

**TANZANIA COMMUNICATION REGULATORY AUTHORITY  
(TCRA)**



**SECOND PUBLIC CONSULTATION DOCUMENT ON MIGRATION FROM  
ANALOGUE TO DIGITAL BROADCASTING IN TANZANIA**

**THE CASE FOR THE ESTABLISHMENT OF  
THE MULTIPLEX OPERATOR**

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## **EXECUTIVE SUMMARY**

This Second Public Consultation Document (PCD) is a follow up document of the First PCD on Digital Switchover published on 8<sup>th</sup> July 2005.

This document suggests best ways to achieve smooth migration from analogue to digital broadcasting in Tanzania.

It describes various options and recommends best options on how to establish Multiplex operators (MUX). It also discusses licensing framework in line with the Converged License Framework (CLF) and suggests suitable licensing approach.

It goes further to explain the process of how to get the Multiplex operators and determine the number of MUX in the market.

This document recognizes three key players, namely, MUX, content service provider and the regulator in the delivery of broadcasting services to consumers and discusses their working relationships.

The document discusses four options of migration strategy and recommends the best option to be adopted.

The document concludes by putting up recommendations for the establishment of MUX.

## **LIST OF ACRONYMS**

<b>AM</b>	Amplitude Modulation
<b>CA</b>	Conditional Access
<b>CD</b>	Compact Disc
<b>CLF</b>	Converged Licensing Framework
<b>CMUX</b>	Commercial Multiplex Operator
<b>DAB</b>	Digital Audio Broadcasting
<b>DSTV</b>	Digital Satellite Television
<b>DTT</b>	Digital Terrestrial Television
<b>DTV</b>	Digital Television
<b>DVB</b>	Digital Video Broadcasting
<b>DVB-S</b>	Digital Video Broadcasting Satellite
<b>DVB-T</b>	Digital Video Broadcasting Terrestrial
<b>EPG</b>	Electronic Programme Guide
<b>FM</b>	Frequency Modulation
<b>HDTV</b>	High Definition Television
<b>ITU</b>	International Telecommunication Union
<b>MF</b>	Medium Frequency
<b>MHz</b>	Megahertz
<b>MID</b>	Ministry of Infrastructure Development
<b>MUX</b>	Multiplex Operator
<b>NICT</b>	National Information and Communications Technologies Policy
<b>NTSC</b>	National Television Systems Committee
<b>PAL</b>	Phase Alternation Line
<b>PCD</b>	Public Consultation Document
<b>PMO</b>	Prime Minister's Office
<b>PMUX</b>	Public Multiplex Operator
<b>SDTV</b>	Standard Definition Television
<b>SMS</b>	Subscriber Management System
<b>STL</b>	Studio to Transmitter Link
<b>TCRA</b>	Tanzania Communications Regulatory Authority
<b>T-DAB</b>	Terrestrial Digital Audio Broadcasting
<b>TV</b>	Television
<b>TVT</b>	Televishehi ya Taifa
<b>UK</b>	United Kingdom
<b>USA</b>	United States of America
<b>VHF</b>	Very High Frequency
<b>ZBC</b>	Zanzibar Broadcasting Commission

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# **MIGRATION FROM ANALOGUE TO DIGITAL TERRESTRIAL BROADCASTING IN TANZANIA**

## **1.0 BACKGROUND**

- 1.1 The Tanzania Communications Regulatory Authority (TCRA) on August 8, 2005 issued a Public Consultation Document (PCD) on Switchover (Migration) from Analogue to Digital Broadcasting in Tanzania.
- 1.2 The PCD main objective was to gather comment on how digital broadcasting in Tanzania can be adopted, organized and regulated.
- 1.3 TCRA organized a series of consultation meetings with stakeholders ending up with the Broadcasters' Conference (BC-05) in Bagamoyo on December 18, 2005
- 1.4 The BC-05 came up with substantial proposals and recommendations that have been used by this document as foundation stones for building up a comprehensive document.
- 1.5 One of the fundamental recommendations by the BC-05 was the need to establish a multiplex operator (MUX), to handle all the signal distribution functions, establish a relationship with content service providers, network service providers and the Authority.
- 1.6 It is against this background that this Second PCD has been prepared to analyse the role of the MUX in the broadcasting value chain. This PCD is to be made available to all stakeholders for public comment.
- 1.7 The intention of the PCD is to subject the contents of this document to public inquiry processes in order to generate opinions and comments that will help in formulation of a *modus operandi* governing the operation of the MUX during and after the transition period.
- 1.8 The First PCD issued by the Authority on August 8, 2005 and the Second PCD (on the Establishment of MUX) will constitute the basic documents for formulation of policy, regulatory and legal frameworks under which digital broadcasting is going to be organized, regulated and developed in line with the country's Vision 2025.
- 1.9 The two documents are targetted at providing an enabling environment for the development of a vibrant broadcasting industry that addresses the development

needs of the majority of Tanzanians, foster democracy, pluralism, diversity and fair competition.

- 1.10 The two documents, after consultation with all the stakeholders, will be reviewed to come-up with a comprehensive document on Digital Broadcasting in Tanzania addressing all the critical issues to be taken care of during and after the transition period.
- 1.11 Comments by the public and stakeholders should reach the Authority not less than 31<sup>st</sup> December,2006 through the following address:

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## **2.0 INTRODUCTION**

- 2.1 This is the Second PCD on digital terrestrial broadcasting in Tanzania.
- 2.2 The First PCD covered a number of pertinent issues regarding digital switchover but did not go into details on best ways to handle the key issue of signal distribution during the transition period and thereafter.
- 2.3 The First Document in summary dealt with the objectives of the document and the consultative process. It is discernible that the public consultative process, be part of public inquiry initiatives by the Authority to enhance good governance on broadcasting issues for the first time since the inception of the Authority in 2003.
- 2.4 The document discussed the status of the broadcasting industry in the country highlighting the current analogue system of broadcasting and its shortcomings. It underscored the need to adopt digital broadcasting because of its immense advantages brought about by technological developments.

- 2.5 The document identified the driving forces for adoption of digital broadcasting and dealt with the implications if Tanzania is left behind in the world of digital broadcasting.
- 2.6 The document dealt with possible options for licensing of digital services including an explanation on the role of the multiplex operator in the whole process of delivery of broadcasting services to the consumer.
- 2.7 The document made a provisional roadmap for implementation of digital broadcasting in the country.
- 2.8 This Second PCD will deal with an analysis of digital terrestrial broadcasting and the establishment of MUX as a signal distributor and options for its licensing.
- 2.9 Inputs by all stakeholders involved in the consultation process will be taken on board for concretization of policy, regulatory and legislative frameworks on how the broadcasting industry is going to be organized and regulated during the digital era.
- 2.10 Consequently the Authority will publish a comprehensive document on Digital Terrestrial Broadcasting in the country that will guide the operations of the broadcasting industry in the 21st century.

