

An Outline Assessment of the Growth of the Broadcast Market in Sub-Saharan Africa and its implications for spectrum allocation

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Balancing Act

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Executive Summary

The overall conclusion of this report is that based on a projection of future demand for TV channels there are a considerable number of countries in Africa that require less than 4 MUXs and that there is a significant amount of spectrum that can be released for other services. There is a small group of countries that are likely to need more than 4 MUXs. However more detailed spectrum management planning would need to be done to establish exact demand as their geographic location of channels is complex in several cases.

This study focuses on the countries of Sub-Saharan Africa that are not members of the Arab Spectrum Group (which includes Comoros, Djibouti, Egypt, Libya, Morocco, Mauritania, Somalia and Sudan). For the sake clarity we refer to these countries as Sub-Saharan Africa throughout the report on the understanding that the Arab Spectrum Management Group countries have been excluded. This report is a companion study to a piece of work on the Middle East carried out by Plum Consulting for the GSMA. To ensure comparability, we have followed their methodology (see Introduction).

Section 2 is provided as background for the reader less familiar with ITU spectrum processes. It summarizes the international planning process for the digital transition in broadcasting and provides a round-up of the work carried out so far in Africa and the Middle East in terms of spectrum planning.

Section 3 is the core of the report and contains the material from which the main conclusions have been drawn. It looks at the number of existing channels in the countries in focus for this study (section 3.1) and the factors affecting growth over the next 5-10 years (section 3.2). It then lays out how we have projected the growth in TV channels and the number of projected channels, with low and high estimates. (section 3.3).

Finally, these future channel requirements are converted into MUX and spectrum requirements. Future TV channel requirements are based on the low estimates supplied. The data for the conclusions follow are in the spreadsheets which accompany this report.

Summary of Conclusions

Even with a growth in the projected amount of TV channels over the next 5-10 years, there are a considerable number of African countries (27) where there are significant amounts of spectrum that can be freed up for other uses. Of these, 16 countries would only require one MUX on our low estimate projections and would even with one MUX have space to expand their number of channels. 8 countries would require only 2-3 MUX and therefore have some "headroom" for expansion.

The current planning for 4 MUXs in these countries probably overstates the amount of broadcast spectrum required.¹

Although the amount varies from country to country, Governments and regulators in these countries need to consider whether it makes sense to continue to reserve spectrum for broadcast use at the current level. On this basis, Governments might want to have the ability to be able to award above and below 694 MHz to mobile use. Governments should work closely together to re-plan spectrum in ways that lower interference and where possible, the number of MUXs required.

The use of the VHF band – where countries are not already using it for analogue TV broadcasting – requires careful consideration. On a conservative use case, an additional MUX might be added in this band and it would take care of demand in one more country (Ghana). A South African Government study recommended that two MUXs might be found in the VHF band and Finland, for example, has 3 MUXs in this band. On this basis, a further 8 countries could accommodate their future demand on our low estimate.

This leaves 8 countries where there is a demand for over 8 MUXs: Congo Brazzaville, DRC, Ethiopia, Kenya, Madagascar, Mozambique, Nigeria and Uganda.

Of these, it is incredibly complex and difficult to estimate the real MUX demand in DRC and Nigeria. Both are extremely large countries and many channels operate either on a regional licence (for example, state TV stations in Nigeria) or a de-facto regional basis (for example, DRC TV stations that only reach a Kinshasa footprint). Nevertheless, in both instances, TV broadcasters might have some expectation of the availability of national coverage once the digital transition is completed.

There are many complex border issues and these will be impossible to address without a formal spectrum planning exercise for the countries concerned. For example, Congo-Brazzaville and DRC's capitals – respectively Brazzaville and Kinshasa – are only separated by the Congo river which is between 1-2 miles at its narrowest point. Both are where the densest area of broadcast channels can be found in both countries. By contrast, Madagascar is an island at some considerable distance from its neighbours.

In some cases these countries find themselves in this high demand category because of the supply of DTT Pay TV bouquets. Government and regulators will need to think about the impact of these operators. The question is by no means straightforward as most have taken on the task of implementing the digital transition where Government has not had the funds to invest itself. Restricting these businesses would undercut Africa's digital transition in broadcasting. However, all of the

¹ This would change if some of these countries were to liberalise their airwaves but there is no sign that this is likely to happen. Where it is likely (for example, it has been signaled by public announcements) we have made allowance in our estimates.

countries in this category have some commercial and policy choices that will allow them to deliver the projected number of channels, most notably with the use of satellite.

At a technology level, the use of satellite is not as widespread as in the Middle East and wealth levels are such that the idea of delivering via IPTV would only remain open to a relatively small number of wealthy users. Nevertheless, the mobile operators themselves can and should consider delivering broadcast content.

Although only recently launched, the Kenyan example of Safaricom's theBIGBox product is pertinent. Furthermore, wider satellite use is also a possibility, particularly to achieve cost-effective distribution for low-density (particularly rural) populations. But a broader reality is that African broadcasters are likely to need to deliver their programmes across multiple platforms chosen for their costeffectiveness and ability to reach the desired audiences.

Considerations for governments

This study recommends that African Governments and regulators look carefully at the use of spectrum by terrestrial broadcasting. For policy-makers there are a number of considerations that need to be made:

- 5.1.1 **Channel numbers:** The number of standard definition (SD) and high definition (HD) channels required after the analogue switch-off. In some countries the number of channels is smaller than a 4 MUX allocation and is likely to remain so for the foreseeable future.
- 5.1.2 **Channel Growth Points:** Those countries identified in this study as requiring above 4 MUXs need to think about how the additional channels will be delivered. In some cases (for example, DCR and Nigeria) it will only be through detailed spectrum planning that we can identify how a balance of national and regional channels can be achieved. Also future improvements in the DVB-T2 standard (both with Fixed and Statistical MUXing) promise a greater number of channels per MUX (see Figure 3).
- 5.1.3 **Technology Choices:** There are three sets of technology choices that need consideration: T-DAB radio, 3DTV and Ultra-High Definition. T-DAB radio (in the VHF band focused on in this study) has barely been discussed in Sub-Saharan Africa and a deadline for a switchover globally is likely to fall beyond a 10-year time horizon. Nevertheless Governments need to be clear about what future expectations they might have for T-DAB radio. 3DTV and UHD are both more likely to be delivered by satellite or IPTV.
- 5.1.4 **Geographic Footprint:** African countries that have a small geographic footprint will have a much larger burden compared with others because of the requirements of cross-border coordination. There is the potential that

spectrum usage, not just in neighboring countries, but countries further away will have to be considered when identifying whether spectrum can be released. This could require bilateral coordination with a number of "neighbouring" countries after the current replanning exercise is completed if less multiplexes are required in practice in some countries.

