ICT Access Gaps Study
Final Report

submitted to

COMMUNICATIONS AUTHORITY OF KENYA

by

intelecon
research & consultancy ltd

11 March 2016

Table of Contents

Annex A: Project Terms of Reference
Annex B: Mobile Platform Survey Results
Annex C: Interactive Geoportal Specification and GIS training needs assessment
Annex D: List of Sub-locations with Zero coverage
Annex E: List of 389 Sub-locations considered as priorities for USF Year 1
Annex F: Draft invitation for broadband connectivity of Internet Ready Schools
Annex G: 2014 Postal Sector Report Recommendations

List of Tables

List of Figures

Acronyms / Abbreviations

2G	Second Generation Mobile Communications
3G	Third Generation Mobile Communications
BSC	Base Station Controller (in GSM networks)
BSD	Broadcast Signal Distributor
BTS	Base Transceiver Station
CA	Communications Authority of Kenya
CAPEX	Capital Expenditure
CIAK	Courier Industry Association of Kenya
DTT	Digital Terrestrial Television
GIS	Geographic Information System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
ICT	Information and Communications Technologies
ICTA	The ICT Authority
KBC	Kenya Broadcasting Corporation
KCSE	Kenya Certificate of Secondary Education
KENET	Kenya Educational Network
KETRACO	Kenya Electricicity Transmission Company
KICA	Kenya Information and Communications Act
KICD	Kenya Institute of Curriculum Development
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power and Lighting Company (Kenya Power)
MoEST	Ministry of Education, Science and Technology
MoICT	Ministry of Information & Communications Technology
NOFBI	National Optical Fibre Backbone Infrastructure
OPEX	Operating Expenditure
PANG	Pan-African Group (Kenya) Co., Limited
PCK	Postal Corporation of Kenya (Posta)
UA	Universal Access
US	Universal Service
USAC	Universal Service Advisory Council
USF	Universal Service Fund

Acknowledgements

.

Executive Summary

Introduction

The study on ICT Access Gaps in Kenya had two main components:

- **Phase 1:** The Access gaps study is aimed at conducting a country level assessment to determine the extent of communication coverage and the access levels by citizens in the telecommunications, post and courier and broadcasting sectors, and the gaps in infrastructure and service coverage across all sub-locations in Kenya.

- **Phase 2**: Design an initial set of priority Universal Service Fund (USF) projects in the voice and broadband basic telecommunications sectors and support the Authority in managing competitive tendering of the network expansion projects in Year 1. The project timeline for this activity is nine months.

This report provides results of the Phase 1 activity while providing initial perspectives on the nature and scale of the gap projects to be included in Phase 2. These shall be developed further and a detailed plan presented in a Project Design Report at the end of May 2016.

A key deliverable of the study was to develop and implement an interactive Geo-Portal for regular update and definition of the access gap areas for each service area giving Global Positioning System (GPS) coordinates for selected USF areas of intervention.

Methodology

The essential project methodology has been: a) to secure Geographic Information System (GIS) map and population data from the Kenya National Bureau of Statistics (KNBS); communications service data from the Authority, the operators and other stakeholders; and b) to create an Access Gap Model for identifying the gaps and estimating the costs of addressing them in terms of subsidy requirements. The Access Gaps Model comprises two integrated components, illustrated in Figure 1, namely:

- **A suite of GIS software** within the Geo-Portal capable of integrating GIS maps and geo-referenced data (i.e., data with GPS coordinates) into a single model displaying the boundaries of counties, constituencies, wards and sub-locations, populations and population distribution, 2G and 3G mobile signal coverage maps, fibre routes and the locations of schools, health centres, post offices and broadcast stations.

- **A complex Excel spreadsheet** referenced to the GIS software that calculates areas and populations covered by the mobile signals using latest Q4 2015 GIS coverage maps supplied by the mobile operators. This allows estimation of the subsidies required to fill the mobile signal gaps, including required additional transmission investment. The Excel model includes all demand and cost data relevant to the estimation of the commercial viability and subsidy requirements for providing services to the gap areas.

Figure 1: Access Gap Flow Chart
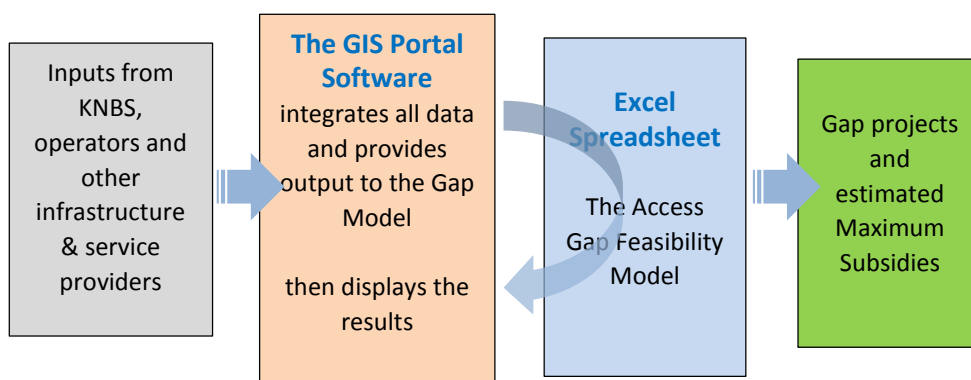
An important feature of the gap analysis has also been to integrate an accurate population distribution dataset acquired from **LandScan,** which is used to identify human population concentrations in each sub-location and calculate population coverage accurately through GIS spatial analysis. This also guides the design of projects through map visualisation and accurate performance modeling.