### **3.0 ANALYSIS OF DIGITAL TERRESTRIAL BROADCASTING AND THE ESTABLISHMENT OF MULTIPLEX OPERATOR**

#### **3.1 THE CURRENT ANALOGUE SYSTEM OF BROADCASTING**

- 3.1.1 The current system of broadcasting is predominantly analogue especially the free to air services. Cable television services have changed tremendously over the years since 1994 when Cable television licences were granted. Cable television operators in major cities are now on broadband with capability of offering a number of enhanced services on the digital platform.
- 3.1.2 As of June 28, 2006 there were 59 licensed broadcasters operating free to air services for television and radio. Radio broadcasting is by far the most accessed service than television. Radio broadcasting services covers almost the whole country while television covers largely 20 major urban centers.

- 3.1.3 When we talk of digital terrestrial broadcasting in Tanzania basically we are talking about converting the 59 analogue incumbents to digital broadcasting and accommodating new entrants. Essentially this second PCD, in simple terms, is about how the broadcasting services are going to be organized and operated during and after the transition period to full digital broadcasting.
- 3.1.4 The Information and Broadcasting Policy of 1993 and the revised Information and Broadcasting Policy of 2003 did not mention anything about Terrestrial Digital Broadcasting in Tanzania. Both policies addressed the development of analogue broadcasting in the country.
- 3.1.5 The new digital technologies have brought about significant changes in the broadcasting landscape. The changed broadcasting environment needs to be addressed by new policies, laws, regulations and rules.
- 3.1.6 Current policies, laws and regulations governing the provision of Broadcasting Services, allow content service providers to own and operate studios and transmitters for both radio and television. The Converged Licensing Framework (CLF) adopted by the Authority February 23, 2005 made a separation of roles and functions between content service provision and transmission facilities. The Authority introduced separate licenses for content service provision, as a stand alone license and for signal distribution/ transmission falling under the Network Facilities license category.
- 3.1.7 It is against this background that we embark on an analysis of the present situation on how best to organize the industry to meet the challenges and opportunities brought about by digital technology.
- 3.1.8 In analogue broadcasting scenario one programme occupies one radio frequency. The programme cycle begins from the studio where production of the programme takes place. The licensed content service provider is responsible for the entire process from production transmission and delivery of signal to the consumer by free to air mode of transmission.

- 3.1.9 The content service provider owns studio and transmission facilities including Studio Transmitter Link (STL), and is assigned frequency to facilitate signal transmission and broadcasting.
- 3.1.10 The production process from the studio to the consumer receivers is on an analogue format. With the adoption of the CLF, broadcasters are licensed as content service providers to provide broadcasting services and other value added services to the consumers.

Below figure 1 shows the analogue broadcasting value chain and its inherent limitations on expansion and business flexibility.

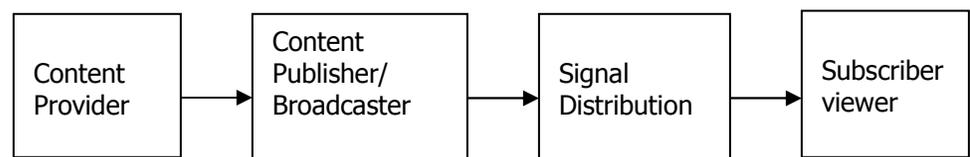


Figure 1: **Analogue Value Chain**

- 3.1.11 In most of the stations, researchers, producers and commissioning editors use a wide range of analogue and digital equipment to initiate the programme cycle in broadcasting studio.
- 3.1.12 Most post production is done in digital format. However the transmission of programme from studio to the receivers is basically an analogue process.
- 3.1.13 Digital Terrestrial Broadcasting is non-existent in Tanzania. Digital satellite services provided by Dstv based in South Africa, are received by subscription on analogue television receivers. Digital television receivers are not available in local stores, while digital radio receivers are scarcely available in local stores specially those receiving World Space signals though expensive remain unaffordable to most consumers.
- 3.1.14 The introduction of digital technologies in broadcasting has changed completely the way content is collected, produced, broadcast and delivered to the consumer.

- 3.1.15 The consumer, worldwide, is slowly but steadily experiencing an abundance of content services that he/she never experienced before. The new technologies have made it possible for the consumer to enjoy services like demand a movie/video of his /her choice at a time he/she wants and moreover it is now possible to record programmes of your choice and view it later at a time you want it to view with the availability of personal video recorders (PVRs).
- 3.1.16 The mode of delivery has changed. It is no longer economically viable for one operator to have a system of delivery of multiple channels without recourse to use the services of an independent multiplex operator (MUX).
- 3.1.17 In view of the above, this Second PCD proposes the establishment of the multiplex operator to handle all matters regarding signal distribution from broadcasters to audiences/consumers.
- 3.1.18 This arrangement reinforces the validity of the Converged Licensing Framework (CLF) that advocates the separation of Content Service provision distinct from signal distribution done by Network Facility Providers.
- 3.1.19 In this document we will strive to define the multiplex operator/signal distributor, its rationale, its functions and obligations, relationship between the MUX and content service providers. The document will as well establish the link between the MUX and the network service provider and the relationship between the MUX and the Regulator in terms of regulatory framework.

## **3.2 THE DIGITAL BROADCASTING SCENARIO**

- 3.2.1 Digital broadcasting represents a fundamental change from analogue broadcasting whereby basically one frequency carries one programme.
- 3.2.2 In digital terrestrial broadcasting one radio frequency can accommodate a number of broadcast programmes.
- 3.2.3 Digital broadcasting involves the delivery of a variable number of digital bit streams not only for sound and television but also multimedia services.

- 3.2.4 These streams are combined into a single digital stream for transmission on a particular frequency channel.
- 3.2.5 The process of combining digital streams into a single channel is known as multiplexing. The central feature of digital broadcasting is multiplexing.
- 3.2.6 The Digital Broadcasting Value Chain and the operations of the Multiplex Operator are represented in figure 2 and figure 3 below respectively.