1. Introduction

In July 2015 Balancing Act was commissioned to produce An Outline Assessment of the Growth of the Broadcast Market in Sub-Saharan Africa and its implications for spectrum allocation. In response to this request, we produced a proposal that forms the basis for this report. The proposal identified two key objectives:

- a) To provide a scoping of the likely growth of broadcast channels in Sub-Saharan Africa.
- b) Based on this estimate of likely growth, to identify the likely spectrum requirements over the next five to ten years.

1.1 Geographic Scope

This study focuses on the countries of Sub-Saharan Africa that are not members of the Arab Spectrum Group (which includes Comoros, Djibouti, Egypt, Libya, Morocco, Mauritania, Somalia and Sudan). These countries are listed below and for the sake clarity we refer to Sub-Saharan Africa throughout the report on the understanding that the Arab Spectrum Group countries have been excluded:

	1	
Angola	Gabon	Nigeria
Benin	Gambia	Reunion
Botswana	Ghana	Rwanda
Burkina Faso	Guinea	Sao Tome and Principe
Burundi	Guinea-Bissau	Senegal
Cape Verde	Kenya	Seychelles
Cameroon	Lesotho	Sierra Leone
Chad	Liberia	South Africa
Central African Republic	Madagascar	Swaziland
Congo-Brazzaville	Malawi	Tanzania
Cote d'Ivoire	Mali	Togo
DRC	Mauritius	Uganda
Equatorial Guinea	Mozambique	Zambia
Eritrea	Namibia	Zimbabwe
Ethiopia	Niger	

Table 1: African Countries in Focus for this study (2015)

Balancing Act has tracked the number of TV channels in Africa over 4 years through a combination of the following methods: visits to countries, publicly available news sources and regulator websites. Inevitably in the more dynamic markets this information is both fast-moving and sometimes contradictory. In the case of the latter, we have taken a view on the reliability of the source and included or excluded channel on this basis.

1.2 Report Structure

This report has three main sections that are as follows:

Section 2: The Context provides a short summary of the ITU spectrum processes undertaken so far at an international level (**2.1**) and sketches in Progress so Far in Sub-Saharan Africa (**2.2**) which looks at the work that has already been done and makes comparisons with the Middle East and the findings of a similar report by Plum Consulting which covers the Arab Spectrum Group countries (**2.3**).

Section 3: Sub-Saharan African TV Channels – Now and in the Future opens by looking at the number of existing analogue and DTT TV Channels in the countries in question (**3.1**). The Factors Affecting the Growth of TV channels over the next 5-10 years section looks at the kind of things that have and will continue to spark growth in the broadcast sector (**3.2**). Using a set of assumptions spelt out in the section Projected Growth in TV Channels (**3.3**) the report outlines how demand for TV channels may change in the next 5-10 years. The concluding section – Multiplex Requirements (**3.4**) converts the projected demand into multiplex requirements by country using the methodology described below.

Section 4: Case Studies looks at three very different countries and the broadcasting system and the dynamics of it in each one: Nigeria (**4.1**), Senegal (**4.2**) and South Africa (**4.3**).

Section 5 presents the Conclusions of the report and is followed by an appendices with background documents consulted (**A.1**), a Glossary (**A.2**) and Data Spreadsheets (**A.3**).

1.3 Methodology

In order to achieve a common starting point for the discussions about spectrum requirements, this study follows the same methodology used by Plum Consulting for its GSMA study covering the Arab Spectrum Group:

Figure 1: Methodology



Source: Plum Consulting

The diagram above also includes a stage where projections are made for the number of TV channels over the next 5-10 years.

The DTT technology assumptions that have to be made are relatively simple. Because most African countries were slow to implement DTT broadcasting, with the exception of three countries, all have used DVB-T2 and MPEG-4.

Assumptions have to be made about HD channels. These are already present on the continent in Pay TV bouquets but are delivered by satellite. So a key question is will there be Pay or Free-To-Air DTT HD Channels?

Will there be a Single Frequency Network (SFN) or a Multi-Frequency Network (MFN)? Single Frequency Networks are more efficient but not always technically possible across a whole country and may not be workable if there are local or regional TV stations as there are in, say, Nigeria.

Will VHF (Band III) be used for DTT or will it reserved for some other use? Some countries have reserved Band III for digital radio (T-DAB). In the Sub-Saharan African context, migrating radio to this standard not been been discussed except in South Africa, where the National Association of Broadcasters and the Southern African Digital Broadcasting Association (Sadiba), are running DAB+ and DRM digital radio technology trials.

2. The Context

2.1 The ITU Process To Date

Any decision taken on spectrum use requires international harmonization as the things using spectrum – like TV, radio and mobile phones – would otherwise cross borders and interfere with the same uses in neighboring countries.

The process for international harmonization of spectrum allocation is managed by the International Telecommunication Union (ITU). With an accelerating pace of change with digital technology, it has been responsible for two parallel sets of discussions: broadcast spectrum requirements after the transition to digital broadcasting and the requirement for more spectrum for mobile broadband, particularly LTE.

The planning for these dual requirements took place during what have become known as the Geneva planning processes of 2004 (known as RRC-04) and 2006 (RRC-06). The second meeting produced the Geneva 2006 Frequency Plan (GE06) which was designed to allocate VHF (Band III) and UHF (Bands IV and V) broadcasting bands in 118 countries (see map below) for digital radio (T-DAB) and TV (DVB-T). These two standards were adopted by all of the countries involved in the process.

Figure 2: RRC-06 Planning Area



Source: Plum Consulting

The first of the two planning meetings (RRC-04) – set out the criteria and parameters for making the required changes in spectrum allocation and the second meeting (RRC-06) dealt with detailed work of frequency planning. This detailed planning work was done in five Co-ordination and Planning Groups covering the following areas: Europe and the North Eastern area, Western and Central Africa, Eastern and Southern Africa, Red Sea area (an area with extreme propagation conditions) and Other States, and the Mediterranean.

The frequency band 174-230 MHz (Band III) was subdivided into 7 or 8 DVB-T RF channels depending on whether the country proposed to use 8 or 7 MHz bandwidth and also subdivided into 32 T-DAB blocks with 1.75 MHz bandwidth. The 470-862 MHz (Bands IV and V) was subdivided into 49 RF channels with 8 MHz bandwidth. See diagram below:

Broadcast Spectrum Bands

VHF	UHF Band IV	UHF Band V	UHF Band V
174-230	470-582	582-694	694-862
7 RF Channels	14 RF Channels	14 RF Channels	21 RF Channels

Source: ITU, Balancing Act

Each national administration undertook several iterations of its digital requirements and eventually these were fed into planning software provided by the ITU that calculated how these requirements would be met.

Two qualifying factors were accepted in the process. For the first of these qualifying factors, countries could argue for two or more digital platforms even though the compatibility analysis carried out by the software showed that interference might occur. In some cases, agreement was reached on the basis that one or other of the platforms might have a lower transmission signal and thus cover a smaller area.

