Open Spectrum For Development: Kenya Case Study

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Acronyms

ASP	*Application Service Provider*
CCK	*Communications Commission of Kenya*
CLC	*Communications licensing Committee*
ERP	*Effective Radiated Power*
FSM	*Frequency Spectrum Management*
ICT	*Information and Communication Technology*
ISM	*Industrial Scientific Medical bands*
ITU	*International Telecommunications Union*
KBC	*Kenya Broadcasting Corporation*
KSH	*Kenya shilling (US$=Ksh 75)*
NCS	*National Communications Secretariat*
NFP	*Network Facilities Provider*
TESPOK	*Telecommunications Service Providers of Kenya*
TNOF	*Telecommunications Network Operator Forum*
TOFA	*Table of Frequency allocation*
TV	*Television*
WRC	*World Radio Conference*

Source: Sultana, R(2010) Spectrum Commons: Redefining future regulation of Spectrum, in CPR Africa Cape Town April 2010 (www.researchinafrica.net)

Working definitions – spectrum allocation models

Command & control (Administrative approach) - In C&C model regulator or spectrum manager specifies detailed rules and constraints affecting how, where and when spectrum can be used and who has access to spectrum. This model places an emphasis on the technical management of radio spectrum i.e. minimizing harmful interference. Consequently, different services are sometimes allocated to different frequency bands, although in most frequency bands, more than one radio service is allocated, and sharing between services takes place under specified technical criteria. This is most dominant form of spectrum allocation.

Market methods - Market methods of spectrum allocation believes in the concept –'spectrum is a profitable resource and should be treated in the same way as all other resources, i.e. via market'. It is a comparative process where market decides assignment of spectrum and used at the initial issuance of a spectrum license (e.g. auction). It allows right to trade spectrum (by allowing spectrum rights to be bought and sold) over the lifetime of a license, a change of use and transfer between users of the relevant spectrum.

Spectrum commons - A commons is a resource that is owned or controlled jointly by a group of individuals. It "is characterized by restrictions on who uses the resource, and when and how." The person or group of persons that establishes and enforces these restrictions is the controller of the commons. Conceptually, commons can be considered as a resource that is free and open for shared use.

Summary Key findings

1 Spectrum access and management is a high priority issue elaborately defined in the policy framework, enacted in the enabling legislation and further refined in telecommunications regulations and a host of procedures

2. The approach to licensing of spectrum is administrative method 'command & control' with an internal committee responsible for allocation of the spectrum. The policy however foresee a need to realise a market value and options of market based access are open for consideration. CCK acknowledges market based approach as the way forward to ensure optimum usage, realise market value and incentivise efficient usage.

3 CCK has done an excellent job to operate transparently in spectrum management. Unfortunately, some key component of the process – the consideration of the committee assigning the frequency is not open to public scrutiny

4 Pricing method is administratively determined with formulas for each application. The challenge however is that with same pricing countrywide, those in the rural areas with less population density and less purchasing power are penalised. CCK is aware of this discrepancy and committed to address the problem through a zoning formula

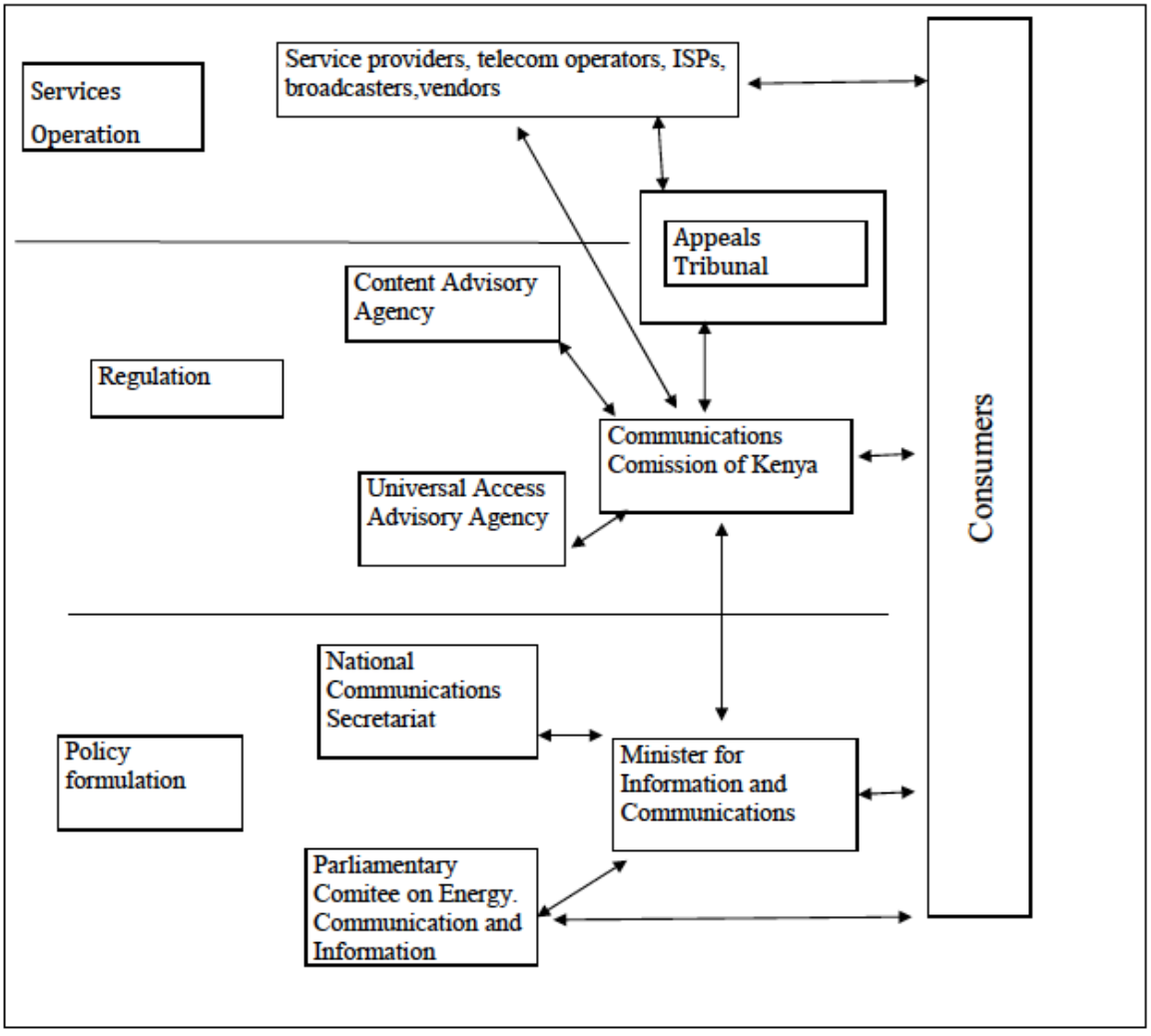
5 Spectrum is inadequate and a number of initiatives are being undertaken by CCK to release spectrum including transition to digital TV migration, periodic spectrum utilisation audits, nudge government to release excess spectrum etc, however a radical approach is needed to address long-term needs for spectrum. A combination of market based and commons approach are necessary to incentivise efficient usage.