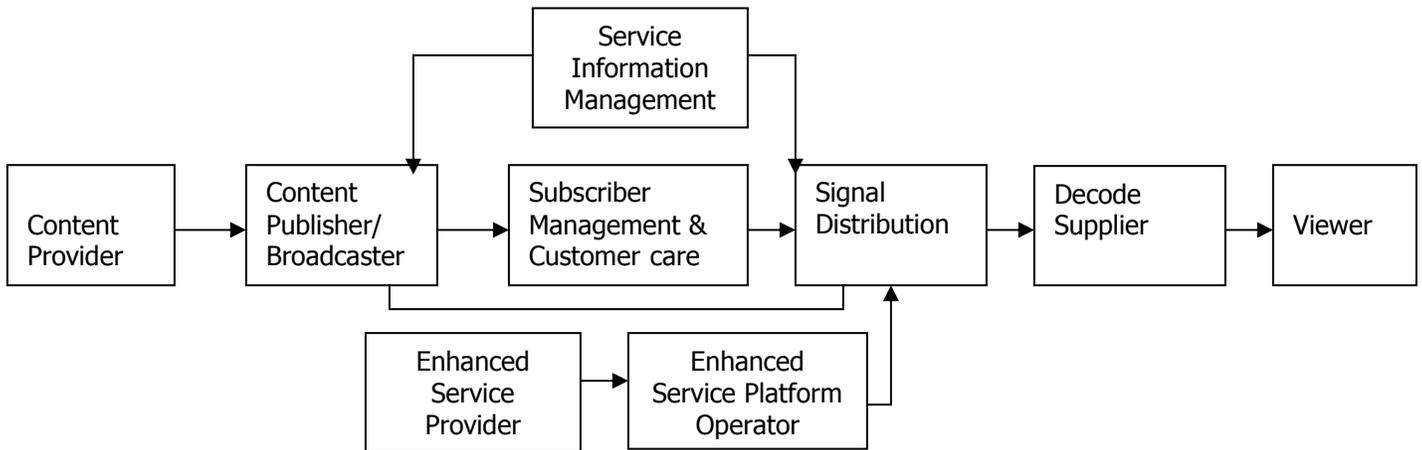


Figure 2: **Digital Value Chain**

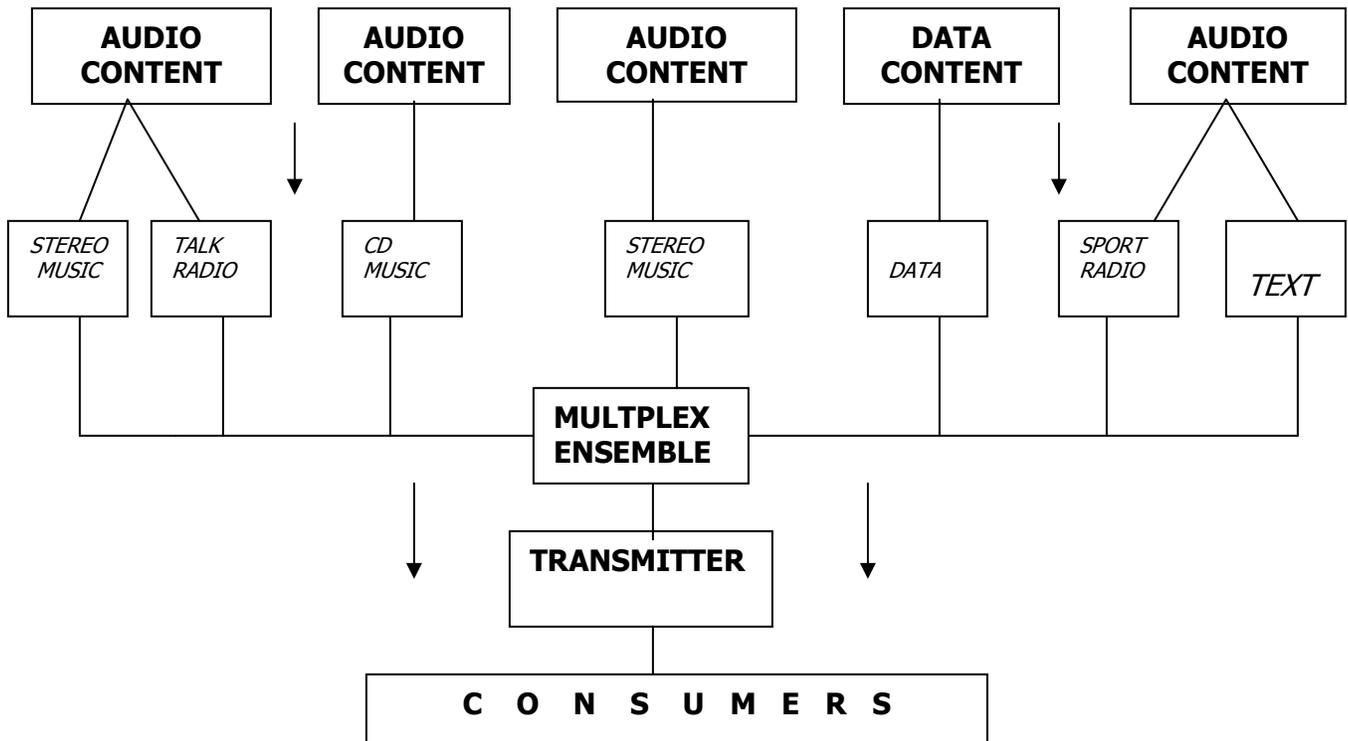


Figure 3: Digital Multiplex Operation

- 3.2.7 From the above representation of digital value chain and digital multiplex operation large number of services could be provided via a single Multiplex of CD quality Radio service. This could be transmitted along with still pictures, text data and communication service such as paging. Free to air service may be mixed in the same multiplex with subscription services. Therefore digital broadcasting introduces another level of multiplex to deliver content services to consumers.
- 3.2.8 The possibilities of one frequency to accommodate a number of programmes which may be combined into single digital streams recognize another key function in the digital broadcast value chain. This function is known as multiplexing. The one who manages the above said process is called the multiplex operator.

### **3.3 THE CASE FOR THE ESTABLISHMENT OF MULTIPLEX OPERATOR**

#### **3.3.1 DEFINITIONS**

- (i) **A multiplex** is a digital transmission channel which combines programme material and other data in a digital form for transmission via a frequency channel. The process of digital combination of the signals is called multiplexing.
- (ii) **Multiplex Operator (MUX)** is that entity that compiles, operates and markets a content offering on a digital Multiplex and that decides on the Condition Access and Subscriber Management System (SMS) to be used.

#### **3.3.2 FUNCTIONS OF MULTIPLEX OPERATOR.**

The following are the core functions of multiplex operators:

- (i) Establish and operate multiplexes
- (ii) Provide signal feed to transmitting station.
- (iii) Provide multimedia transmission services to consumers.
- (iv) Establish and manage subscriber management system.

- (v) Provide transmission of content services by subscription to consumers.
- (vi) Managing multiplex reconfiguration and data rate allocation to the service provider.
- (vii) Billing of service provider for bits/sec.

### **3.3.3 OBLIGATION OF MULTIPLEX OPERATORS**

Normally the obligations of MUX operator are as follows:

- (i) Carry the existing free to air National analogue Television channels until the analogue services are switched off.
- (ii) Ensure guaranteed slots for the simulcast of the existing free to air analogue television channels and digital channels.
- (iii) Ensure that all programme hours provided on the existing analogue channels shall be simulcast on the guaranteed digital channels.
- (iv) Enter into contracts with content service providers and make them available to the regulator.
- (v) To adhere to license conditions as provided by the Regulator.

## **3.4 LICENSING ISSUES**

### **3.4.1 THE CURRENT LICENSING STRUCTURE**

- (i) TCRA adopted a Converged Licensing Framework (CLF) whereby there are four categories of licenses, namely:-
  - (a) Network Facility License
  - (b) Network Services License
  - (c) Content Service License
  - (d) Application service licence
- (ii) Currently the content service providers are allowed to own and operate studio and transmission facilities, provided that the transmission facilities are not leased out to other operators.

- (iii) For that matter one license i.e. content service license is granted to broadcasting operators to deliver content through the existing transmission facilities.
- (iv) Under the CLF content service providers who do not own their own transmission facilities (network facilities) may deliver broadcasting services using licensed network facility operators.
- (v) The network facility operator provides transmission infrastructures to content service provider to deliver broadcasting services to consumers. This is the ideal situation but in reality the incumbent licensed content service providers do not lease network facilities from network facility providers to deliver broadcasting services to consumers.
- (vi) Under the digital platform format, multiplexing processes are necessary for efficient and effective delivery of broadcasting services to consumers. This process requires separation of content service provision and network service provision.
- (vii) Therefore, under the proposed arrangement, content service providers shall not be allowed to own and operate transmission (network facilities) facilities.
- (viii) Content service providers shall be allowed to deliver their content through a multiplex operator, who will be allowed to own and operate network facilities.
- (ix) There are a number of possible structures for multiplex and transmission management to enable the dynamic characteristics of the digital platform to deliver content to consumers. Two options are suggested:

#### **3.4.2 OPTION ONE: COMBINED LICENSING**

- (i) Combined licensing option, means allowing broadcasters to provide the content services and retain control of transmission as applicable in analogue platform.