For the second of the qualifying factors, countries could accept a higher level of interference than they had agreed to at RRC-04. They could accept up to 5 db of extra interference and no protection would be given to legacy analogue TV services.

The overall purpose of this spectrum planning was to make more spectrum available for mobile broadband. The 790-862 MHz band (also referred to as the 800 MHz band) was agreed and as was subsequently the 694-790 MHz band (700 MHz band) at WRC-12 for Region 1.

Since over a decade has elapsed since the beginning of the process, the digital broadcasting standards have improved. The transition from DVB-T (with MPEG-2) to DVB-T2 (with MPEG-4) has created various network efficiencies. The biggest of these has been a 30% higher transmission capacity. It also allows for improved Single Frequency Network performance and supports larger scale networks than DVB-T. It also allows for an around 25% power saving by transmitters whilst providing the same coverage area. The differences can be seen in the chart below:

Figure 3: Comparison of DVB-T and DVB-T2

Format	Source coding	Number of RF channels DVB-T	Number of RF channels DVB-T2	Number of RF channels DVB-T2
		Fixed M	MUXing	Fixed MUXing future
SD	MPEG-2	6	10	10
SD	MPEG-4/AVC	9	13	15
HD-720p	MPEG-4/AVC	3	4	5
HD-1080i	MPEG-4/AVC	2	4	4
		Statistica	I MUXing	Statistical MUXing future
SD	MPEG-2	8	13	13
SD	MPEG-4/AVC	11	16	19
HD-720p	MPEG-4/AVC	3	5	5
HD-1080i	MPEG-4/AVC	3	4	5

Source: ITU

In Africa - with the exception of Mauritius – which started its digital broadcasting transition early, all countries have either moved to DVB-T2 (after initially implementing DVB-T) or started off with DVB-T2.

The spectrum planning processes that took place at RRC-06 did not take account of these likely improvements so subsequent discussions have focused on how much spectrum broadcasters need having gone digital and whether this might free up more spectrum for mobile broadband.

2.2 Progress so far in Sub-Saharan Africa

As part of this work, countries in Sub-Saharan Africa have been looking at how they might modify RRC-06 frequencies above channel 48 (694 MHz). Two co-ordination groups were established: Western and Central Africa and Eastern and Southern Africa. Using input data from 47 African countries and the GE-06 calculation approach these groups looked at re-planning the UHF band to provide a minimum of four coverage layers (MUXs) in RF channels 21-48 (470-694 MHz).

The chart below shows the attainable percentage of sites in each different country able to achieve four coverage areas based on work presented at the 3rd and final GE06 Frequency Plan Coordination Meeting for African Countries in Kenya in May 2013.



Figure 4: Attainability percentage to achieve 4 DTT multiplexes or more within the band 470 – 694 MHz band

It was considered that with the implementation of Single Frequency Networks (SFNs) more than four multiplexes per country might be possible.

2.3 Progress in the Middle East

The Middle East (which includes parts of North Africa) is addressing the same issues as Africa and it provides a useful point of comparison for similar processes in Africa². Four sub-regional groups were created as shown in the table below:

Group A	UAE, Bahrain, Saudi Arabia, Oman, Qatar, Kuwait, Iraq and Yemen
Group B	Saudi Arabia, Jordan, Syria, Palestine, Iraq, Lebanon and Egypt
Group C	Saudi Arabia, Egypt, Sudan, Djibouti, Somalia, the Comoros, Yemen and Libya

² See http://www.itu.int/en/ITU-R/terrestrial/broadcast/ASMG/Pages/default.aspx

Group D	Libya, Algeria, Tunisia, Morocco and Mauritania
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At the first overall co-ordination meeting it was agreed that all countries that had not already started the digital transition with some other standard would adopt DVB-T2 with MPEG-4.

The region is afflicted with civil conflicts that affect four countries (Yemen, Iraq, Libya and Somalia). In addition, there is a concern from the Arab states about ensuring that interference with Iran's airwaves is minimized.

The key conclusions of this overall planning meeting were as follows:

- 2.3.1 Each country would aim to have four DTT multiplexes.
- 2.3.2 A maximum margin of 4 dB would be used for coordination between the Arab countries, with the option of individual countries agreeing to less stringent criteria during bilateral meetings.
- 2.2.3 Non-Arab countries that would be affected by the GE-06 Plan would be invited to the coordination meetings.

The chart below shows iteration 22 with the percentage of required RF channels that have been identified for each country, both on the basis of ignoring interferers up to 3 or 4 dB and on the basis of ignoring all interferers. As in the equivalent chart in 2.2 above, 100% indicates that frequencies are available for all the identified transmitters based on the requirement for 4 layers.

Figure 5:

Iteration 22 of coordination showing assignable channels



Source: Plum Consulting, ITU

Those Arab countries requiring more than four multiplexes in the UHF bands might be able to increase them according to the GE-06 Article 4 Procedures. All these MUXs would be in the UHF band as almost all countries have allocated the VHF band for T-DAB radio or held as reserve capacity for future needs. Some Arab countries already use the 800 MHz band for mobile services and so did not have TV frequencies identified in this band.

The defining feature of the ASMG broadcast landscape is the high level of satellite TV³ use, both for Free-To-Air and Pay TV. According to Eutelsat, 92% of households were able to receive satellite broadcasts and 90% receive Free-To-Air broadcasts. So although the number of Free-To-Air TV channels has grown from 487 in 2010 to 538 in 2011 and we understand growth to date has leveled off. Therefore the pattern of channel growth has been somewhat more modest compared to the African countries which are the focus of this study.

There is also a relatively high level of channels offering HD and 3D content and on the last available estimate across Arab states, 29% of households had HD compatible televisions.

Despite this high level of satellite, regional Governments remain committed to having terrestrial broadcasting for two reasons. Firstly, commercially available household satellite equipment remains out of the reach of those on lower incomes. Secondly, national terrestrial TV stations remain the easiest to control as they sit clearly within the jurisdiction of each individual country.

³ There are also better developed IPTV services in some countries than in the African region.

3. Sub-Saharan African TV Channels – Now and in the Future

It is worth repeating the caveat about the data contained in the two sections below made at the beginning of this report. Balancing Act has tracked the number of TV channels in Africa over 4 years through a combination of the following methods: visits to countries, publicly available news sources and regulator websites. Inevitably in the more dynamic markets this information is both fast-moving and sometimes contradictory. In the case of the latter, we have taken a view on the reliability of the source and included or excluded channels on this basis.

3.1 Existing TV Channels

There has been a considerable growth in analogue and DTT TV channels in the countries in focus for this study since 2011 when we first looked at the number of TV channels. The table below shows a 47% growth in channels excluding DTT bouquets and a 305% increase with DTT channels:

Table 2: Number of Terrestrial Broadcast TV Channels - 2011 and 2014

2011	2014 exc DTT Bouquets	2014 with DTT bouquets
292	429	891

Nevertheless, 50% of the 44 countries being examined still have less than 5 channels per country. The big change has been that a significant number of countries (20) now have multi-channel DTT Pay operators. TV The reasons behind this and why things are likely to change are examined in the next section.