6 For historical reasons, the government occupies very critical parts of the spectrum that private sector crave for to provide broadband wireless access. Offers to pay-off the government to migrate to other parts of the spectrum have been proposed and it is for the government agencies to make the move

7 While spectrum is a key infrastructure for growth of telecommunications, it has not attracted public attention and therefore the access and use is an operator /CCK issue outside the public domain. There are no lobby groups/forums addressing spectrum issues

Spectrum policy regulatory environment

Management of the frequency spectrum is a fundamental component of the ICT policy and regulatory framework in Kenya. It is a recognition of the role it plays in communications and consequently, its management is clearly laid out at three levels namely, policy, legal and the regulatory. The key actors on spectrum and their relationships is illustrated in fig 1.



As illustrated in Fig 1 the policy layer includes the Ministry of Information and Communications (MoIC), the Parliamentary committee on Energy, Communications and Information and the National Communications Secretariat (NCS)[1].

NCS is responsible for researching and developing ICT policy for promulgation by the Minister. This is policy includes spectrum policy guidelines. The Parliamentary Committee on ICT on the other hand is a Departmental Committee i.e. a permanent committee with oversight authority on ICT issues. The Parliamentary Committee have the powers to summon the Minister responsible for ICT and indeed all organs in the ICT sector on issues it deems fit. This includes all matters relating to the spectrum allocation and its management.

At the regulatory layer, Communications Commission of Kenya (CCK) is a key actor with a legal mandate on spectrum management in Kenya. Kenya Communications Act 1998, Kenya Communications Act 2010, and subsequent subsidiary legislation as promulgated by the Minister define the CCK's mandate. Appeals Tribunal arbitrates any disputes arising from implementation of the enabling legislation.

Other actors are advisory agencies on content and universal access. At the time of the research, these agencies were not yet operational. The operational layer includes all the ICT operators and users of spectrum. As illustrated in Fig 1, the consumer interfaces with all layers directly apart from the Appeals Tribunal, which can only be moved through an appeal of CCK decisions.

The specific role of the actors is discussed in the following section.

Policy framework for spectrum management

At policy level, the national ICT policy - Information and Communications Technology Guidelines[2] promulgated in March 2006 sets out the policy guidelines for the spectrum management and dedicates a whole chapter to the radio frequency spectrum. Firstly, the policy statement acknowledges that the spectrum is a 'scarce public resource that goes to waste if not used optimally'. The management of the spectrum is therefore intended to be in line with public policy objectives to ensure that users have access under clear and specific objectives. The key is to maintain balance between the public and private interest, and in the event of conflict, the public interest prevails.

The government's objective in the utilisation and the management of the spectrum is to achieve the following;

(a) Enhanced national security and defence
(b) Enhanced emergency preparedness against disasters
(c) Efficient national and international transportation systems;
(d) Sustainable conservation of natural resources;
(e) Efficiency in the dissemination of educational information and entertainment;
(f) Efficient and affordable telecommunication services;
(g) Research and Development; and
(h) Enhancement of social and economic progress

[1] Note that with the promulgation of a new constitution scheduled on August 27th, 2010, the terminology will change from Minister to secretary and the ministry responsible will change after new government is sworn in 2012.