- (ii) Under this option, the broadcaster will establish and operate studio and transmitters.
- (iii) This approach would effectively reflect the way in which the current terrestrial broadcasting services are provided.

**Advantages:**

- (iv) The advantages of this option are that content providers will own studio and transmission systems, which is not different from analogue system; and that, excess capacity of channels accrued from inherited digital capability will be leased to other content service providers.
- (v) This approach allows the content service provider to operate without involving another party and that the content service provider will be able to monitor and control the entire broadcasting chain and act accordingly in case of problems.
- (vi) The content service provider will master expertise for the whole broadcasting chain.

**Disadvantages:**

- (vii) The following are considered as disadvantages of combined licensing approach.
  - (a) Content provider will own multiplex which may not be fully utilized. This is due to the fact that the broadcaster may not have enough programmes to utilize all channels capacity available in the multiplex;
  - (b) It is expensive for an operator to own a multiplex that is not fully utilized;
  - (c) Management of spectrum utilisation becomes a complex process;
  - (d) The combined licensing approach cannot guarantee efficient utilisation of spectrum; and

- (e) Will bring multiple contracts of frequency leasing which can amount to commercial conflicts.

### **3.4.3 OPTION TWO: - SEPARATE LICENSING**

- (i) This approach provides for the creation of a multiplex operator as discrete function separate from that of content service provider. The provision of content services is separated from transmission process.
- (ii) MUX be recognised and regulated as a technical facilitator or infrastructure provider with no control over or responsibility for, the nature or content of programme transmitted on behalf of the content service provider other than required to satisfy the technical general condition of operation.

#### **Advantage of Separate Licensing**

- (iii) Content service provider will concentrate on production of more content and enjoy economies of scale;
- (iv) Off load Management expense used to control transmitter chain and expansion of network;
- (v) There is no multiple contracts and therefore smooth operation of delivery of broadcasting content services;
- (vi) Guarantees efficient utilisation of frequency spectrum;
- (vii) It encourages sharing of resources i.e. towers and transmitting sites;
- (viii) It reduces costs of Staff, Administration; and
- (ix) It is environmentally friendly i.e reduce Mushrooming of masts

#### **Disadvantages of Separate Licensing**

- (x) It causes inconvenience on transmission if either party (Multiplex operator or content service provider) will not meet regulatory requirements.

(xi) No possibility to master expertise of the whole broadcast chain.

### **3.4.5 RECOMMENDED LICENSING APPROACH**

- (i) The First PCD captured the two options by describing the role of multiplex operators in delivery of broadcasting services, but did not go into detail on how the multiplex operator would operate, its obligations and the relationships with other stakeholders.
- (ii) During the public consultations initiated by the First PCD, stakeholders were in favor of the **SEPARATE LICENSING** because of the advantages that surpass the disadvantages of the combined approach.

## **3.5 THREE KEY PLAYERS IN BROADCASTING VALUE CHAIN**

- 3.5.1 Experience of other countries show that there are three key players in the broadcasting value chain in the delivery process of broadcasting services.
- 3.5.2 In countries like United Kingdom, South Africa, Hong Kong and Australia recognize the role of the three key players namely; Multiplex operator, Content Service provider and Network provider licensed in the process of delivery of content to consumers.
- 3.5.3 **Multiplex operator:** That entity that compiles operates and markets a content offering on a digital multiplex and that decides on the conditional Access (CA) and Subscriber Management System (SMS) to be used.
- 3.5.4 **Content service provider:** A service participant on a digital broadcast multiplex that contributes to the content offering in that multiplex whether be in a form of a audio or video or data services.
- 3.5.5 **Network service provider:** That entity that operates networks and transmitters and distributes signals associated with a multiplex.
- 3.5.6 However, some of the above mentioned countries consider having two main key players where Multiplex operator assumes function of network service provider.

### **Advantages of Three Key Players**

3.5.7 With three key players namely content service providers, Multiplex operator and Network service providers, there are number of advantages:-

- (i) Quick network rollout will be realized as the network service provider will concentrate on installation of transmitter only while Multiplex operator will dwell on Subscriber Management System (SMS), multiplexing and signal distribution.
- (ii) Expansion of services will move fast.
- (iii) Less investment as expansion investment capital is distributed to all three players.

### **Disadvantages of Three Key Players**

3.5.8 The three key players have disadvantages as follows:

- (i) Involvement of the third party makes the delivery process of content service to consumers more complex.
- (ii) Since the three parties are inter dependent on giving content service to the consumers, in case one party violets regulatory requirement it will also cause inconvenience to other and inhibit delivery of services.
- (iii) The size of possible available programs would contribute in deciding as to how many players should be entrusted the work of disseminating content from studio to consumer.

### **3.5.9 PROPOSED APPROACH**

- (i) Under separate licensing approach, two key players are proposed to handle all the processes leading to the delivery of broadcasting services to the consumers, namely content service provider and multiplex operator. This is because of the advantages of two key players surpass that of three players.
- (ii) Adopting two key players will reduce complexity in the course of delivering broadcasting services to consumers.

- (iii) Involvements of the third party in the broadcasting chain reduce interdependence while management of the entire delivering broadcasting service process becomes easier.
- (iv) The Multiplex operator will take the role of network service provider and manage the entire process of transmission.

### **3.6 RELATIONSHIP BETWEEN MUX OPERATOR, REGULATOR, AND CONTENT SERVICE PROVIDER.**

3.6.1 In the digital broadcasting value chain, the MUX operator operates and manages transmission facilities to enable delivery of contents provided by the content service provider. Relationship among these two key players should well be defined to achieve trouble - free transmission of content.

3.6.2 The following explanations may be considered for developing an institutional arrangement for smooth operations.

#### **Working Relationship Between MUX and Content Service Provider**

3.6.3 The MUX is obliged to provide the required coverage by the content service provider.

3.6.4 The MUX is required to provide quality delivery of broadcasting services as per contract between MUX and content service provider.

3.6.5 The MUX operator is obliged to promptly initiate a bill to the content service provider to enable early payment for services rendered.

3.6.6 The MUX should ensure that Content service providers enjoy the same or less total costs in the delivery of broadcasting services to the consumers.

#### **Working Relationship Between MUX and the Regulator**

3.6.7 All parties should comply with the stipulations of the contract.

3.6.8 The MUX has the mandate to establish a dispute resolution mechanism.

3.6.9 When a dispute arises between the two and not resolved amicably by the two, the Regulator may be approached to resolve the dispute. If the

dispute is not resolved by the Regulator, the two may resort to the Fair Competition Commission.

3.6.10 The MUX should appraise the Regulator on quarterly basis, on the utilization of frequency channels and content service provider data base.