Figure 6: Channels Per Country – Sub-Saharan Countries in Focus



3.2 Factors Affecting the Growth of TV channels over the next 5-10 years

A number of the Sub-Saharan African countries that are the focus of this study are amongst the most dynamic broadcast TV markets on the continent. It is important to understand why this is before laying out our assumptions for future growth in the next section. The factors affecting growth are as follows:

- 3.2.1 **Liberalisation:** Even before the digital transition, one of the biggest drivers of the growth of TV channels was liberalisation: the opening up of the Government monopoly of the airwaves to privately owned channels. By March 2014, 25 out of 48 Sub-Saharan African countries had completely liberalised (both radio and TV), 15 partially liberalised (radio only) and 8 not liberalised⁴. Out of the countries in focus in this study, four may grant private Free-To-Air licences over the next 5 years: these include: Cote d'Ivoire, Ethiopia, Mali and Zimbabwe.
- 3.2.2 **Business Models and Advertising:** There are only six countries⁵ where advertising expenditure has been consistently tracked on the continent. Advertising expenditure is usually a mirror of the broader economy and in the countries with tracked advertising expenditure it has matched or exceeded economic growth.

However, the number of advertisers is often limited and discount levels are high. In these circumstances, the growth of channels over the last 5 years might have been more limited than it actually has been. The reality is that owning media – particularly TV stations – is seen as a means to gain influence and status so there is no shortage of people wanting to launch TV channels irrespective of whether there is an underlying business model.

3.2.3 **Fragmenting Audiences:** In many countries where TV channels have proliferated – whether through liberalisation or the transition to digital – the original key players have tended to retain most of their audience share. However, as the table below⁶ shows this is not true of all countries:

Country/category	Ghana	Senegal	Tanzania
No of TV stations	8	17	19
Key players (Ever	4	11	8
watched by 25%+)			

Audience fragmentation is and will continue to increase because of the number of new delivery platforms (3.2.6 below).

⁴ The Sub-Saharan African Media Landscape – Then, Now and in the Future, Balancing Act, August 2014

⁵ Ghana, Kenya, Nigeria, South Africa, Tanzania and Uganda.

⁶ Same report source as footnote 1.

3.2.4 **DTT Pay TV Operators:** One of Sub-Saharan Africa's Pay TV operators -Chinese operator StarTimes – entered the market by securing deals to assist the national broadcaster with the digital transition in exchange for getting access to DTT channels to run Pay TV bouquets. Its initial market entry tactic was to offer low cost Pay TV bouquets which has proved successful. In response, South African operator DStv – which had previously operated only on satellite – decided to offer a low cost DTT bouquet called GoTV. In francophone West Africa there are also two more of these DTT Pay TV operators.

This is significant because a Pay TV bouquet can often have more channels than the total of all Free-To-Air channels in the countries where they operate.

3.2.5 **Geographic area and population density:** The pattern of TV viewing in Sub-Saharan Africa is very particular. The majority of TV audiences are found in the densely populated urban areas where there is access to electricity. With some notable exceptions, the percentage of households with access to electricity is low. However, the majority of the population is usually found widely scattered across rural areas.

Many countries are extremely large: for example, the DRC has a considerable number of TV channels but the majority of them are in the capital Kinshasa. In countries that have come out of civil war like Liberia and Sierra Leone, the TV channels are largely (but not exclusively) in the capital and it would make better sense to provide national coverage using satellite as a supplementary platform.

3.2.6 **More delivery platforms:** African TV viewers have over a decade gone from watching television on a single analogue TV with a terrestrial aerial to having a large number of delivery platforms. Proprietary satellite decoders for Pay TV have established themselves at the high end of the market. Satellite operators have recently launched satellite platforms for Free-To-Air and low-cost Pay TV channels: Ghana's Multi TV has established a significant audience on satellite.⁷ The transition to digital and the new low price DTT Pay TV offers have driven the take-up of terrestrial decoders.

In some countries – like Angola, Kenya and Mozambique – cable and fibre operators have established a presence. Kenya has recently said it will offer two IP-TV licences. One of these is likely to go to the country's biggest mobile operator Safaricom, which has launched a product called the BIGbox which runs on 4G. Although the number of views varies enormously, You Tube has also established a clear presence for both catch-up TV and original video content.

⁷ 1.7 million households.

3.2.7 **Possibility of HD channels:** Three of Sub-Saharan Africa's largest Pay TV providers offer HD channels. As HD televisions become more widely distributed in the larger broadcast markets, there will come a time when a Free-To-Air broadcaster seeks to use HD as a differentiator in a crowded market. There is currently no data on HD television penetration although levels are currently unlikely to exceed 5% in most markets. Nevertheless the Senegalese public broadcaster RTS has expressed interest in launching an HD channel.

3.3 Projected Growth in TV Channels

It is worth saying that in some markets the DTT transition has opened the door to many new channels and many more are on their way. In August 2015 the Kenyan regulator CAK announced that it had licensed 8 new channels and that there were a further 72 it was processing. Now obviously not all of these new channels will necessarily survive. So the projections below are given to take account of channels launching and dying.

The growth assumptions given below are based on categorising 44 African broadcast markets into Small, Medium and Large as shown in the table below. Placing countries in each category has been done through a mix of population size, GDP level and our assessment of the potential for TV channel growth.

Small (29)	Medium (10)	Large (5)
Benin	Cameroon	Angola
Botswana	Congo-Brazzaville	DRC
Burkina Faso	Cote d'Ivoire	Ethiopia
Burundi	Ghana	Nigeria
Cape Verde	Kenya	South Africa
Chad	Madagascar	
Central African Republic	Mozambique	
Eritrea	Senegal	
Gabon	Tanzania	
Guinea	Uganda	
Guinea-Bissau		
Lesotho		
Liberia		
Malawi		
Mali		
Mauritius		
Namibia		
Niger		
Reunion		
Rwanda		
Sao Tome and Principe		
Seychelles		
Sierra Leone		
Swaziland		
Togo		
Zambia		
Zimbabwe		

Table 4: Focus countries categorized by market potential

Low and high estimates have been given for the number of new channels and the assumptions have been spelt out below. The list below gives the overall growth assumptions used but these have been tweaked where local circumstances require it.

For small and medium country markets, we have assumed that larger existing players by audience share will get one extra channel and in large country markets, larger players by audience share will get 2 channels each.

The presence of DTT Pay TV operators with multi channel bouquets increases the number of channels a great deal where those companies have a presence. The future plans of these operators are confidential but we have included four countries – Botswana, Cote d'Ivoire, Ethiopia and Zimbabwe – which in our view may well have an operation of one of these operators in the next 5-10 years.