Overview of findings - 2G Mobile voice services

The Geo-Portal has incorporated the latest coverage maps of all three mobile operators and created a combined signal coverage map for -90dBm service quality as shown in Figure 2. The spatial analysis including the LandScan population distribution shows that only 5.6% of the Kenyan population has no access to voice communications services. Whereas geographical coverage is only 45% of Kenya's land area, 94.4% of the population is already covered by 2G mobile services.

Figure 2: Combined operator 2G coverage at -90 dBm signal strength
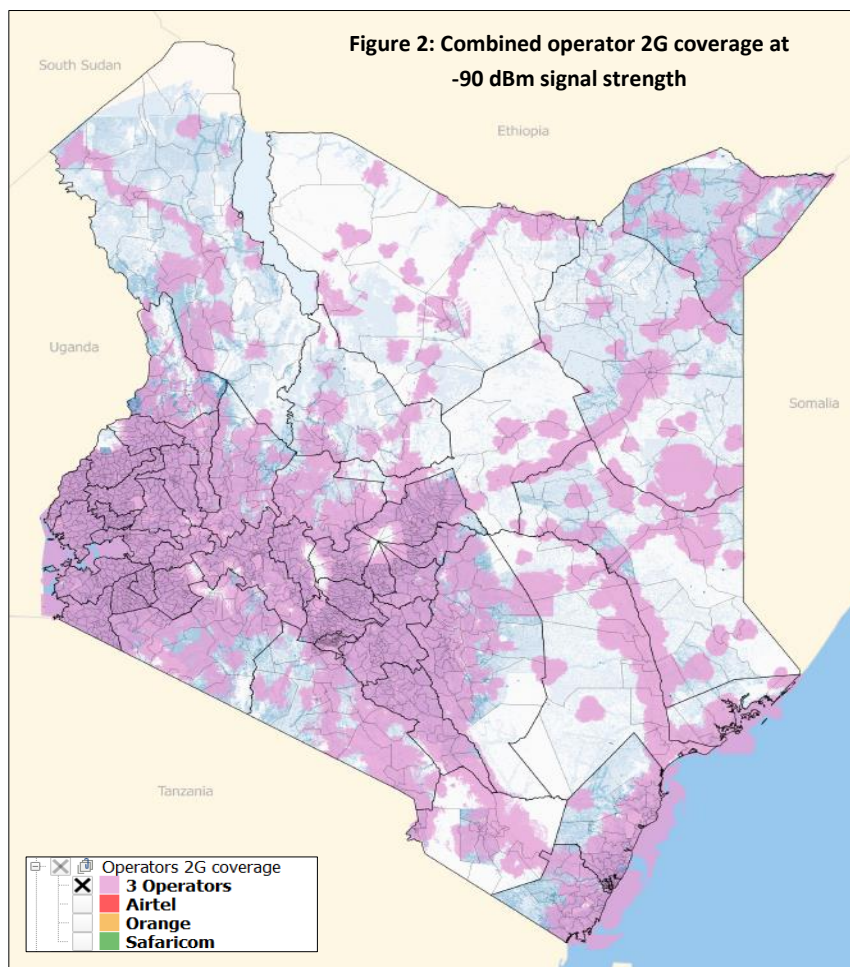
The uncovered sub-locations

Only 164 out of a total of 7,149 sub-locations remain totally uncovered, while a further 418 have less than 50% of their populations covered. Table 1 below summarises the GIS coverage analysis.

Table 1: Sub-location population 2G coverage					
Coverage	**100%**	**>90%**	**50% - 90%**	**< 50%**	**0%**
Sub-locations	5,657	485	425	418	164

As read from Figure 2, virtually all of the major unserved areas are in the North and East regions of the country, as well as in the Southwest border counties of Kajiado and Narok. A list of all Sub-locations with zero coverage, showing their planned or expected coverage status, is provided in Annex D.

3G Broadband coverage

Figure 3 illustrates the broadband coverage but includes also the National Optical Fibre Infrastructure (NOFBI) and private fibre routes as well as Kenya Electricity Transmission Company (KETRACO) and Kenya Power and Lighting Company (KPLC) line routes which either have or could be equipped with optical fibre.