[2] www.information.go.ke /

Source: Information and Communications Technology Sector Policy Guidelines

It is from these objectives that the government drew up strategies to achieve the objectives. These strategies are:

- To plan, allocate and assign the spectrum in an optimal manner and ensure that the radio systems are implemented within a reasonable period and the spectrum is efficiently utilised

- To encourage spectrum sharing among various services and users to cater for the scarcity of the spectrum, this however will not apply if safety of life can be compromised

- To encourage the use of the non-spectrum based alternative technologies to achieve the same objective

- To apply market-based principles to promote effective use of the resource. Spectrum fees should however not be a burden to the operators

- To develop and implement standards that conform to international standards and which mitigate harmful interference to ensure maximization of access and utilization of the spectrum

- To migrate spectrum users to other frequencies on the express understanding that assignment/allocation neither conferred ownership nor continued right over a frequency.

This framework has continued to guide the legal and regulatory stance in the management of the spectrum in the country. It informs the subsidiary legislation, which governs day-to-day management of the spectrum. One strategy has however yet to be operationalised. Market based principles to allocate spectrum through auctions have yet to be operationalised instead CCK still applies the traditional administrative allocation approach. As discussed later in the report, CCK is exploring how to operationalise this strategic objective.

Legal and regulatory framework

Kenya Communications Act 1998[3] and its amendment Kenya Communications (Amendment) Act 2009[4] provide the legal foundation under which the ICT regulator Communications Commission of Kenya (CCK) manages all the spectrum. Under Part 4 of the Kenya Communications Act 1998, CCK has the legal mandate to regulate the spectrum, issue licenses, determine the fees payable for use of the spectrum, establish and enforce standards to maintain integrity of the spectrum. The Kenya Communications Act 1998 also empowers the Minister for the responsible for communications, in consultation with CCK to promulgate regulations for the better utilisation of the spectrum.

Parliament amended the Kenya Communications Act 1998 in 2009 and added a section on broadcasting services. The amendment - Kenya Communications (Amendment) Act 2009 mandates the CCK to regulate the broadcasting sector. the mandate demands that CCK to promote and facilitate the development of a diverse range of broadcasting services in keeping with public interest, facilitate and encourage the development of Kenyan programmes and promote plurality and diversity of Kenyan views for a competitive market place of ideas.

The Kenya Communications (Amendment) Act 2009 empowers the CCK to license broadcasters which in so doing will have due regard to the availability of spectrum at the time of application and for future use.

The principal Act and its amendment is the legal foundation for spectrum licensing guided by the above-cited national ICT policy objectives. In line with the Act, the Minister in consultation with CCK promulgated regulations in 2010 – The Kenya Information and Communications (Radio

[3] http://www.information.go.ke/index.php?option=com_docman&task=cat_view&Itemid=37&gid=189&orderby=dmdate_published
[4] http://www.information.go.ke/index.php?option=com_docman&task=cat_view&Itemid=37&gid=189&orderby=dmdate_published

Communications and Frequency Spectrum) Regulations, 2010[5]. The regulations provide details for better utilization of the spectrum.

The regulations provide a detailed framework for spectrum assignment. In assigning the spectrum, CCK has to take into account the following considerations;

- that the spectrum is available for the proposed service and location
- whether the proposed service can be satisfied by other technologies
- safety radio communications which is paramount

The regulations stipulate that such an assignment does not confer ownership and CCK must approve any such transfer of an assignment to take effect.

In addition, CCK has developed detailed procedures for applications for spectrum as well as fees once assigned.

As noted in the foregoing CCK is the primary organ responsible for the radio spectrum management. In discharging this mandate, CCK retained the administrative approach[6] in spectrum assignment. A committee within CCK determines the assignment and returns a verdict of whether favourable or unfavourable. No market auctions of spectrum have been undertaken in Kenya although envisaged in the national ICT policy. Equally, the commons approach[7] is limited to two swathes of the unlicensed slots in the ISM bands at 2.5G and 5.7G.

The spectrum management process

CCK has developed guidelines for the assignment and of the spectrum, which it recognises as a 'scarce' resource. In the current Strategic Plan 2008-2013, CCK sets out broad strategies to ensure efficient utilisation of the spectrum. In particular, the allocation to licensed operators would be based on services offered and prevailing market demands. This takes into account technology changes, operators in the market and consumers needs. CCK commits to continue carrying out spectrum utilization audits periodically to establish the spectrum use and revise the national allocation table appropriately.

A key objective of the current Strategic Plan among other things is to;

- Review and release spectrum within 2.3 to 2.7 GHz and 400 and 800Mhz currently held by the government. the strategy by CCK will be to provide financial support to affected government agencies to migrate away and release and reallocate freed spectrum to other users . To cover the cost of migration CCK is considering paying for the additional cost to the migrating organisations and CCK in turn to recover the cost from the allocation to the operators.
- transition from analogue to digital television broadcasting by 2012 and release some of the spectrum currently held by analogue broadcasting
- ensure market oriented allocation and assignment of scarce resources. This is intended to gradually introduce market auctions as a method on the spectrum allocation.
- Review the Table of Frequency Allocation (TOFA) plan by 2012. CCK will undertaken the review after taking into account the Proceedings and Final Acts of the WRC 2012[8].