As noted in the section above, HD channels are now a key part of the larger Pay TV operators bouquets. When there is a "critical mass" of HD TVs in key markets, HD channels will become attractive both as a differentiator for broadcasters in crowded markets and as a way of allowing advertisers to reach up-market viewers. For this reason we have included high and low FTA HD channel estimates for five countries: Angola, Kenya, Mauritius, Nigeria and South Africa.

The figure below shows existing channels, a low estimate of channel growth and a high estimate:



Figure 7: Low and High Estimates for Channel Growth

The chart below focuses down on the 17 countries that have a projected low estimate demand of 50 channels or over: in other words, they may need more than 4 MUXs to accommodate the projected demand.



The impact of technology choices on this projected demand are much more difficult to read. The overwhelming majority of viewers in the countries focused on in this study receive terrestrial broadcasts. There is not the same history of mass satellite TV viewing found in the Middle East region.

Although the number of people receiving Pay TV by satellite has increased a great deal, the overall numbers remain small. The company that has done a great deal to pioneer the DTT transition in Africa – StarTimes – has started to use both DTT and satellite to deliver its services. Broadcast channels delivered by cable and fibre only have a very small number of subscribers and it is noteworthy that Wananchi switched from cable and fibre to satellite for its roll-out outside of Kenya.

3.4 Multiplex and Spectrum Requirements

3.4.1 MUX Requirements

Figure 9 below shows the channel estimates in Figure 7 in the previous section converted into MUX requirements based on the ITU table in section 2.1. The requirement for Free-To-Air terrestrial HD channels is a factor but not a significant one. More important is the impact of the presence of DTT Pay TV operators with multi-channel bouquets.



Figure 9: High and Low Estimates of MUXs by country

There are 27 countries requiring 1-4 MUXs on our low estimate projections and these include: Angola, Benin, Botswana, Burkina Faso, Cape Verde, Chad, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea-Bissau, Lesotho, Liberia, Mali, Mauritius, Namibia, Niger, Reunion, Sao Tome, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Togo, Zambia, and Zimbabwe.

Of these, 16 countries would only require one MUX on our low estimate projections and would even with one MUX have space to expand their number of channels. 8 countries would require only 2-3 MUX and therefore have some "headroom" for expansion.

More than 4 MUXs may be available through using the VHF band. Globally, anything between 1-3 MUXs have been added to the totals available in particular countries. There is a South African Government study by Deloitte⁸ that concludes 2 MUXs could be added in this way and in Finland there are 3 MUXs in the VHF band.

So on a conservative basis – only adding one MUX in the VHF band – this would take care of Ghana which on our low estimate has a requirement for 5 MUXs. On the basis that two or three MUXs might be added in the VHF band, a further 8 countries would be accommodated: Burundi, Cameroon⁹, Central African Republic, Cote d'Ivoire, Guinea, Malawi, Rwanda and Tanzania.

This leaves 8 countries where there is a demand for over 8 MUXs: Congo Brazzaville, DRC, Ethiopia, Kenya, Madagascar, Mozambique, Nigeria and Uganda.

⁸ Second Digital Dividend - Final Report and Implementation Plan, Deloitte for the Department of Communications, South Africa, 2013

⁹ A number of Cameroon's TV channels currently address a single city and its surrounding areas. These include channels in the capital Yaounde, Douala and Kribi.

Of these, it is incredibly complex and difficult to estimate the real MUX demand in DRC and Nigeria. Both are extremely large countries and many channels operate either on a regional licence (for example, state TV stations in Nigeria) or a de-facto regional basis (for example, DRC TV stations that only reach a Kinshasa footprint). Nevertheless, in both instances, TV broadcasters might have some expectation of the availability of national coverage once the digital transition is completed.

There are many complex border issues and these will be impossible to address without a formal spectrum planning exercise for the countries concerned. For example, Congo-Brazzaville and DRC's capitals – respectively Brazzaville and Kinshasa – are only separated by the Congo river which is between 1-2 miles at its narrowest point. Both are where the densest area of broadcast channels can be found in each country. However, Madagascar is an island at some considerable distance from its neighbours.

In some cases these countries find themselves in this high demand category because of the supply of DTT Pay TV bouquets.

However, all of the countries in this category have some commercial and policy choices that will allow them to deliver the projected number of channels, most notably the use of satellite.

In the interests of completeness, we have included the MUX demand table from the Plum Consulting report on the Middle East spectrum planning group, ASMG. It includes the North African countries (Egypt, Libya, Morocco and Tunisia) and a number of other African countries which orient to the Arab world (Djibouti, Mauritania, Somalia). None of the countries shown from the African continent have a demand for more than 4 MUXs on the low estimate. Mauritania is not included on the table below but has a MUX demand of up to 4 MUXs.

Figure 10: DTT multiplexes by country in the Middle East and Parts of Africa



DTT multiplexes by country Number of required DTT multiplexes

Source: Plum Consulting

3.4.2 Spectrum Requirements

The charts below illustrate the spectrum allocations based on the low estimate MUX projections described in the previous section going from the lowest to the highest requirement. The countries illustrated are shown below the spectrum ranges:

Figure 11: Spectrum Allocations for Projected MUX Demand



9 MUXs or more for 8 countries:

Congo-B (11), DRC (17), Gabon (13), Kenya (12), Madagascar (9), Mozambique (10), Nigeria (19), Uganda (11)

4. Case Studies

4.1 Nigeria

Nigeria is one of Africa's largest¹⁰ and most populous countries¹¹ and was the first to establish television broadcasting in Sub-Saharan Africa in 1959.¹² Its post-colonial independence constitution guaranteed two levels of Government broadcasting: nationally at the Federal Government level and on a statewide level by State Governments. Although the market was deregulated by Decree No. 38, 1992, private terrestrial TV stations did not start broadcasting until 1994. It is now Africa's largest broadcast market based on the huge size of its population.

Based on various survey data around 65% of the population has access to Free-To-Air terrestrial television. The two largest broadcast markets are Lagos and Abuja and not all broadcasters have a national footprint. Some of the larger broadcast companies have begun to start operating in the north of the country. Based on 4.4 people per household, there are a total of 40.2 million households.

The key Free-To-Air TV players in Lagos based on 2011 data were as follows: Galaxy (16%), Silverbird (16%), TVC (16%), Channels TV (15%), AIT (14%) and NTA (4%). TVC is relatively new entrant in the market. In Abuja, AIT and NTA are the two key players by audience share.

Although these key players get the majority of audience share, there are a considerable number of Free-To-Air TV stations, particularly in Lagos, Abuja and Port Harcourt. Furthermore there are new TV entrants that have either recently entered the market or will do so over the next 12-18 months.

The Nigerian Pay TV market is the largest in Sub–Saharan Africa outside of South Africa but there are also a considerable number of pirate subscribers: these were estimated informally 5 years ago by one operator to be somewhere between 300,000-500,000.