Figure 3: 3G coverage and Fibre Routes
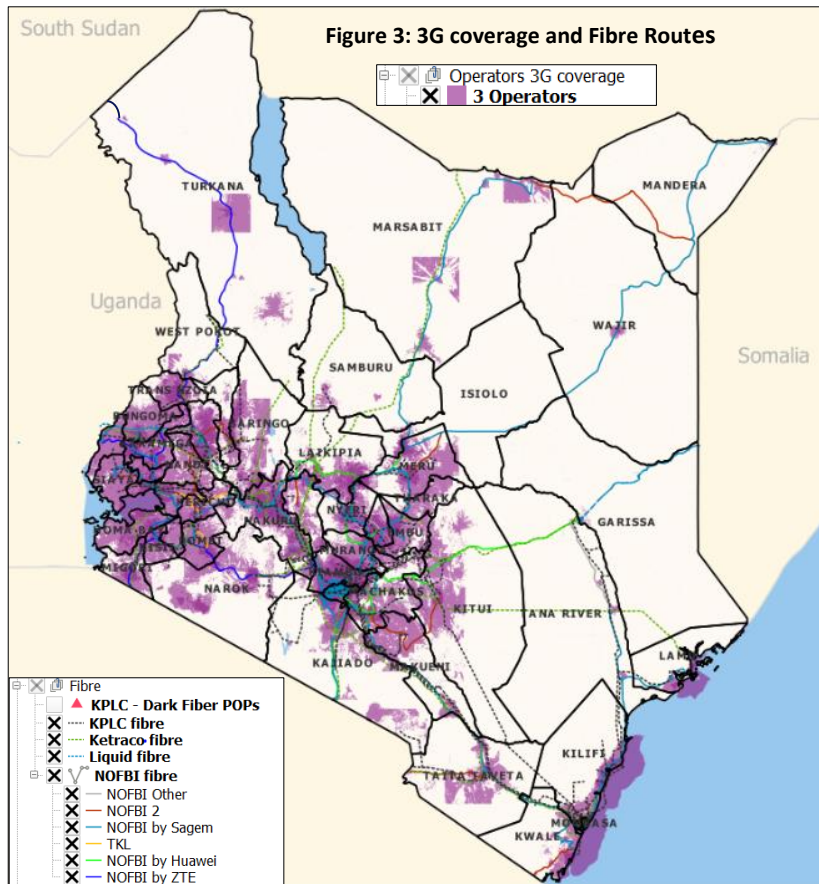
Whilst 3G service geographical coverage is only 17% of the geographical land area, 78% of the population is covered; thus the access gap for 3G broadband service is 22% of the population. The regional disparity for 3G is more pronounced than for 2G, even though the population coverage has improved significantly in recent years and will continue to expand through market forces, especially as 3G devices become more affordable and popular.

Every County in Kenya has at least one population centre with 3G coverage, except Isiolo County which today has zero percent 3G coverage. Analysis by sub-location indicates that 1,244 sub-locations country-wide have zero 3G coverage and a further 977 have less than 50% coverage as shown in Table 2.

Table 2: Sub-location population 3G coverage					
Coverage	100%	>90%	50% - 90%	< 50%	0%
Sub-locations	2,454	1,324	1,146	977	1,244

As indicated, while every county headquarter has been reached by NOFBI at least, the extension of broadband transmission into the large geographical gap areas would still be a costly undertaking. However, many thousands of potential broadband users who are not yet connected, such as primary and secondary schools, health centres and Government offices, are located within less than 1 Km of a fibre route. Thus there is very good potential for an early USF broadband outreach program to reach key sectors with demand, especially considering the needs of schools and tertiary educational institutions below university level. These could greatly benefit from connectivity in the short term. General users of 3G will continue to adopt the services and grow in accordance with the increase in general demand for data communications and the commercial expansion of the networks.

Post and Courier Sector

The total number of PCK post offices in Kenya has been reduced from around 900 in year 2000, was reported as 695 at the time of the 2011 Gap Study, and sits at 623 today. This reflects the latest data received from the Postal Corporation of Kenya (PCK). The 623 post offices are captured in Table 3.

The post offices were listed by county and constituency. All counties have at least two (2) post offices, though the representation of the Northern Rift and North Eastern regions as well as Narok and Kajiado in the South western border is sparse.

Table 3: Post Office National Administrative Structure		
General Post office	2	• Nairobi and Mombasa
Head Post Office	29	• Nairobi and Laikipia have 2 • 25 other counties have 1 • 20 counties have no Head Post Office
Departmental Post office	447	• Minimum of 1 per county • 40 in Nairobi county • Average 9 in other counties
Sub Post Office	145	• Generally located in remote areas from county headquarters
Total	623	

PCK administrative representation

544 of the postal outlets provided to the consultants by PCK had geographical coordinates and could therefore be identified to the sub-location level, whereas 79 had no geographical coordinates and could not be located exactly, except to the constituency in which the PCK list placed them. Table 4 provides the consultant's best estimate on distribution of post offices at the various administrative levels:

Table 4: Country wide distribution of Post Offices					
Administrative Level	Total	At least one PO present	Penetration of post offices		
			Min	Average	Max[1]
County	47	47	2	13	55
Constituency	295	264	0	2	14
Ward	1,450	480	0	33%	10
Sub-location	7,149	524	0	7%	7

---

[1] The maximum PO penetrations at all administrative levels is generally in Nairobi and other urban centres.