3.6.11 The MUX should ensure that all contracts entered into with the content service providers are made available to the regulator.

3.6.12 The MUX is obliged to indicate the applicable fee structure and submit the same to the Regulator for approval.

3.6.13 The MUX should make available to the regulator all the network configurations for broadcasting purposes.

3.6.14 The MUX should ensure that there is infrastructure sharing in delivering broadcasting services.

3.6.15 Assignment of frequency channels to MUX shall be based on market demand.

3.6.16 The MUX should ensure that the tariffs charged to content service providers should not exceed the current total costs incurred by content service providers in the delivery of services to the consumer.

3.6.17 The Regulator should not charge license fees to the MUX operator and content service provider that will have adverse effects on the delivery of broadcasting services to the consumer as compared to the current applicable fees.

3.6.18 The MUX should ensure that Content service providers enjoy the same or less total costs in the transmission and delivery of broadcasting services to the consumers.

### **Working Relationship Between The Regulator and Content Services Provider**

3.6.19 The Regulator shall not charge license fees to the content service provider that will have adverse effects on the delivery of broadcasting services to the consumers as compared to the current applicable fees.

- 3.6.20 The content service provider shall inform the regulator any intended expansion of service area.
- 3.6.21 The content service provider shall ensure that the annual license fee is paid promptly to the Regulator as per license conditions.
- 3.6.22 The content service provider shall submit frequency assigned by MUX whenever there is expansion of service area or any modifications of frequency assignment.
- 3.6.23 The Regulator shall be informed of any modification of shareholding structure by the content service provider.
- 3.6.24 The Regulator shall be informed of any modification made to the programme line up by the content service provider.

### **3.7 DETERMINATION OF NUMBER OF MULTIPLEX OPERATORS COUNTRYWIDE**

- 3.7.1 In determining the number of Multiplex operators, countrywide, first and foremost, an analysis should be made on the core functions of the Multiplex Operators.
- 3.7.2 Multiplex Operators are regarded simply as infrastructure providers and Managers of transmission process. They need hardware to achieve programme transmission and frequency spectrum resource to deliver content services to consumers.
- 3.7.3 Another important factor is the availability of the frequency spectrum resource to be used by the MUX. If a service area has four operators for instance, one MUX with 8 channels would be underutilized.
- 3.7.4 Importantly, the market demand forms a very important aspect in consideration of the number of MUX operators that can be licensed to operate countrywide. The market demand include radio and television programmes and enhanced services.
- 3.7.5 It is equally important to consider the ways of accommodating various types of services for every level of service area.

3.7.6 The levels are based on the geographic service area provided in the existing TCRA content service license.

The service areas are as follows:-

- (i) National service Layer: These Networks are intended to provide services throughout the entire country.
- (ii) Regional Service Layer: These Networks are intended to provide services in ten administrative Regions of choice by the content service provider.
- (iii) District Service Layer: These Networks are intended to provide service to one district administrative area.
- (iv) Local/Community Service Layer: These Networks are intended to provide service in a small local area/or community.

3.7.7 In the existing analogue environment, there is a one to one correlation between the frequency channel and the broadcasting station, and it is possible to tailor the frequency coverage to the requirement of a particular station.

3.7.8 However in a digital environment with multiplexes capable of carrying a number of different programmes, the coverage of each programme or channel have to be considered and a compromise reached between the MUX and the content service provider.

**National Networks:**

3.7.9 National Networks by definition are intended to serve the whole country. Currently in the analogue environment, there are five programmes for Radio and four programmes for Television.

3.7.10 In planning for Digital Broadcasting at National Network level, the following matters need to be addressed:-

- (i) How many multiplexes can cater for current National programmes being Radio and TV and future broadcast development.

- (ii) Should National Networks be planned on the basis of common programming throughout the entire service area or should National Multiplexers carry Regional Service programmes as well?
- (iii) Should this apply for all multiplexers or only some?

### **Regional/District Networks**

- 3.7.11 Currently there are licensees with Regional and District service area categories. In order to determine requirements of multiplexes versus available transmitted programmes, the need for establishing the number of programmes in each Regional and District service area is inevitable to have a matching multiplex.
- 3.7.12 Future requirements of programmes should be taken into account in the planning process.
- 3.7.13 For regions like Arusha, Mwanza, Dodoma, Mbeya and Morogoro have at least eight programmes for both Television and Radio.
- 3.7.14 For service areas combining Regional and District programmes it is anticipated that two multiplexes would be needed with the assumption that such multiplex would provide five high quality programmes.
- 3.7.15 The rest of the service areas for Regional and District levels, would need ONE multiplex for both Radio and Television as they do have very few programmes ranging from one to three.
- 3.7.16 However, this consideration did not take into account added value services and future requirement of programmes.

### **Community Networks**

- 3.7.17 Community Radio/Television is becoming a vibrant area in the broadcasting sector. However the areas served are normally small. In considering the area to be served, the provision of a multiplex to cover relatively small area is probably not economical.

3.7.18 Another approach would be to allow a certain number of programme channels on a National or Regional Multiplexes be reserved for community services and make some provision for these to be shared between various community services.

### **Value Added Services**

3.7.19 Due to convergence and ability to use broadcasting technologies to deliver other services, it would be possible to allow multiplexes to provide both broadcasting services and data services. However whether this would be facilitated with separate multiplexes would require a decision to be taken.

3.7.20 During the transition period, provision of value added services should be encouraged because of its distinctive demand in the market place compared to analogue services. Value added services can be realized only under digital platform. This measure will encourage and accelerate migration process, and attract investments.

### **Public Service Broadcaster**

3.7.21 Public Service Broadcaster (TAASISI YA UTANGAZAJI- (TUT) has got unique obligations different from that of commercial, non commercial broadcasters and community broadcasters.

3.7.22 Apart from other broadcasting programmes carried by commercial and non commercial broadcasters, Public Service Broadcaster carries educational entertainment and information programmes which the government finds it to be a public good.

3.7.23 Consequently the infrastructure used by the Public Service Broadcaster belongs to tax payers that has to be accountable to the public.

3.7.24 This makes it mandatory for the Public Service Broadcaster to have National coverage in fulfillment of Universal Service obligations.

3.7.25 It is therefore desirable that in order to guarantee provision of public broadcasting programmes, the public service broadcaster should acquire and manage the infrastructure.

- 3.7.26 From the above mentioned reasons, it is recommended that the Public Service Broadcaster be allowed to establish its own MUX so that it can achieve its main objective of serving the public without discrimination.
- 3.7.27 This will ensure smooth provision of broadcasting services intended to the public using digital platform.
- 3.7.28 The government has provided operational charter to TUT which among other things is to make sure that TUT start another commercial channel to ensure that it stands by its own without subsidy from the Government.
- 3.7.29 Operating its own MUX, TUT will use extra channels for commercial purpose and the objective of financial independence may be realized.
- 3.7.30 However for TUT to carry out its functions smoothly using digital the platform the organization has to be divided in two division namely content service provision and Multiplex operation.