The number of pirate subscribers may have actually gone down as there are now two low-end bouquets in the market: DStv's GoTV and Star Times. According to Balancing Act estimates based on industry-obtained data, there are over 1.8 million subscribers.

However, even factoring in a high estimate of pirate TV subscribers, only around 8 million of the TV viewing population gets Pay TV. With the exception of StarTimes, all operators deliver their services using satellite.

¹⁰ 923,788 sq kms, CIA World Factbook

¹¹ 181,562,056 (July 2015 estimate), CIA World Factbook

¹² In Ibabadan in Western Region.

In early August 2014 international satellite operator SES launched a DTH broadcast platform in partnership with the locally owned (publicly quoted) Computer Warehouse Group. It appears that there are around 3 million DTH boxes in the market and it will be seeking to get a bouquet of Free-To-Air broadcasters to come on to a platform that will give immediate national coverage. The platform has not yet launched twelve months later. The business model for this approach is Multi TV in Ghana that has reached 1.8 million households in Ghana, making it a significant FTA player.

There are also Fibre-To-The-Home and cable operators but their user numbers are insignificant alongside the huge, national Free-To-Air TV viewer figures.

One Nigerian broadcaster – AIT/Daar – had proposed launching HD TV channels (on a Pay TV basis) but subsequently got into financial difficulties and the plan was never realized.

Despite an early start with the policy process in Sub-Saharan African terms, the Nigerian digital broadcast transition policy document generated by the appointed task force languished on the desk of two successive Presidents before getting the go-ahead in 2012.

In the meantime, the Chinese company StarTimes had formed a joint venture with a local investor and the state broadcaster NTA. StarTimes got channels to launch a Pay TV operation on DTT and because there was no policy on who would be DTT signal carriers, it gained a significant "first-mover" advantage in becoming potentially the largest signal carrier. However because it rolled out early, it used MPEG2 boxes and these subsequently have had to be changed to MPEG4 boxes. DStv's GoTV has added another estimated 400-500,000 DTT subscribers¹³ to the DTT households.

The subsequent licensing of signal carriers has been far from straightforward. Regulator NBC announced in 2014 that it was appointing two signal carriers, one that would be created by separating out the signal carriage function from the Federal Government broadcaster NTA and another one called Pinnacle Communications.

In May 2015 Pinnacle Communications took the regulator NBC to court, challenging this decision on two grounds. Firstly, it said NBC had departed from the Government White Paper on the specified number of signal carriers. Secondly, there were not – as NBC had announced - two signal carriers licensed (itself and the NTA signal carrier) but now three other operators: Details Nigeria Ltd (the signal carrier for DStv's DTT Pay TV operation), StarTimes and MTS Communications.

In August 2015 the Director-General of NBC, Emeka Mba said it was counting on the sale of spectrum to finance the digital transition.

¹³ August 2014 estimates.

In signal coverage terms, Lagos has the largest number of TV channels but there are also 36 states and the Federal Territory of the capital of Abuja. NBC's announced intention is to create national signal coverage. This means that in each of the state capital's (and maybe more widely across the whole state) there will be: the Federal Government's TV station NTA's channels; the State TV station; and whatever private FTA or Pay TV channels that choose to be broadcast from those locations. But whilst signal carriers are committed to national coverage, StarTimes has already said that this will be achieved through a combination of terrestrial DTT and satellite DTH.

Detailed spectrum planning will be needed to establish exactly how much spectrum will be needed and where.

4.2 Senegal

By contrast with Nigeria, Senegal is a much smaller country, having only 21% of its landmass and a population of 13.9 million. The Senegalese Government started broadcasting in 1965 and that organization has – through various changes and restructurings – become the current Government broadcaster RTS. It gets licence fee income but is heavily dependent on advertising income. Private broadcasting was introduced in 2003 but did not really take off until several years later.

There are five main players in the Senegalese TV market. The table below is taken from a national survey¹⁴ and shows the percentage of respondents that have ever watched and of those who have ever watched, what percentage have done so on a daily basis:

¹⁴ 2. Face-To-Face Surveys – Overview Summary Results, Balancing Act, August 2014

	Ever	Of ever, watching daily
RTS1	97%	75%
2STV	88%	68%
TFM	81%	34%
Walf TV	81%	65%
RDV	78%	52%
Sen TV	55%	56%
Africa 7	40%	39%
TV5	41%	72%
2S Racines	37%	32%
Lamp Fall TV	32%	30%
LCS	28%	20%
Canal Horizons	26%	26%

Table 5: Senegal – Audience Share of Key Broadcasters (2013)

Source: Balancing Act - Respondents: Ever: 856 Daily: 635

An international operator (TV5) and a Pay TV operator (Canal Horizons) – both of which are delivered by satellite - get significant audience share. The other 6 TV stations listed had audiences below 20%.

It is difficult to know the extent of the Pay TV market in Senegal as Canal+ does not break down its subscribers by territory. Nevertheless, there are probably around 200,000-250,000 Pay TV subscribers across all operators which means that somewhere between 1-2 million people are watching Pay TV in their homes. The balance (represented in the survey above) may well watch it in bars, cafes and restaurants or at someone else's house.

Sonatel, which is partly owned by Orange, has an IPTV service but although there are no recent subscriber figures, its impact must be limited. According to the regulator ARTP, in June 2015 there were only 1.7% of all Internet subscribers (123, 364) that had fixed Internet and only 0.3% of all Internet subscribers (21,770) that had a connection above 256 kbps.

Although Canal+ has HD channels in its premium bouquets, no other broadcaster either has implemented them or has plans to do so. However the Senegalese broadcast regulator has said: "In this context, the creation of HD channels or the carrying of HD international channels on DTT can promote the public interest as part of the transition". The two biggest cities in Senegal are the capital Dakar and Touba, which lies inland to the east of the capital. Taking surrounding settlements, Greater Dakar is the largest conurbation with well over 2 million people. In terms of its geography, Senegal is unusual in that it surrounds its neighbor Gambia. The latter country is a thin finger of territory running along a river. Normally this might cause significant problems in broadcast spectrum terms. However, Gambia has only one TV channel and the two countries share to a large extent a common language, Wolof.

The Comite National Numerique was set up to create a policy framework for the digital transition in broadcasting. In the process of carrying out the transition, a new body was created in December 2013 called Comite National de Pilotage de la transition de l'analogique vers numerique (CONTAN). The broadcast regulator is the Conseil National de Regulation de l'Audiovisuel (CNRA).

The national signal carrier licence was awarded to local Pay TV operator EXCAF in what was described as a public-private partnership. In exchange for the licence, EXCAF has been allowed to use the DTT transmission platform to transmit its channels.

On 17 June 2015 President Macky Sall announced that the initial DTT roll-out would cover 60% of the population but the licence has a condition mandating national coverage. Some of this coverage – as specified in the licence – will be done by satellite. The country also has a set-top box subsidy scheme.