Although the number of sub-locations with at least one post office has reduced from 677 recorded at the 2011 Access Gap Study to around 524 today[2], it should be noted that almost all constituencies have post offices. Today, 264 out of the total 295 constituencies appear to have a post office and therefore 31 constituencies, mostly in the North Rift, North Eastern and South western border counties named above, are without a sub-post office.

A major 2014 postal sector study report noted the current population service penetration to be approximately one post office per 65,000 population, which is in the middle of African benchmarks used for the study[3]. However, the same study also noted that the regional penetration varied from one post office per 25,000 persons in Nairobi to one post office serving 178,000 in the northern counties. Amongst a list of 24 specific recommendations which are appended at Annex G, the report recommended that the decline in the number of post offices be halted.

Figure 4, which confirms the number of postal and courier outlets in the CA's Q1 2015/16 Statistical Report, indicates that the number of post offices has remained stable since June 2014. While the number of postal outlets indeed has stabilized since 2014, the number of registered private courier outlets has tripled over the same period.

Figure 4: Postal and Courier Outlets
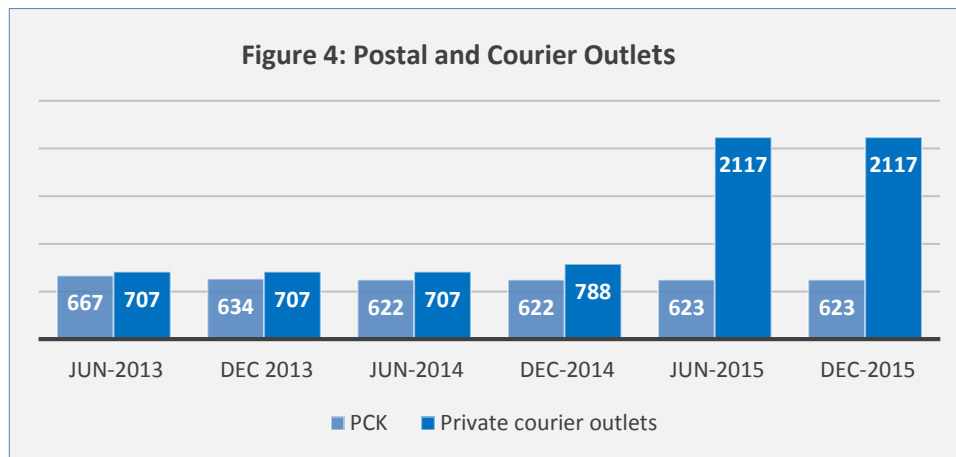
Universal postal services

The above-referenced 2014 Postal Sector Study noted that the definition of universal postal service is based on that of the Universal Postal Union (UPU). Whilst the UPU defines the products to be included in the universal service, it does not specify the level of access to these services nor the quality or price of services. While Kenya has defined the USO products, there is as of yet no definition of access arrangements. The study also recommended the development of a Stand-alone Policy for the Postal and Courier Sector and the development of access standards in terms of population, distance and administrative boundaries.

The consultant has reviewed the access situation in detail and the trend in demand for services in Section 4.2 of the report and has made recommendations on the necessary next

---

[2] Out of the total of 79 post offices listed by PCK which did not have geographic coordinates. The consultant's analysis showed that around 60 of these cases are additional post offices in constituencies in the GPS list, while the remainder are in other constituencies. The final estimate of the number of wards and sub-locations was made based on reasonable assumptions for cases where sub-locations and wards also have more than one post office.

[3] Final Report: "Diagnostic Analysis, Recommendations and Implementation Plan", Report for the Communications Commission of Kenya, 4 June 2014, Analysis Mason, with Sunflower Associates, Postal & Logistics Consulting Worldwide.

steps to review the position of the postal services and of PCK, before the USF would be able to consider making participation in addressing the postal access gap a priority in its Strategic Plan.

The Broadcasting Sector

Kenya's broadcasting market includes over 100 FM radio stations and around 40 digital Digital Terrestrial Television (DTT) sites to date, which will increase to more than 70 by mid-2016. Kenya is a leader in the conversion to DTT in Africa and has licensed two signal distributors KBC – Signet and Pan African Group (PANG) – which have been contracted by the Government to cover more than 68% of the population by mid-2016.

Kenya's TV household penetration rate of was estimated at 32% in 2014[4]. Free-to-air broadcasting is still the primary access method in over 85% of TV households, with Pay-TV services in main cities accounting for approximately 561,500 of the country's 12 million households. DTT has an overall 56% market share of total Pay-TV users, followed by DTH with 36%, and then the cable system of Zuku (Wanachi).

Based on the tower height and transit power of existing and contracted DTT sites, Figure 5 shows all DTT transmitter coverage contracted by the Government and expected by mid-2016. The extent of usable signal from all of the stations contracted to roll out by mid-2016 will cover 69% of the population. Every county will have at least one DTT station.

