB-T, DVB-S, DVB-H. In all this, one would also want to see the extent to which a state-owned broadcaster leads or lags the field, and why.

One more research issue would be worth including. South African regulator Icasa has called for constant monitoring of consumer take-up, affordability of set-top boxes, and other issues in order to ensure that digital migration is progressing according to agreed timeframes. Indeed, the AfriMap research could profitably assess countries, regulators and state-owned broadcasters on the extent to which there is recognition that a transition needs proactive managing – and therefore monitoring. Just one thing extra to add to an already enormous – but also enormously exciting – research agenda.

List of useful references:

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