4.3 South Africa

South Africa is a big¹⁵ country with a large and very ethnically mixed population¹⁶. Television was first broadcast in 1976 and what became the Government broadcaster SABC is dependent on a licence fee and advertising. In 1986 Pay TV provider M-Net started to broadcast but it was 1998 before the first private free to air company eTV started broadcasting.

South Africa is Africa's wealthiest country but actually has relatively few FTA broadcasters. In addition to the ones mentioned above, there are five community TV stations.

The table below shows the major broadcasting players by audience share based upon AMPS survey data. SABC and eTV take the biggest share of FTA viewing but Pay TV – through a combination of Multichoice and M-Net – reaches a significant part of the TV viewing audience. Multichoice is delivered by satellite and M-Net by terrestrial analogue signal.

¹⁵ 1,219,090 sq kms, CIA Factbook

¹⁶ 53,675,563 (July 2015 estimate), CIA Factbook

South Africa is Sub-Saharan Africa's largest Pay TV market with DStv having 5.4 million subscribers in July 2015.¹⁷ StarTimes took over its sole competitor Top TV and renamed it StarSat but its subscribers are far fewer in number.

DStv has four authorized IPTV integrators but the overwhelming majority of its subscribers use a satellite dish to receive its channels. Telecoms operator Telkom was going to set up an IPTV operation but cancelled its plans before they came to fruition. Nevertheless fibre-to-the-home has started to roll out in the more affluent parts of the main cities and it may become a broadcast channel delivery method in the future.

DStv bouquets have 22 HD channels but these are all broadcast by satellite. The market is probably sufficiently affluent to support some FTA HD channels in the future.





¹⁷ Company website, accessed August 2015

South Africa's transition to digital broadcasting was originally scheduled to have taken place by the 2010 World Cup. But disagreements between broadcasters and set-top box manufacturers over standards has led to repeated delays. There is a single broadcast signal carrier Sentech that is currently responsible for analogue broadcast transmission. It has carried a series of DTT pilots, most recently with the DVB-T2/MPEG-4 standard.

The amendments to the Governments Digital Migration Policy were published in March 2015. It says that 65% of households exclusively rely upon Free To Air television. The migration strategy is aiming to cover 84% of the country with DTT broadcasts and the remaining 16% by satellite. There is no mention of HD channels in the amendments.

In August 2015, it was announced that South Africa's DTT system had grown to cover 84.46% of the population and provided 58.49% geographic coverage, after two greenfield sites went live in Harrismith, Free State and Ngqeleni, Eastern Cape.

The switching on of these new greenfield sites supports the existing 178 DTT migration transmitters, which were turned on by state-owned signal distributor Sentech in March 2015.

Two more greenfield sites – Burgersfort in Limpopo and Holy Cross in the Eastern Cape – are being built to ensure maximum digital TV coverage in remote areas. The last two greenfield sites are expected to be on air by March 2016, raising the population coverage to 85.20% and geographical coverage to 58.91%.

5. Conclusions

Even with a growth in the projected amount of TV channels over the next 5-10 years, there are a considerable number of African countries (27) where there are significant amounts of spectrum can be freed up for other uses. Of these, 16 countries would only require one MUX on our low estimate projections and would even with one MUX have space to expand their number of channels. 8 countries would require only 2-3 MUX and therefore have some "headroom" for expansion. The current planning for 4 MUXs in these countries probably overstates the amount of broadcast spectrum required.¹⁸

Although the amount varies from country to country, Governments and regulators in these countries need to consider whether it makes sense to continue to reserve spectrum for broadcast use. On this basis, Governments might want to have the ability to able to award above and below 694 MHz to mobile use. Governments should work closely together to re-plan spectrum in ways that lower interference and where possible, the number of MUXs required.

The use of the VHF band – where countries are not already using it for analogue TV broadcasting – requires careful consideration. On a conservative use case, an additional MUX might be added in this band and it would take care of demand in one more country (Ghana). A South African Government study recommended that two MUXs might be found in the VHF band and Finland has 3 MUXs in this band. On this basis, a further 8 countries could accommodate their future demand on our low estimate.

This leaves 8 countries where there is a demand for over 8 MUXs: Congo Brazzaville, DRC, Ethiopia, Kenya, Madagascar, Mozambique, Nigeria and Uganda.

Of these, it is incredibly complex and difficult to estimate the real MUX demand in DRC and Nigeria. Both are extremely large countries and many channels operate either on a regional licence (for example, state TV stations in Nigeria) or a de-facto regional basis (for example, DRC TV stations that only reach a Kinshasa footprint). Nevertheless, in both instances, TV broadcasters might have some expectation of the availability of national coverage once the digital transition is completed.

There are many complex border issues and these will need to be addressed by a formal spectrum planning exercise for the countries concerned. For example, Congo-Brazzaville and DRC's capitals – respectively Brazzaville and Kinshasa – are only separated by the Congo river which is between 1-2 miles at its narrowest point. Both are where the densest area of broadcast channels can be found in both

¹⁸ This would change if some of these countries were to liberalise their airwaves but there is no sign that this is likely to happen. Where it is likely (for example, it has been signaled by public announcements) we have made allowance in our estimates.

countries. By contrast, Madagascar is an island at some considerable distance from its neighbours.

In some cases these countries find themselves in this high demand category because of the supply of DTT Pay TV bouquets. Government and regulators will need to think about the impact of these operators. The question is by no means straightforward as most have taken on the task of implementing the digital transition where Government has not had the funds to invest itself. Restricting these businesses would undercut Africa's digital transition in broadcasting. However, all of the countries in this category have some commercial and policy choices that will allow them to deliver the projected number of channels, most notably with the use of satellite.

At a technology level, the use of satellite is not as widespread as in the Middle East and wealth levels are such that idea of delivering via IPTV would only remain open to a relatively small number of wealthy users. Nevertheless, the mobile operators themselves can and should consider delivering broadcast content.

Although only recently launched, the Kenyan example of Safaricom's theBIGBox product is pertinent. Furthermore, wider satellite use is also a possibility, particularly to achieve cost-effective distribution for low-density (particularly rural) populations. But a broader reality is that broadcasters are likely to need to deliver their programmes across multiple platforms chosen for their cost-effectiveness and ability to reach the desired audiences.