Figure 5: Digital TV Stations (Contracted to Mid-2016)

---
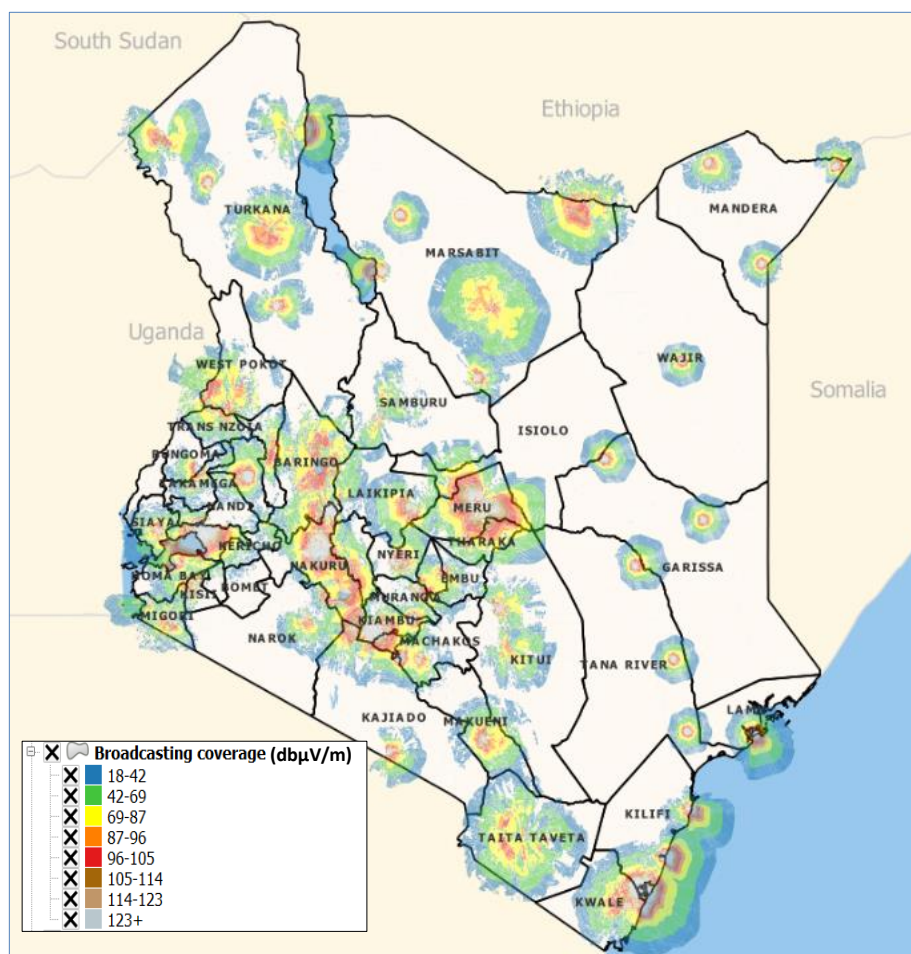
[4] Report by Dataxis, a global media research company, April 2015.

Table 5 shows the positive extent to which the roll-out of DTT services has progressed and extended across the country to date, with 47% of sub-locations (3,381) having more than 90% useable signal coverage and a further 884 above 50%. The gap analysis shows that 1,927 sub-locations in Kenya today are without any useable DTT signal coverage and another 957 will have less than 50% coverage.

Table 5: DTT Broadcast coverage to the sub-location level (% of population)				
Coverage	**100%**	**>90%**	**50% - 90%**	**< 50%**	**0%**
Sub-locations	**2,704**	**677**	**884**	**957**	**1,927**

The gap study however considers television broadcasting service not to be a part of universal service since penetration of television ownership, as noted above, is reported at only 32 percent of households in 2014. Thus while DTT broadcast has achieved good strides, it should not be necessarily considered a target for USF investment until television ownership becomes a social norm (e.g., beyond 75%). The consultant therefore recommends that broadcasters should not necessarily be required to contribute to the USF until this point is reached.

The USF resources available for commencement of its program

The USF currently has KES 2.9 billion (US$ 29 million) available finance and this will grow by a further KES 800-900 million (US$ 8-9 million) in 2016. Thus the fund's resources in late 2016, when the first subsidy contracts are awarded, will be over KES 3.5 billion. The USF's new resources will grow at a rate estimated between 2% and 9% in US dollar terms over the next 5 years and will enable investments of between KES 8-9 billion (US$ 80-90 million) by the year 2021.

Based on capacity considerations and the need to balance expenditures over a five year program, the consultant advises that the first year's projects in fiscal 2016/2017 should be conservatively projected at no more than a maximum of 50% of the total amount in the fund account including the expected 2016 contributions[5].

The Proposed Priority Projects

Following identification of the basic services and broadband gaps and consultation with all key stakeholders, the two priorities for USF investment *as a first year priority* are the following:

- **Voice services** – Make a large contribution to closure of the remaining gap in basic voice services. This will reduce the population coverage gap from 5.6% of the population to around half (2.8%) by 2018, combining proposed USF investments with the licence obligations already accepted in 2015 by the two leading operators, Safaricom and Airtel.

- **Broadband** - Establish a first step towards addressing the *critical national gap* which exists in connectivity of schools and tertiary college institutions below university level.