### **3.8 PROPOSED NUMBER OF MULTIPLEX OPERATORS COUNTRYWIDE**

- 3.8.1 After analysing the factors for multiplex requirements and coverage, it is now desirable to propose number of Multiplex operators countrywide. In order to arrive at justifiable decision, spectrum availability, demand for programmes, programmes available and value added services demand are key elements to determine economic viability of the multiplex operator.
- 3.8.2 It is clear that at the moment there is no business case for multiplexes to be located at Regional, district and Community levels.
- 3.8.3 The current statistics indicate that only five regions have managed to have average of eight programmes, against sixty four channels which may be available for utilization. Having regional or district Multiplex operators, does not support a business case for MUX to be commercially viable at those levels. It is proposed that National Multiplex cover Regional, District and Community level for economic sustainability.
- 3.8.4 The fact that TUT is a publicly funded public service broadcaster its current broadcast infrastructure should be considered to guarantee provision of public broadcasting service.

3.8.5 Therefore, it is proposed that THREE National multiplex operators be licensed, ONE for public service broadcasting and TWO for commercial service broadcasting to foster competition.

3.8.6 Public Multiplex Operator (PMUX) will have the obligation of continuing giving service to the public, especially programmes which are not commercial but needed by the public. This will guarantee continuity provision of public content services and ownership of public infrastructure.

**i.e.** Transmitting site, towers, building.  
to guarantee their commercial viability.

3.8.7 The Commercial Multiplex Operators (CMUX), operating at national level, will carry, national as well as regional, district and community programmes. This will optimize usage of number of channels available in National Multiplexes.

3.8.8 The need to have regional or community multiplexes will be considered later depending on requirements, market growth and commercial viability.

### **3.9 VALUE ADDED SERVICES MULTIPLEXES**

3.9.1 At initial stages, no rule will be applied on how many channels should be reserved for added value services. This will depend on demand for such services.

3.9.2 At this stage to consider and propose separate multiplex operators for added value services will be counterproductive and indeed does not make any business case.

3.9.3 MUX may decide on the space for value added services after conducting surveys and ascertain the demand supported by business plan, to be submitted to the Regulator for licensing consideration. The issue of stand-alone multiplexes for community service area may be addressed at a later stage.

## **4.0 LICENSING PROCESS OF A MULTIPLEX OPERATOR**

4.1 The process of granting licences to MUX could be outlined as follows:-

4.1.1 The regulator advertises the intention to grant multiplex operators licence and stipulate the scope of the licence i.e local or national and other conditions.

4.1.2 Prospective companies submit applications and regulator evaluates and shortlists companies who enter into negotiations with content service providers and negotiate a multiplex content offering that they would like to provide.

4.1.3 Short listed applicants confirm from content service providers quality and capacity allocation per service and commercial terms.

4.1.4 The final applications to the regulator are then compiled and submitted containing the following details:-

- (i) Content offering (existing analogue programmes, new programmes and added value services)
- (ii) The network requirements (number of multiplexes)
- (iii) Market initiatives
- (iv) Roll – out plan
- (v) Capital investment and financial capability
- (vi) Provide samples of contracts entered between the two parties
- (vii) Management and shareholding structure
- (viii) Other things as per current arrangement

4.1.5 The Regulator evaluates and considers the applications from various companies and grants licence to the winning applicants.

4.1.6 The process is a minimum requirement for regulation. It reduces the workload of the regulator as it facilitates and encourages commercial negotiations outside the regulatory process on core issues such as the content offering, quality of services and the rights of content provider on a multiplex.

## **4.2 Pre- Conditions for Negotiation**

- 4.2.1 An applicant for multiplex license should know in advance the license fee charged by the Regulator before entering in negotiation with content service providers.
- 4.2.2 An applicant should as well know in advance the role and obligations in delivering broadcasting services to consumers.
- 4.2.3 An applicant should adhere to adopted working relationships terms and conditions between the two parties.

## **4.3 Proposed License Categories for Multiplex**

- 4.3.1 It is proposed that the MUX be categorized under the Network Facility License (NFL) pursuant to the Converged Licensing Framework.
- 4.3.2 This is in line with the core functions of the MUX which is to provide infrastructure for delivery of broadcasting services to consumers.

## **4.4 Licence Period**

- 4.4.1 International experience has shown that the duration of licences for MUX range from 10 to 15 years. For instance Hongkong is (10), UK (12) and Germany (15).
- 4.4.2 This document recommends that Tanzania adopt a 10 year period due to the fact that prospective investors need to have ample time to recoup their investments.

## **4.5 License Fees**

- 4.5.1 There are several methods of determining licence fees of MUX. One of them is auctioning. However experience has shown that action is very expensive and is counterproductive because of its inherent high costs which are passed over to consumers and consumers find it burden some to sustain such services.
- 4.5.2 Benchmarking is yet another approach to license MUX. Benchmarking should be taken with much care because of the economic disparities from country to country.

4.5.3 Considering the adoption of the CLF system of licensing and the fact that MUX falls under the category of Network Facility Providers, a licence fee of US Dollars \$ 400,000.- be considered as initial license fees and subsequently payment of 0.8% of gross annual turn over.

#### **4.6 Set of Criteria for Assessment of MUX**

4.6.1 The following criteria should be considered in the assessment of MUX when submitting application for licence.

- (i) Roll - out programme and geographical coverage of digital broadcasting.
- (ii) Business plan for promoting earlier consumer take up of digital broadcast.
- (iii) Service profiles on MUX including the mix of audio/television programmes and value added services.
- (iv) The promotion of competition and efficient use of MUX capacity.
- (v) Confirm to provide carrier service to content service providers licensees and value added service licence in a non discriminatory way.

#### **5.0 THE PLANNING PROCESS AND THE OUTCOME OF RRC – 06**

5.1 Radio spectrum bands used for broadcasting have traditionally been planned at an international level. This has been done under the auspices of the International Telecommunication Union (ITU).

5.2 To facilitate the development of both digital sound broadcasting and terrestrial television, the ITU proposed two conferences to be attended by the member states of the Regions one.

5.3 The first session of the conference was held in May 2004. Its purpose was to address the technical basis for the planning of the digital Radio and television terrestrial broadcasting services in the VHF & UHF frequency bands and prepare work programme for the period between two sessions.

- 5.4 The second session convened in 15 May to 16 June 2006. The respective National Administrations signed the final agreements and acts on regulatory framework and technical characteristics of the planned digital broadcasting stations during the last conference.
- 5.5 The Geographic areas involved in the planning process and signed the final act were, Europe, Africa, Middle East (including Iran) and states belonging to the former soviet union.

### **Technical Standard and Frequency Bands**

- 5.6 The agreed technical standard during the planning process is T-DAB for sound digital broadcast and DVB-T for television broadcast.
- 5.7 The frequency band planned for digital broadcasting services are VHF band III (174 to 230 MHz) and UHF bands IV & V (470MHz to 862 MHz).
- 5.8 DVB-T standard will use Band IV and V while Band III will be shared by DVB-T and T-DAB.
- 5.9 VHF band II, which is heavily used by FM Sound broadcast stations is excluded from consideration and no changes are envisaged for this band for the foreseeable future.
- 5.10 Contrary to GE89 PLAN (Analogue Television Plan), digital plan used frequency assignment and allotment to describe technical characteristics of the requirements.
- 5.11 Basically frequency assignments describe all technical parameters of the transmitters equipment i.e antenna height, power, geographical location while allotment describe geographical coverage of the assigned channel without giving other detailed technical parameters i.e power.