5.1 Considerations for governments

This study recommends that African Governments and regulators look carefully at the use of spectrum by terrestrial broadcasting. For policy-makers there are a number of considerations that need to be made:

- 5.1.1 **Channel numbers:** The number of standard definition (SD) and high definition (HD) channels required after the analogue switch-off. In some countries the number of channels is smaller than a 4 MUX allocation and is likely to remain so for the foreseeable future.
- 5.1.2 **Channel Growth Points:** Those countries identified in this study as requiring above 4 MUXs need to think about how the additional channels will be delivered. In some cases (for example, DCR and Nigeria) it will only be through detailed spectrum planning that can identify how a balance of national and regional channels can be achieved. Also future improvements in the DVB-T2 standard (both with Fixed and Statistical MUXing) promise a greater number of channels per MUX (see Figure 3).
- 5.1.3 **Technology Choices:** There are three sets of technology choices that need consideration: T-DAB radio, 3DTV and Ultra-High Definition. T-DAB radio (in

the VHF band focused on in this study) has barely been discussed in Sub-Saharan Africa and a deadline for a switchover globally is likely to fall beyond a 10-year time horizon. Nevertheless Governments need to be clear about what future expectations they might have for T-DAB radio. 3DTV and UHD are both more likely to be delivered by satellite or IPTV.

5.1.4 **Geographic Footprint:** African countries that have a small geographic footprint will have a much larger burden compared with others because of the requirements of cross-border coordination. There is the potential that spectrum usage, not just in neighboring countries, but countries further away will have to be considered when identifying whether spectrum can be released. This could require bilateral coordination with a number of "neighbouring" countries after the current replanning exercise is completed if less multiplexes are required in practice in some countries. Such activity has been extensively been carried out in Europe regarding the 800 MHz band.

Appendix A

A1. Reference Documents

Cameroon – Analog to Digital Switchover, Presentation by CAM-DBS, 2013

Digital Broadcasting Migration Strategy (for Lesotho), LTA, 2012

Second Digital Dividend - Final Report and Implementation Plan, Deloitte for the Department of Communications, South Africa, 2013

Digital Migration in Zambia, Presentation by Malolela Musambo, member of the Digital Migration Task Force, 2013

Digital TV Switch Over - Economic Impact Assessment (for Namibia), Christoph Stork and Rosa Kanyangela, ICT Consultants, 2014

Feuille de route du Mali pour la transition vers la Television Numerique, ITU, 2012

Frequency Coordination Exercises in Sub-Saharan African Countries, Presentation by Pham Nhu Hai Head, Broadcasting Services Division Radiocommunication Bureau, ITU, 2013

Presentation of Digital Migration for Mozambique (No Title), Conselho Superior de Communicao Social, 2009

Roadmap for the transition from analogue to digital terrestrial television in Angola – Assessment Report, ITU, 2012

Roadmap for the transition from analogue to digital terrestrial television in Ethiopia - Assessment Report, ITU, 2012

State of Broadcasting Industry Report 2014 (South Africa), National Association of Broadcasters, 2014

Terrestrial broadcasting and spectrum use in the Arab states, Plum Consulting for the GSMA, April 2015

The digital broadcast transition: Changes in spectrum and their implications, Balancing Act for African Telecommunications Union, 2011

The digital broadcast transition: Changes in spectrum and their implications, Balancing Act for African Telecommunications Union, 2014

3rd and Final GE06 Frequency Plan Coordination Meeting for African Countries Report, African Telecommunication Union, July, 2013

A2. Glossary

Term	Definition
ASMG	The Arab Spectrum Management Group is the forum through
	which Arab states coordinate frequency planning.

ATU	African Telecommunication Union is the continental
	organization fostering developments of information and
	communications technologies infrastructure and services.
Channel	In the context of this report, it can have two meanings: a
	broadcast or TV channel or an RF channel. The former are a
	continuously broadcast set of programmes. The latter is the
	specific frequency range on which a TV channel is broadcast.
DSO	Digital Switch Over – shorthand term used to describe the
	replacement of analogue terrestrial television with digital
	terrestrial television.
DVB-T	Digital Video Broadcasting – Terrestrial. European standard
	developed for the broadcast of digital terrestrial TV.
	Standardised by the European Standards Institute (ETSI)
DVB-T2	Digital Video Broadcasting – Second Generation Terrestrial.
	Extension of DVB-T. This is the standard most African
	countries in this study are or will use.
DTT	Digital Terrestrial Television – The standard used to replace
	analogue television that uses spectrum more efficiently.
FTA	Free To Air – TV channels that can be viewed with out
	payment.
H.265	Video codec standard for HD (high definition)
H.264/MPEG-4 AVC	Video compression standard which support high definition
	TV. AVC is advanced video coding.
HD-720p	High Definition TV format with 720 scan horizontal lines that
-	create the image and using progressive (p) scan to display the
	picture on the TV.
HD-1080i	High definition TV format with 1080 scan horizontal lines that
	create the image and using interlaced (i) scan to display the
	picture on the TV.
GE-06	The Geneva 2006 frequency plan (GE06) was developed to
	provide for T-DAB and DVB-T digital services in the VHF
	(Band III) and UHF (Bands IV and V)
	broadcasting bands in 118 countries.
IPTV	Internet Protocol Television is the term for television that is
	watched over a Local Area Network or the Internet and is
	delivered using internet protocol.
ITU	The International Telecommunication Union is a specialized
	agency of the United Nations (UN) that is responsible for
	through which nations coordinate frequency planning and set
	international
	telecommunications and broadcasting standards.
LTE	Long Term Evolution is a mobile broadband technology which
	is often referred to as 4G
MFN	A Multi Frequency Network uses a number of different
	transmitter frequencies, carrying the same data, to provide
	the required coverage.
MUX	A DTT multiplex (MUX) is a bundle of TV services that have
	been digitised, compressed and combined into a data-stream
	for transmission to the consumer over a single channel. The
	receiver separates each service from this compressed data-
	stream and turns it into a form which can be viewed. Anything
	that can be digitised can be contained in a multiplex. This can
	include: sound, video, text, computer applications, electronic

	programme guide information, receiver upgrades and
	conditional access (descrambling).
MPEG-2	It is a standard for "the generic coding of moving pictures and
	associated audio information".
MPEG-4	MPEG-4 is a method of defining compression of audio and
	visual (AV) digital data and is more efficient than MPEG-2.
RRC-04 and RRC-06	Regional Radiocommunications Conference in 2004 and 2006
	respectively – organized by the ITU - where the planning for
	digital broadcasting was undertaken
Statistical MUXing	Statistical multiplexing allows the total multiplex capacity to
	be shared between the channels based on their bit rate
	requirements. The amount of data required will vary rapidly
	depending on the picture and this allows the resources to be
	dynamically shared. This can be more efficient compared with
	allocating a fixed bit rate per channel.
Terrestrial television	Terrestrial television uses radio frequencies and a number of
	transmitter sites to broadcast TV. The signals can be received
	via users TV antennas that can, for example, be roof mounted.
T-DAB	Terrestrial Digital Audio Broadcasting. Replacement for
	analogue radio.
UHD	Ultra High Definition television is higher definition than HD
UHF	Ultra High Frequencies is the name given to Bands IV and V
	(470-862 MHz)
UVF	Very High Frequencies is the name given to Band III (174-230
	MHz)
WRC-15	The World Radio Conference, organised by the ITU as a forum
	for frequency coordination, will be held in late 2015.

A3. Data Spreadsheets