For the day-to-day management and allocation of the spectrum, CCK has established a committee – Communications Licensing Committee (CLC) and a department – Frequency Spectrum Management (FSM). The CLC is a standing committee within CCK management to assist in vetting and evaluation of licence applications. Its membership is drawn from among the CCK departments as well as the Office of the President. CLC considers 'the legal, regulatory and policy standpoint' to arrive at a finding on an application

CLC is a management organ i.e. a specialised committee working under the CCK management and its deliberations are not available to the public, the assignment of the spectrum is however available for scrutiny by the public after paying a fee. The spectrum assignment information is not available to the public on the web; however, this information is available at CCK offices during

[5] http://www.kenyalaw.org/LegalNotices/pop_ln.php?file=396
[6] See working definitions at page 3
[7] See working definitions at pp 3
[8] ITU after consultation has rescheduled the WRC 2011 to 2012

office hours. Assignment for broadcasting stations is available on the web at http://www.cck.go.ke/licensing/spectrum/register.html .

The FSM undertakes the planning, assignment, licensing, monitoring and coordination of the spectrum resource and the geostationary satellite orbits. The department has published detailed procedures on its scope. The procedures published for 2009/2010 deal with;

- Low power wireless system in the 446Mhz (family radios)
- Citizen band radio
- Amateur radio
- Aircraft radio station licence
- Maritime station radio licence
- Private HF/VHF/UHF radio networks
- Fixed cellular mobile and paging services

In addition, FSM has published the spectrum fees schedule for the whole spectrum for 24 categories of transmitting stations. An application fee of Ksh 1000[9] is chargeable for the listed licence. It should be noted that wireless access systems operating on shared non-protected basis pay an annual fee of ksh10 000 per terminal while fixed wireless access networks on protected basis pay an exclusive spectrum assignment fee and usage fee. Family radios operating on 446.0-446.1 Mhz do not require a licence. In the case of broadcasting stations, the fee is based on Effective Radiated power (ERP).

While CCK reserves the right to change the charging methodologies, the current fee schedule does not envisage spectrum auctions as a methodology for spectrum allocation. A new methodology would have to be developed to cater for market-based mechanisms.

Spectrum allocation – the National Table of Frequency Allocation

FSM also develops and maintains the Table of Frequency Allocations (ToFA) (http://www.cck.go.ke/licensing/spectrum/freq_table.html). The current TOFA published in 2008 is due for update based on the decisions of the forthcoming World Radio Conference (WRC).

The current national ToFA takes into account the current international regulations and specifically World Radio Conference and Radio Regulations both regional and global as well as national spectrum priorities. CCK intends to update the ToFA after the forthcoming WRC in 2012 to incorporate the outcome of the WRC. The ToFA allocates the whole spectrum range and specifies primary and secondary allocations. It also sets out government allocations of the spectrum. CLC determines its assignment based on the TOFA framework.

The TOFA is effected under the Kenya Communications Act 1998, the Kenya Communications (Amendment) Act 2009, Kenya Communications Regulations 2001, Sectoral Policy promulgated by the Minister. Periodic spectrum utilization audit is conducted as a management tool to provide input in the review of the TOFA.

TOFA and ITU allocation for the Africa Region

Kenya is part of the ITU region 1 and within the ITU defined African Broadcasting Area. The national spectrum allocations are in conformity with the ITU allocations with significant deviations. Where such deviations occur, it is to take into account national peculiarities and such deviation does not cause interference to other users across the borders. These deviations would normally be allocation of for example allocation of maritime frequencies deep inland where they cannot conceivably cause interference.

Spectrum assignment process

CCK approach to spectrum assignment is administrative 'command and control'. CCK assigns the entire spectrum on first come first served basis on the allocated bands. No auctions or beauty contests or combinations thereof are in operation. While different procedures are applied for

[9] US$ = Ksh75 at the time of the research

different services, the following procedures are applicable to assign the spectrum to low/medium/high capacity fixed telecommunication links, studio to transmitter links, fixed wireless access and cellular mobile and paging services

- Applicant fills the requisite forms with detailed technical and operating data of the proposed equipment and submits the same to the CCK for consideration after paying an application fee. These forms are available on the CCK website
- The application is deliberated by the CLC in line with ITU and ToFA and if found favourable is approved and suitable frequencies are assigned. The applicant is asked to pay the requisite fee. If not found with merit is rejected

The equipment has to be type approved for the frequency to be assigned and the frequency is renewable annually by payment of a usage fee.

This procedure is applicable for protected assignments. If the operator wants to operate on the non-protected bands, the only requirement is equipment type approval and a subsequent usage fee chargeable per terminal annually.

Pricing schemes for spectrum license fees

The annual licence fees are set out in a schedule developed through an administrative process, which specifies the licence fee for any type of the radio transmitting station. This schedule is available on the web (www.cck.go.ke). Typical licence fees for fixed wireless access on licensed spectrum comprise of;

1) An exclusive spectrum bandwidth assignment fee and,
2) A spectrum usage fee

The fees are set out in table 1.