### **Tanzania Planning Approach**

- 5.12 Tanzania used both assignments and allotments as a planning approach during the process of RRC-06. According to the approach the Tanzania territory is divided into forty eight allotments. The Allotments approach was basically used for areas where decision on the location of the transmitter is not yet established.

5.13 The assignments approach was used in locations where there are analogue stations operating.

### **RRC – 06 Planning Results**

5.14 The outcome of the Regional Radio Communication Conference Planning established GE-06 PLAN for implementation of terrestrial digital plan in bands (174-236) and 470-862 MHZ.

5.15 The GE-06 planning results indicate, that our administration have been afforded at least five multiplexes in each town at district level which will be used for DVB-T and one multiplex for T-DAB respectively.

5.16 The summaries of results are as follows:-

- (i) 239 allotments in UHF for DVB-T
- (ii) 20 allotment in VHF for DVB-T
- (iii) 83 allotments in VHF for T-DAB
- (iv) 88 assignments in UHF for DVB-T.

### **5.17 Transition Period**

The agreed transition period to migrate from analogue to digital broadcast began on 17 June, 2006 at 0001 hours UTC and will end 16 June, 2015 at 0001 hrs UTC.

### **5.18 Analogue Broadcasting Systems During Transition Period**

During the transition period from 2006 to 2015, Digital broadcasting system should not cause any interference to analogue system or claim any protection from interference.

### **5.19 Analogue Frequency Application During Transition**

5.19.1 GE89 plan for analogue frequency assignment indicates available frequency for assignment for each town at district level.

5.19.2 During transition period application for analogue broadcasting frequency may still be lodged to the authority for consideration.

- 5.19.3 Continuing assigning planned analogue frequency without determining the limit may inhibit migration process and growth of digital broadcasting.
- 5.19.4 It is proposed that 25% of the available planned analogue frequency in each district town, be used for assignment of new application during transition.
- 5.19.5 The rest be left unassigned.  
The aim is to limit entry to analogue broadcasting operator and meet agreed **SWITCHOFF** date of **2015** without creating big constrains.
- 5.19.6 During the transition period analogue broadcasters may wish to purchase upgradeable analogue transmitters to enable them upgrade to digital platform.
- 5.19.7 However content service providers during transition period may wish to use multiplex operators to carry analogue transmission, and be left with core business of content provision.
- 5.19.8 It is therefore proposed that content service provider negotiate with multiplex operators and agree on the terms of operations during the transition period as per planned timetable.
- 5.19.9 Likewise the analogue frequency applicant may wish to continue with the role of offering content provision and transmission during the SIMULCAST period provided that such analogue systems are SWITCHED OFF by the year 2015.

## **6.0 MIGRATION STRATEGY**

- 6.1 It is important to think discuss the migration process, by considering factors that may attribute to the smooth switch over to digital broadcasting.
- 6.2 Mismanagement of the migration process may disrupt even the existing analogue systems and cause big Impact to the social welfare of the people. At the moment there is no big market force in the country to influence the introduction and take up of digital broadcasting.

- 6.3 A review of International case studies shows that there are different drivers for different countries. <sup>1</sup>Research in the UK shows that the single biggest driver for the take - up of services was access to a wider variety of programming viz 73% whilst 48% of the non adopters would only switch to digital for the free to air services.
- 6.4 Willingness of consumers to migrate to digital platform system needs to be addressed and make good analysis to ensure smooth migration process.
- 6.5 The following are outlined as various option which may be considered for migration from analogue to digital broadcasting.

**Source:** <sup>1</sup>UK Consumer Survey March 2001 – Consumer Association.

## **7.0 MIGRATION OPTIONS**

- 7.1. Based on benchmarks and international practice, the following are Options most applicable that may be adopted by Tanzania.

### **Option One**

- 7.2 Allow analogue terrestrial broadcast to continue without introducing any proper planning for migration or impose any restrictions for importing or using analogue equipment before technology obsolescence would force broadcasters and audiences to migrate to digital broadcasting.

### **Short fall**

- 7.3 Digital broadcast will start without proper planning and results on miscellaneous technical standards.
- 7.4 Broadcasters would be faced with high cost per viewer budgets to meet universal service obligation through expansion of the existing analogue transmitter network.

### **Option two**

- 7.5 To introduce digital broadcasting with market forces shaping entry and existence.

- 7.6 Government to purely facilitate the introduction of new services and the granting of licences.
- 7.7 This approach would not be linked to other National objectives to create an information society in our country.
- 7.8 This approach would therefore not be directed by strong drivers to influence the shape of digital broadcast.

### **Shortfall**

- 7.9. Mostly upper income group would benefit from digital broadcast.

### **Option Three**

- 7.10 This option advocates the introduction of digital broadcasting facilitated by managed market take-up strategy.
- 7.11 No clear market demand for start of digital broadcast, but Government would give proper plan and timetable leading to switch off at analogue network transmitters.
- 7.12 This would be a managed and forced migration which is an effective way of achieving various goals within desired timeframes e.g. universal service, minimising digital divide, etc.
- 7.13 Subsidised receiver equipment for consumers could be used as an incentive and catalyst.
- 7.14 In addition government would have to subsidise the migration for the public broadcaster.

### **Short fall**

- 7.15 No clear market demand and government should set aside budget for migration process.

### **Option Four**

- 7.16 Introduce of digital broadcasting in urban areas first with a plan to expand services to the rural areas.

7.17 The profile of the consumer in these areas could lead to successful commercial and advertising revenue driven broadcast models, which in turn ease financial investment for expansion. Cost will come down slowly through financial successful roll-out in the urban areas.

## **8.0 RECOMMENDED OPTION AND STRATEGY**

8.1 In accordance to the above analysis, option one gives a scenario of not being concerned with technological development happening in the world.

8.2 It also gives possibility of continued usage of an out dated equipment/technology and hence sustainability of both technology and equipment to be at risk. This scenario culminates into high operation cost, as the developer of equipment may cease to manufacture such equipment.

8.3 The digital broadcast in such situation would catch the society unprepared.

8.4 Option two and four both allows the well to do class of society to have access to digital broadcasting services. To meet obligations of universal access becomes more difficult and will take long time.

8.5 This document proposes **option three**, using managed market take up strategy. Full involvement of the Government in migration process is recommended to achieve various goals within desired timeframe. Universal access obligations may also be achieved with low cost relatively compare to other three options.

## **9.0 LEGAL CONSIDERATIONS**

9.1 On 8<sup>th</sup> August 2005 the Tanzania communication Regulatory Authority issued a consultation document on switchover from Analogue to Digital broadcasting in Tanzania.

9.2 In that consultation document it was proposed for legislative amendment to the laws that regulate broadcasting in Tanzania (The Broadcasting Services Act, 1993). Such amendments include but are not limited to spectrum use, licensing, switching from analogue to digital, replacing analogue transmitter or upgrading the analogue infrastructure.

- 9.3 In this present document it is recommended to amend the Broadcasting Services Act, 1993 to accommodate Terrestrial Digital Broadcasting in Tanzania.