---

[5]The consultant has also advised that the USF should expand its human resources, targeting a capacity of 7-9 persons in the next year, in order to have the capacity for multiple project planning, design, management and monitoring. At least one, ideally two, of the additional staff should have a telecom engineering background for project development, design and management and additional deputies should also have technical skills.

These priorities shall be implemented under the accepted guidelines of the USF, which stress transparency and competition in the distribution of funds and have led to development of the following two projects for the first year of the USF's operation:

Voice Gap Project

The Voice gap project will be tendered as multiple bidding lots at the sub-location or ward level. The licensed operators in this sector will be invited to bid for as many or few of the Lots as interests them.

A total of 348 sub-locations have been identified at this stage, through the combined GIS and Access Gap Model methodology as the priority cases which best meet the critical performance criteria suited to "smart subsidies", meaning that they will result in *sustainable service provision* in the gap areas. The total of sub-locations to be included in the USF competition reduces to 214 after consideration of operator licence obligations between 2016 and 2018. This final total is affordable for the USF's first year of operation in accordance with the planned expenditure and capacity guidelines outlined previously.

This list of sub-locations will be subjected to further evaluation and refinement by the consultant, combining them into optimal ward or partial ward sized lots as appropriate, according to the following principles:

- Facilitating network build-out projects to facilitate contiguous growth from the existing network coverage out to progressively more remote sites and areas;
- Creating sustainable projects after the subsidy period; and
- Provision of opportunities which will interest all the operators in bidding;

Next steps to project finalisation and implementation

Following a brief field validation visit to representative gap areas and further study through the GIS mapping tool, the consultant will prepare a Project Design Report (scheduled for 27th May 2016) that will finalise all details of the project and bidding lots for submission to an Industry Workshop in the first week of June 2016. Bidding Documents will be available for the subsidy competitions at end of June 2016. Awards are expected to be made by early November 2016.

Expected Budget for the voice services project

The budgeting for these USF projects is developed in three stages as illustrated in Figure 5.

Figure 5: Voice Gap Budgeting

Maximum subsidy estimate
US$ 22.2 M

Expected award amounts
US$ 15 M

Distribute in Fiscal 2016/17
US$ 10 M
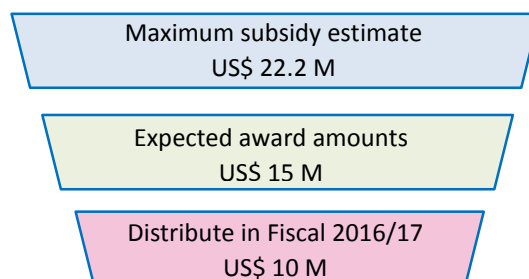
The steps to final expenditure in 2016/2017

1. As currently estimated the maximum subsidies calculated if all tender lots are bid would be US$ 22.2 M. Each Tender Lot will have a declared maximum subsidy amount

which proponents must bid below. Thus the actual awards made are expected to be below this.

2. Since the cost estimates are *by design* on the high side and the revenues are slightly under-estimated, it is expected that various factors, including the competitive market, will yield lower bids. As well, some lots may not attract bidders. Based on consultant experience in many countries, the total of awards made is not expected to exceed sixty seven to seventy percent (67-70%) of the sum of maximum estimates, reducing the total project budget to around US$ 15 M.

3. Finally, since USF subsidies will be distributed on a progressive basis as the awarded Lots are implemented, it is not expected that the USF will distribute more than 67% of the awards made in the first fiscal year of operation (2016/17), thus the final amount distributed in 2016/17 on the voice service project will be approximately US$ 10 M (KES 1 billion).

Education Broadband Connectivity Project

A holistic, multi-faceted and national approach to Internet connectivity for the nation's schools (focusing on secondary for reasons described in Section 5.3) and tertiary college institutions below university level is recommended. This is envisaged to include:

- The identification or creation of Internet ready ("e-ready") schools and institutions in each county. In particular, a main focus will be secondary schools that are already teaching the Kenya Certificate of Education (KCSE) Computer Studies curriculum and offering students for examination;

- The provision of necessary ICT training to the teachers in participating institutions to ensure that they are well prepared to make use of connectivity;

- Provision of broadband connection and support to the "Education Cloud" portal – the Learning Management System - that is to be established by the Kenya Institute of Curriculum Development (KICD). This will facilitate ready access to digital content developed by KICD as well as to other approved local or international education content and resources; and

- Technical support to ensure that the connected schools are not hindered by technical problems from the full benefit of broadband connectivity.

The first year project is envisaged to be a demonstration pilot after which it is expected that an increasing number of "e-ready" secondary schools will subsequently prepare themselves and come forward for connectivity under USF support in future years.