Table 1: spectrum assignment fee framework

EXCLUSIVE SPECTRUM BANDWIDTH ASSIGNMENT FEE
Annual Fee for exclusive spectrum bandwidth assignment countrywide is calculated as follows:
Fn (Ksh) =Assigned bandwidth (kHz) x Weighting factor x 1043.65/8.5 kHz
Where: Weighting factor to be used = 6
Unit fee = Ksh. 1043.65
SPECTRUM USAGE FEE
This is based on actual usage of the spectrum, depending on the number of TRXs in the network.
Fee Fu (Ksh.) = 100,000 x n x K1
Where: n is the actual or equivalent number of 1.75MHz duplex TRXs estimated to be in use at the end of the year in review
Annual Spectrum Management cost of one TRX is Ksh. 100,000
Weighting factor, K1 = 0.8, for f < 1 GHz
= 0.7, for 1 GHz ≤ f < 6 GHz
= 0.6, for 6 GHz ≤ f < 10 GHz
= 0.5, for 10 GHz ≤ f < 20 GHz
= 0.4, for f ≥ 20 GHz
Note: f is the frequency band in GHz

Source: CCK – www.cck.go.ke

In the case of shared and non- protected wireless access systems, a spectrum fee of Ksh 10000 is applicable for each transmitter. It is therefore not possible to know the full cost of spectrum upfront without identifying the number of transmitters to be in operation.

A criticism of this is charging methodology is the implication to the rural areas. The operator in the rural areas and often areas with scanty population has to pay the same fee as in heavily populated areas. This is a disincentive to the operator that want to provide service in the rural areas and therefore a penalty to the rural communities. CCK is considering introducing zoning. Under zoning, considerations such as the population and capacity to pay will be factored in the pricing of spectrum for rural applications.

Kenya spectrum policy is 'use it or lose it'. Once assigned an operator must use the spectrum or else CCK will recover and assign to others. CCK however does not have the tools to incentivise efficient usage of the assigned spectrum. A tool under consideration is market-based assignment using auctions. CCK believes that the spectrum price should be commensurate with economic value and therefore incentivise efficient usage. In considering an economic value as a basis for allocation, CCK will need to take into account access to the spectrum for public services that are not expected to pay for spectrum market defined rates.

Strategies to increase spectrum

Transition to the digital TV broadcasting

Kenya launched the transition to digital broadcasting on Dec 9th, 2009 becoming the second country in Africa to switch –on to digital transmission after South Africa. This is in line with the decisions taken by the Regional Radio Communications Conference in Geneva in 2006 (RRC-06). Kenya as member of the ITU Region 1 committed to switch-off analogue digital transmission by 17 June 2015. As a party to the treaty, Kenya moved fast, to implement the decision and appointed a taskforce in September 2007 to spearhead the transition.

The high demand for frequencies by the broadcasting sector was a major motivation to fast track the transition. Indeed, by 30th April 2007, when the taskforce was established, there were over 110 television channels and 264 FM frequencies assigned countrywide to 23 TV and 62 FM sound broadcasters. The national broadcaster Kenya Broadcasting Corporation (KBC) (www.kbc.co.ke) also operated a national network on AM Medium Wave sound broadcasting. At that time, there were 140 Radio and 54 TV stations on air. The demand for broadcasting frequencies had outstripped the availability, especially in urban areas.

The transition from analogue to digital TV is expected to increase efficiency in the use of radio spectrum and improve the quality of content. This is to ease the demand on broadcasting frequencies, which has increased rapidly due to liberalisation of the sector.

The taskforce deliberated on the issue of transition and presented a set of recommendations on the way forward[10]. The key recommendations are:

- That Kenya migrates and switches to digital transmission much earlier than 2015, indeed this is to be completed by 30 June 2012 through three phases. Phase 1 commenced 9 Dec 2009, it was the switch-on of digital transmission, phase two is a simulcast period where both analogue and digital signal are transmitted firstly from Nairobi and its environs and later country wide while phase three is the switch-off of the analogue signal on 30 June 2012. The switch-off will be phased in regions and T-DVB is chosen as the digital standard for Region 1.

- Segment the broadcast market to provide for content and signal distribution. Kenya Communications (Amendment) Act 2009 provide for the licensing of the signal distributors with KBC as the public broadcaster awarded the first signal distribution licence. To avoid cross subsidization and conflict of interest the KBC had to set up a separate company -

[10] See for more details http://www.cck.go.ke/about/downloads/Transition_2007.pdf

Signet to exploit the signal distribution license. Other investors including the current broadcasters are eligible for a signal distribution license

- Implementation of a framework to intervene was necessary to support the transition. This includes awareness creation of the transition and possible market intervention to make the set top boxes affordable. At the launch of the digital migration, the President directed that tax be waived on the set top boxes

After the migration, extra spectrum will be released in VHF and UHF as digital dividend after the switch-off. This spectrum will be available to use for any number of application that could include wireless access systems, cellular operators and possible data casting. A decision has not been taken on the actual assignments of the freed spectrum and is under discussion in ITU for possible world wide allocation.

At the time of the launch of the digital transmission switch-on on Dec 9th 2009, there were 60 TV licences and more than 150 for FM radio[11]. As at the time of the research, over 15 TV stations were already broadcasting on the digital platform.

The key concerns among stakeholders include costs, the allocation of the methodologies of the freed spectrum and the licensing for the signal distributors

The costs is seen in two ways- the cost for the consumer on set top boxes for the over 5 million television sets and the cost of the signal distribution infrastructure to the investor. In both cases, the government has committed to reduce the burden through tax waiver measures. In this regard, the government expects the set top boxes to cost between Ksh 3000-5000 after removal of the tax of 25 per cent import duty and a 16 per cent VAT levy[12]

Media Owners Association (MOA) expressed concern on the allocation of the spectrum to the applicants for signal distributor's licence. As at the time of the research, this has not posed a problem. No applicant has been denied a licence.