## **10.0 CONCLUSION**

- 10.1 It is quite clear that digital broadcasting is the only option for industry development and that there is no way broadcasting can grow without recourse to new technologies. It is therefore imperative that all stakeholders take up the challenge and gear towards digital broadcasting for sustainable development.
- 10.2 Secondly there is no any other viable option for the delivery of broadcasting signals to the consumers other than involvement of the MUX in the way it has been proposed in the aforementioned analysis.

## **11.0 RECOMMENDATIONS**

This Second Public Consultation Document recommends the following:-

- 11.1 Separate licensing approach method to enable effective and efficiency usage of frequency spectrum and allow specialization of core functions for both content service providers and Multiplex Operators.
- 11.2 Three National Multiplex Operators to provide Multiplex Services in Tanzania. One being Public Multiplex Operator (PMUX) and two Commercial Multiplex Operators (CMUX).
- 11.3 Public Service Broadcaster (TUT) to be divided into two entities such that one dealing with Content provision whiles the other deals with transmission.
- 11.4 The MUX operator under the CLF is considered under the category of network facility.
- 11.5 The licence period of MUX operator be 25 years similar to NFL.
- 11.6 The licence fee of MUX operator be \$ 400,000.- of the fee charged for NF, while annual fee remain as 0.8% royalty as provided under network facility licenses.
- 11.7 Migration using managed market take-up is recommended. This will allow full involvement of the Government in the migration process in order to achieve various National goals within desired timeframes.

- 11.8 To use 25% of the remaining planned analogue frequency spectrum during the transition period to accelerate migration process.
- 11.9 Government to issue a policy statement supporting digital broadcasting in the country.
- 11.10 Government to formulate policies aimed at facilitating faster take-up of digital broadcasting such as subsidizing receiver equipment and public broadcasting migration.
- 11.11 It is proposed that Tanzania adopt a phased approach to digital broadcasting switchover within the agreed migration timeframe of June 2006 – June 2015.  
(See Annex I)
- 11.12 TUT be split into entities, one dealing with transmission and the other one dealing with content service provision.

**PROPOSED MIGRATION TIMEFRAME**

<b>TIME FRAME</b>	<b>ACTIVITY</b>	<b>OBJECTIVE</b>	<b>RESPONSIBLE ORGANISATION/ INSTITUTION</b>
PHASE I 2006/07	1) Prepare migration Strategy	Managed take-up smooth migration	TCRA & MICS
	2) Consultation with stakeholders on licensing framework	Create awareness	TCRA
	3) Prepare Tender document for MUX	Guide specification spectrum efficiency	TCRA & MICS
	4) Develop Digital Broadcasting Policy	Give it policy direction	TCRA & MICS
	5) Amendment of ACT to accommodate digital Broadcast	Give it legal locus stand	TCRA & AG-CHAMBERS
	6) Consumer awareness Campaign	Prepare the public for smooth take-up.	TCRA & MEDIA
	7) Coordinate with Industry and manufacturer	Ensure smoother impartation manufacture of the approved STB & HDTV	TCRA, TRA & MIT
PHASE II 2007/08	1) MUX start gradual roll-out of digital Infrastructure	Achieve managed take-up approach	TCRA
	2) Infrastructure roll –out target 25%	Achieve systematic managed take-up approach	TCRA
	3) TUT start process of establishing PMUX	Efficient use of spectrum	TCRA
	4) Consumer awareness Campaign	Prepare public for smooth take-up	TCRA & MEDIA
	5) Coordination with Industry and Manufacturer on digital Broadcast equipment	Ensure smooth importation manufactured of type approved equipment.	TCRA, TRA & MIT
PHASE III 2008/09	1) MUX continue to roll-out digital broadcast infrastructure	Ensure smooth importation manufactured of type approved equipment	TCRA
	2) Infrastructure roll-out target 50%	Ensure smooth importation manufactured of type approved equipment	TCRA
	3) Coordination with manufacturer	Ensure smooth importation manufactured of type approved equipment	TCRA

	4) Consumer awareness campaign	Ensure smooth importation manufactured of type approved equipment	TCRA
	5) PMUX starts to roll-out digital broadcast infrastructure	Ensure smooth importation manufactured of type approved equipment	TCRA
PHASE IV 2009/10	1) CMUX continue to roll- out digital broadcast infrastructure	Ensure smooth importation manufactured of type approved equipment	TCRA
	2) Infrastructure roll-out target 75%	Ensure smooth importation manufactured of type approved equipment	TCRA
	3) Switch off analogue transmitter with small area coverage	Ensure smooth importation manufactured of type approved equipment	TCRA
	4) Consumer awareness continues.	Ensure smooth importation manufactured of type approved equipment	TCRA

## GLOSSARY

- **Added Value Services** means additional services which add value to those already available on the Network. Such services in digital platform are non-programme associated services i.e home banking, home shopping, narrow casting, multimedia and interactive services.
- **Analogue Terrestrial Broadcasting** means free to air broadcasting system using the analogue technology.
- **Broadcasting** means the provision of vision sound multimedia and data service, principally intended for delivery of news, entertainment and education to the general public. It makes use of point to everywhere information delivery to widely available non-proprietary consumer receivers.
- **Conditional Access** means to restrict television programme access to certain groups of users either because of concerns for privacy or the desire to collect revenue for the services. This requires secure encryption of the programme content secure decryption in a set top box for each viewer.
- **Content Services** means Services offered for sound, data, text or images whether still or moving except where transmitted on private communication.
- **Content Service Provider** means a service participant on a digital broadcasting Multiplex that contributes to the content offering in that Multiplex whether it is the form of an audio or video or data service.
- **Digital Television Set** means a television with a built in digital receiver and decoder.
- **Digital Terrestrial Broadcasting** means Free to air broadcasting system using digital technology.
- **Electronic Programme Guide** means to provide information on every programme broadcast with some information on what each programme is about.
- **Enhanced Services** means applications and features that add value to the broadcasting network for instance paging, narrow casting or multimedia services.
- **High Definition Television** means digital format that provides an extremely high - resolution picture (2.1 million pixels) accompanied by digitally enhanced sound (Dolby digital surround sound).
- **Integrated Digital Television** means a television set that has a built-in digital capability to receive digital signals without using set top box.

- **Migration** means the process of change or switchover from analogue to digital broadcasting.
- **Multiplex** is a digital transmission channel which combines programme material and other data in a digital form for transmission via a frequency channel. The process of digital combination of the signals is called multiplexing.
- **Multiplex Operator** means that entity that compiles operates and a content offering on a digital Multiplex and that decides on the condition Access and subscriber management system (SMS) to be used.
- **Network Service Provider** means that entity that operates a network and transmitters that distribute broadcasting signal associated with a Multiplex.
- **Public Consultation Document** means draft paper/document prepared for comment by all stakeholders before it is published as official TCRA document for implementation.
- **Set Top Box** means a converter of digital signal to analogue signal during the transition period.
- **Simulcast Period** means that period from June 17, 2006 to June 16, 2015 during which analogue services are going to run concurrently with digital services.
- **Subscriber Management Systems** means an integrated solution to manage subscribers and prospects products and access rights, dealers and material management, contract management and billing.
- **Transition Period** means the period during which all analogue broadcasting service are systematically switched over to digital broadcasting.