The project is currently planned to be organised as follows:

- A strategic partnership with an educational network agency, the Kenya Education Network (KENET) is under consideration, though not at this stage concluded. KENET has the ability and capacity to support schools networking and to support and advise the consultant and CA during the procurement cycle as well as to operate the network. However long term budget affordability and sustainability concerns, as well as open competition for the last mile access, will also be influential in the final decision;

- Careful selection of at least one school or institution per county – with the support of County Governments and Ministry of Education, Science and Technology (MoEST);

- Technical or financial assistance to a minimal number of schools in the most needy counties, for provision of their ICT infrastructure and digital learning materials, if necessary;

- Connection of a number of additional schools and institutions nationally (up to 250) that meet specific, published criteria for Internet readiness. These criteria will include: a) possession of a secured computer lab with at least 10 modern PCs or laptops, b) trained ICT teachers, and c) active participation in the KCSE computer studies curriculum;

- Supply of "last-mile" access and connection to dedicated access nodes (still to be determined), with unlimited data volume and bandwidth of at least 1 Mbps per connected computer;

- Support the establishment through KENET or directly via KICD (to be determined) a portal through which educational content as well as other approved content, can be secured and supported;

- Provide ICT training course(s) and ongoing webinar-based ICT based pedagogical support for teachers joining the project;

- Provide access to a help-line staffed by dedicated IT experts and technical support.

Expected budget for the Broadband project

This first year USF education project will have a budget of US$ 5 M (KES 500 M) including Capex and school access and network operating subsidy during the first year. Financial support of network access will continue to be provided for a further three (3) years before the institutions have to assume full budgetary responsibility.

Next Steps to project implementation

The Education Connectivity project will be designed to run in parallel and follow the same schedule as the Voice Access Gaps Project. Some schools and institutions will be visited during the field validation visit. The project shall also be included in the Project Design Report (scheduled for 27th May 2016) that will finalise all details of the project and bidding lots for submission to an Industry Workshop in the first week of June 2016. Bidding Documents will be available at end of June 2016. Awards are expected to be made by early November 2016.

The consultant will confer with KENET, KICD, MoEST and industry further, prior to the project's final design in order to ensure that the project will be affordable and financially sustainable for scaling up to a large numbers of schools and institutions in the following years.

The consultant shall also ensure that all participants' roles in the project include close collaboration on school selection and that the overall relationship is governed through a Memorandum of Understanding between KENET, MoEST, KICD and the CA.

All technology supply, "last-mile" and Internet connectivity will be tendered competitively under a Bidding Lot basis, in order to reduce unit costs from the initial estimate and provide the opportunity for several operators to win award contracts for the supply and operation of the services.

1 Introduction

1.1   Overview

The Communications Authority of Kenya (CA) contracted Intelecon Research and Consultancy Ltd. (Intelecon) at the end of October 2015 to undertake this study on ICT Access Gap in Kenya. The study has two main components:

- *Phase 1: The Access gap study* is aimed at conducting a country level assessment to determine the extent of communication coverage and the access levels by citizens, and the gaps in the infrastructure of the telecommunications, postal and broadcasting sectors, and the service coverage that remain. To this end, in-depth engagement with industry and other stakeholders has formed an important part of the study.

  A major component of this first phase is an online Geo-Portal that maps existing communications infrastructure in Kenya using GIS data and also identifies the access gaps and interventional areas. The project timeline for this activity is three months.

- **Phase 2- Design an initial set of priority USF projects and assist competitive tendering**- the consultant will also support the competitive tendering of the initial USF network expansion projects in Year 1. In order to achieve this, the consultant will design USF projects and group the gap areas into optimal lots for the purposes of identifying service providers for each respective gap area through competitive tendering. The consultant will support the various stages of the tendering process including preparation of bid documents/ templates, pre-bid meeting, tender evaluation and contract negotiation. The project timeline for this activity is nine months.

The project also includes the review an existing draft USF operational manual with a view of aligning it with relevant internal procedures of the Authority, procurement legislation and experiences during the first round of USF tenders.

The Consultant's Terms of Reference are appended at Annex A.

1.2   Contents of this report

This report provides a full summary of the activities undertaken and methodology used to develop the Geo-Portal and Access Gap Model, the analyses conducted and access gaps identified, the cost estimates to close the gaps, the financial resources available to the USF and the strategic project options for subsidy tender competitions in Year 1 of the USF's operations.

While this report provides initial perspectives on the nature and scale of the gap projects and tendering lots to be included in the Phase 2 activity, the projects shall be developed further and a detailed plan presented in a Project Design Report at the end of May 2016.

2 Review of the ICT Market Context for Universal Access in Kenya

2.1   Introduction

The ICT Master Plan published in 2014 builds upon and develops the ICT theme from Kenyan's development blueprint Vision 2030, of a globally prosperous and nation envisages Kenya as an "ICT Hub and globally competitive digital economy". The Master Plan outlines three foundations and three pillars:

The foundations provide the essential motivation for Universal Access and closing the gaps identified in this report, namely:

- ICT Human Capital and Workforce development as a pre-requisite to the development of a viable ICT sector;
- An Integrated ICT Infrastructure as a backbone to enable cost-effective delivery of ICT products and services; and
- An Integrated Information Infrastructure focusing on improving the quality of e-Government services and enabling transition to a knowledge-based society.