Other strategies to increase spectrum

In cognisance the increasing demand for the use of the spectrum, CCK is undertaking measures to make available more spectrum in line with the increasing demand. This includes the following measures:

- Periodic spectrum utilisation audit as a management tool to establish the allocations and use of the resource, this activity informs the TOFA when due for review
- CCK recognises that technologies like WiMAX may require other bands that are not free. Accordingly, the strategic plan 2008-2013 foresees a re-farming spectrum for more frequencies
- Review and release spectrum in 2.3 to 2.7 GHz and 400 & 800 MHz currently in use by government agencies. CCK in its strategic plan intends to provide financial support to the agencies affected to migrate to new spectrum space. No methodology of allocation of the freed spectrum is specified for now

These will be the major strategies to the release additional spectrum to the market

[11] http://www.capitalfm.co.ke/news/Kenyanews/Kenya-launches-digital-broadcasting-6763.html
[12]http://www.businessdailyafrica.com/Company%20Industry/Digital%20TV%20uptake%20hit%20by%20high%20prices/-/539550/911508/-/kqlh8l/-/index.html

Access to Unlicensed / License-exempt / Light licensed spectrum

CCK has authorized the use of certain bands on a shared, non-protected basis. Thus, operators in these bands do not have exclusive use in the spectrum. CCK type approves the equipment used in these bands before deployment .Operators have exploited these spectrum to launch wireless access system in both urban and the rural areas. The specific bands are tabulated in table 2

Table 2: unlicenced spectrum

Frequency Band (MHz)	**Maximum Equivalent Isotropically Radiated Power (e.i.r.p.)**	**Maximum mean e.i.r.p. density**
2400-2483.5 MHz	*100mW*	*10mW/MHz*
5150-5250 MHz	*200mW*	*10mW/MHz in any 1 MHz band or 0.25mW/25kHz in any 25kHz band*
5250-5350 MHz	*1W with a maximum transmitter power output of 250mW*	*50mW/MHz*
5470-5725 MHz	*1W with a Maximum transmitter power output of 250mW*	*50mW/MHz*
5725-5800 MHz	*4 Watts with a Maximum transmitter power output of 1W*	*200mWatt/MHz*

Source: CCK

Exploiting wireless

Licensing for national commercial wireless network

A commercial wireless network is considered as infrastructure based operator under the Unified Licensing Framework launched in 2008. By adopting ULF, Kenya moved towards a technology neutral licensing regime. Accordingly, there is no distinction between wired or wireless infrastructure operators. ULF divides the market into three main licensing categories, namely:

- Network Facilities Providers (NFP) – licensees own and operate any form of communications infrastructure, based on satellite, terrestrial mobile or fixed. All the cellular operators, wireless operators and the national and regional data operators are licensed under this category.
- Applications Service Providers (ASP) – provide end user services to customers using infrastructure of the network facilities provider licensees. ISPs are ordinarily licensed under this category
- Content Services Providers (CSP) – provide content services, information services and data processing services. Premium rate service providers are typical licensees under this category

A wireless operator in this regard is categorised as a NFP and would be awarded a 15 year NFP Tier 2[13] licence. Tier 2 provides for a national operation licence. In addition to the NFP licence, the operator can opt for an international gateway whose licence fees are distinct. This is pertinent where the gateway is satellite based otherwise where international connectivity is deemed adequate, this licence is not necessary. Finally, the potential operator will then apply for the spectrum assignment, which is charged separately. As discussed earlier in this report, the spectrum can be exclusive or non-exclusive basis attracting different fees.

The licence fees for a commercial national wireless network comprise an upfront fee and annual operating licence fees are as set out in the table 3

Table 3: licence fees for NFP operator

License Period (Years)	**License Application Fee**	**Initial Operating License Fee**	**Annual Operating Fee**	**Access Fee for Frequency Spectrum**	**Annual Spectrum Fee**
National Network Facilities Provider Tier 2					
15	*Ksh. 10,000*	*Ksh. 15 Million*	*0.5% of Annual Gross Turnover or Ksh. 5 million whichever is higher*	*Bid/Assessed Price for Specific Frequency Spectrum Exclusive utilisation - countrywide*	*Based on Bandwidth & Coverage*
International Network Facilities Providers - International Gateway License					
15	Ksh. 10,000	*Ksh. 15 Million*	*0.5% of Annual Gross Turnover or Ksh. 5 million whichever is higher*	*N/A*	*Based on Bandwidth*

Source: CCK

The potential wireless operator need to be locally registered and with at least 20% local equity ownership at the time of application or within 3 years after commencement of operation. CCK commits to issue the licence if successful within 135 days from the date of application with full information. This includes a 60 days gazette notice period for such an operator to allow comments by interested stakeholder. CCK considers the application for approval taking into account such comments arising from the gazette notice.

Spectrum fee is as illustrated in table 2 is discussed earlier in the report.

[13] NFP Tier 1 is historical and reserved for the four major operators who bid for national licences namely Telkom Kenya, Safaricom, Zain, and Essar Telecom. NFP Tier 2 provides for equal operation rights and is able to offer all the services like NFP Tier 1. Safaricom has the largest wimax network among the four operators. NFP Tier 3 licensees on the other are restricted to a region.

Provision of VOIP services

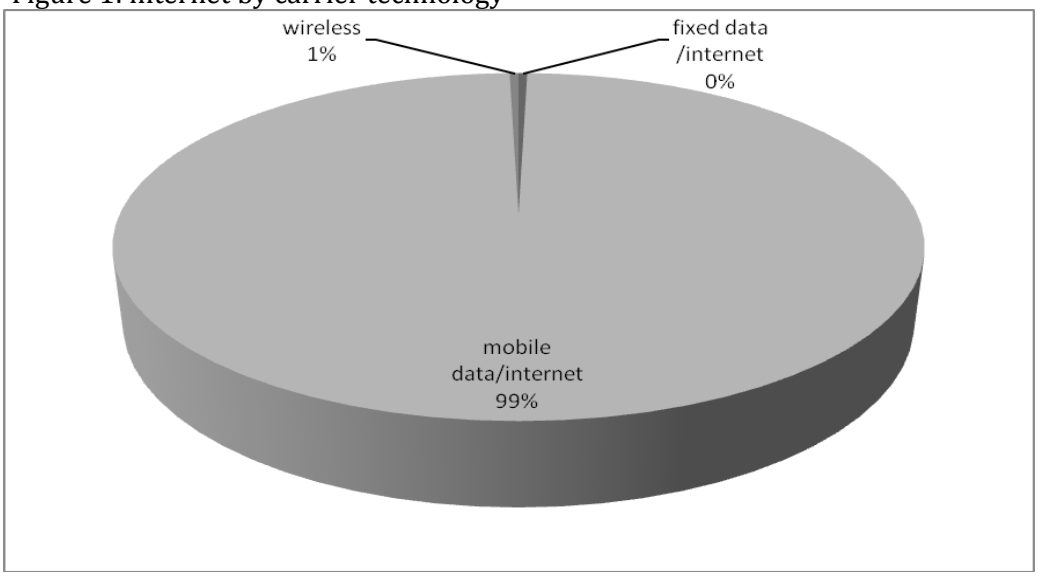
With the change to unified licensing framework and in a technology neutral regime, operators duly licensed can provide VOIP. Notice that there is no specific licence for VOIP. At present, all the operators with an Application Service Provider (ASP) Licence can provide all ISPs services including VOIP. Under this category, CCK had licensed 39 operators as at January 2010[14]. These include the NFP Tier 1 operators like Safaricom, Telkom Kenya and Yu. Other eight big operators with ASP licence include NFP Tier 2 like Kenya Data Network. It should be noted that ASP licences are non-infrastructure based and rely on other operator's network unless possessing an NFP licence.

Wireless ISPs

With the move toward technology neutral licensing, the definition of an ISPs have blurred[15] and at present all NFP licensees are offering internet, indeed the largest providers of internet services are the cellular operators who are all NFP licensees and as at Dec 2009 had a total of the 1,981,048 customers representing 99% of the internet connections on their networks. This is against the fixed data subscribers at 8,349 and wireless internet subscribers at 8,435 representing 1% of all the internet connections as at Dec 2009[16] .

Presently, wireless ISPs or any such configuration is not a key player in the ISPs space in terms of numbers. Those that can provide wireless internet services have to be licensed as NFP Tier 1, 2 or 3. As at January 2010, CCK had issued cumulatively 16 licences. All operators use a combination of the wireless and wireline to provide internet and similarly some of them use a combination of licensed and unlicensed spectrum. Increasingly, the provision of internet especially to corporate customers in urban centres is via optic fibre. Kenya Data Network, Access Kenya and UUNET are key players in the provision of corporate data over wireless however; this is being replaced by optic fibre where they deploy fibre.

Figure 1: internet by carrier technology



Source: CCK

The same period however there were 429,289 fixed wireless subscribers

[14] http://www.cck.go.ke/licensing/telecoms/register_licensees_2010.pdf
[15] Prior to the introduction of ULF, an ISP space was cleared demarcated in the licences and thus cellular, fixed line or data operator were not allowed to provide internet services. This changed and all the operators could provide internet services.
[16] CCK statistics report Dec 2009 http://www.cck.go.ke/resc/statistics/Sector_Statistics_Report_Q2_2009-2010.pdf

Promoting wireless access

Wireless solutions are no doubt very significant in the communications services. This is particularly so in the fixed links and last mile approach to the customer. In the rural areas and sparsely populated areas, wireless access is indispensable. Despite this significance, there is no group or association specifically promoting the interest of the wireless access. However, there are associations lobbying for all round communications issues. The first to be established is Telecommunications Service Providers of Kenya (TESPOK) (www.tespok.or.ke) established in 1999. TESPOK established by ISPs has been very vocal on the position of ISPs. Among its major contribution to the sector is the lobbying to open up the international connectivity for competition, establishment of an internet exchange point and support for ICT policy reform. ISPs were licensed as value add operators and therefore did not have infrastructure , consequently TESPOK did not engage in wireless access issues until after introduction of unified licensing framework when ISPs could apply for infrastructure licence. To date TESPOK has not been specifically aggressive on wireless access.

While TESPOK focused on ISPs, the major carriers had challenges relating to their nature of operation and so established the Telecommunications Network Operator Forum (TNOF). Wireless is part of the challenges of the operators and therefore integrated as part of their lobby strategy.

No formal or informal organisation is therefore established specifically to promote wireless access.

Other spectrum

Due to the shortage of spectrum for the private sector operators, CCK is considering the range to release spectrum for wireless access use. The spectrum at 3.3 and 3.5 GHz provided an opportunity; another area of focus is government spectrum re-use.

Other significant frequencies for fixed and mobile telecommunciations services

CCK has assigned operators on 3.3 and 3.5 GHz to a number of operators in the past for wireless broadband as indicated in table 3

Figure 2: spectrum allocation on selected Bands

3.3 GHz bands	**3.5 GHz bands:**
• Access Kenya (14 MHz); • Wananchi Online (7 MHz); • Trunking systems (14 MHz); • IS Kenya (7 MHz); • Chesco (7 MHz); • Jamii Telecom (7 MHz) ; • Afsat Communications (7 MHz) ; • Tangerine (7 MHz);	• Telkom Kenya Ltd (10.5 MHz); • Open system (7MHz); • Onecom (7 MHz); • Simbanet (7 MHz); • Igo wireless (7 MHz); • Packetstream (7 MHz); • Kenya Data Network (28 MHz); • UUNet (7 MHz)

One Com and PacketStream was taken-over by Safaricom. Safaricom has also announced an intention to take over Igo Wireless. The takeovers give Safaricom access to more spectrum to expand its Wimax network

Government spectrum re-use

Due to historical reasons the government occupied a lot of spectrum and which most is not optimally used[17]. The challenge is to get the government firstly to release part of the spectrum that could be used optimally by operators and particularly for the wireless access system. CCK has proposed to the government agencies to pay the cost of migration of government agencies to release some spectrum. The government agencies must take a decision and accept for this to happen. With the shortage of spectrum, CCK can recoup the cost of migrating government agencies by auctioning the spectrum to the private sector operators.

Government spectrum represents the greatest opportunity to expand access to spectrum for wireless access systems. Some of the spectrum under consideration is the prime 2.3 and 2.5 GHz.

International coordination

WRC 2012

Kenya is an active participant in the World Radio Conferences and is preparing for the next such conference - WRC 2012. The outcome of WRC 2012 will be a major input in the review of the TOFA.

The focal point of the preparation for WRC 2012 is CCK, which has the mandate of the spectrum working closely with other significant actors who include the following;

- National Communications Secretariat (NCS) – this is the organ directly under the Ministry of Information and Communication that research and develop ICT policy- see fig 1
- Specialised agencies with heavy reliance on spectrum e.g. meteorology, aviation , maritime etc
- Government users and especially security agencies , with each participating independently
- Telecommunications operators
- Any other interested stakeholders

This core group develops Kenya position through a consultative process that is later shared among the East African partners to develop a common East African position. This strategy has been used in the past and is being used in preparation for the WRC 2012. The Kenya position is under preparation as at the time of the research.

Stakeholder Spectrum debate

As at the time of the research, there are no individuals or groups engaged in spectrum debate other that the operators individually with the regulator.

National broadband strategy

A national broadband strategy is a cornerstone for the national ICT policy. The strategy defined some of the technologies that would provide the broadband and strategies to increase spectrum for broadband. Finally, the ICT policy recognise the applications and the benefits of the broadband

The ICT policy specifically recognised the need to exploit technologies for broadband infrastructure namely:

- wire line – digital subscriber loop, cable TV
- Wireless – wifi and wimax - The government committed to release these frequencies to increase wireless broadband access

Subsequent initiatives to expand broad band has included the following

[17] Before 1999, Kenya had a monopoly operator and with one operator, the spectrum users were few largely government. Government took more spectrum then needed in today's terms.

- International capacity connectivity – up to four international submarine cables with government spearheading the construction of one of the fibres TEAMS, the submarine
- cable fibres are tabulated below

Table 4: Submarine optic fibre

cable	**capacity**	**Arrival in Mombasa**	**Kenyan interest**
EASSY	*1.4 Tb/s*	*Feb 2010*	*WOICC – Telkom Kenya ltd shareholding* *www.eassy.org*
TEAMS	*120 Gbs - 1.28 Tbs*	*Sept 2009*	*TEAMS(Kenya) 85%, Etisalat (UAE) 15%*
SEACOM	*1.28 Tbs*	*July 2009*	*USA 25% ,SA 50%, Kenya 25%* *www.seacom.mu*
LION	*No published data*		*Orange Madagascar, Mauritius Telecom, and France Telecom initiative majority owner of Telkom Kenya ltd*

Source: operator websites

Two of the submarine fibre optic cables – SEACOM and TEAMS are operational providing much needed international broadband connectivity and redundancy. EASSY landed in February but is on stream yet.

- Multiple countrywide fibre optic networks - government has built a 5000 km network to link the rural areas while the private sector and in have build own infrastructures. Kenya Data Network has built a 7000 km fibre network spanning across the country while the power utility Kenya Power and lighting Company is lighting fibre network across the country. The combination provides the necessary redundancy, choice and capacity to distribute the international capacity to most parts of the country. Additionally three operators are building metro fibres networks in the major cities.
- Broadband Wireless networks – this implemented operators as approach to the consumer and in the rural areas
- 3G Licences - at the time of the research only one national operator Safaricom is providing 3G on its network

With the infrastructure deployment progressing steadily, the government has turned its focus on applications and use of the broadband infrastructure. The greatest effort is now in content development. Migration of to digital TV is for example one strategy to release broadcasters from infrastructure deployment to content development.