These foundations and the associated pillars of: e-Government; ICT as a driver of industry; and developing ICT businesses; are also set within the country's constitutional vision of increased democracy and devolution. *The country is thus also envisioned to develop in a way where each region and county experiences progress towards full participation in the transformed Kenyan economy.*

2.2   Telecommunications Services Overview

The total ICT market is valued at almost KES 200 Billion (US$ 2 Billion) and has the following components:

Table 2-1: Kenya's ICT market 2014/15		
Segment	KES Millions	%
Mobile services (incl. Telkom)	169.5	84.9
Other data service providers	7.5	3.8
Other service providers	11.9	6.0
Postal Corporation	3.5	1.8
Courier Services	7.1	3.5
Total	199.5	

The telecommunications services registered a healthy growth of more than 12.8% over the previous year, though in US dollar terms the market was static due to the change of US$ / KES exchange rate from around 85:1 to 100:1.

CA's latest statistical report shows the **mobile market** to be continuing a vibrant growth in terms of:

- Subscriptions 37.8 Million (88.1%)
- Usage averaging 95 minutes per month
- Revenue KES 172 B in 2014 (22% growth on 2013), and
- Internet subscriptions over 21.6 million (74.2%)

Fibre based data services are also growing healthily and impacting the field of Internet access as follows:

- Over 100,000 subscriptions, recording a year-on-year growth rate of 42%,
- Contributing to an overall Internet user estimate of 31.9 M and penetration of over 74%.

Access to services

This report indicates that almost 95% of Kenya's population are covered by basic voice services and 78% are covered by mobile 3G services. All county headquarters now are reached by the NOFBI fibre backbone and the majority are also reached by alternative private sector fibre routes including those carried on KETRACO and KPCL powerlines and leased to the main operators or data service providers.

While significant gaps have been identified by this report in access to all services, especially broadband, almost all significant population centres as well as most primary and secondary schools are therefore within economic reach of the country's fibre backbones. This report explores the scale of the challenge to close the gaps and sets a strategy for commencing an effective outreach, within the first year of USF operations, as a prelude to planning a five year investment strategy as a deliverable of the Access Gap consultancy project.

2.3   The Post and Courier Market

The post and courier market represents over five percent of the ICT sector revenues. PCK is experiencing challenges such as the decline of domestic letter traffic within its monopoly segment (letters below 350 gm) and the cost of its universal service obligation. The majority of its departmental posts offices are listed as loss-making. However, the postal and courier sector in general, which includes 146 licensed courier companies, has a footprint also of over 140 base locations nation-wide and is operating in an active and growing business climate which is currently benefitting from the growth of the e-commerce industry.

The total number of PCK post offices in Kenya has been reduced from around 900 in year 2000, was reported as 695 at the time of the 2011 Gap Study and sits at 623 today. Figure 2-1, which shows the number of postal and courier outlets in the Q1 2015/16 Statistical Report, indicates that indeed the number of post offices has remained stable since June 2014. While the number of postal outlets has stabilized since 2014, the number of licenced private courier outlets has tripled over the same period.

Figure 2-1: Postal and Courier Outlets
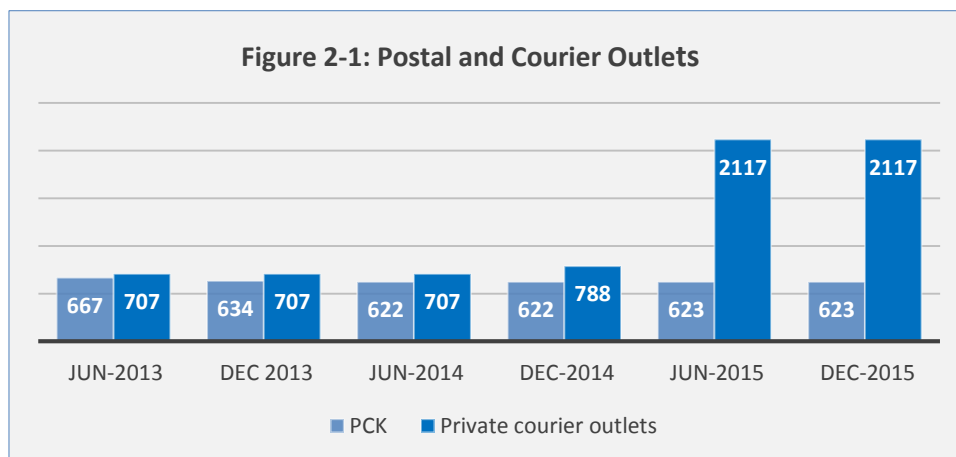
However, PCK is seeking to improve its business presence within its existing footprint. It has engaged in a strategic partnership with the Government to host Huduma centres. The Huduma centers program in Kenya aims to transform Public Service Delivery by providing citizens access to various Public Services and information from One Stop Shop citizen service centres called Huduma Centres and through integrated technology. The centres are to enable both the collection and disbursement of revenue on behalf of the Government as well as offering space in PCK's widely and strategically placed outlets to enable the Public in regional areas to access various Government services easily. The partnership through PCK's PostaPesa platform has enabled an effective roll out of 18 essential Government services (e.g., birth registration certificates, identification cards, police abstracts, driving licenses, passports) in a one stop shop now standing at 46 of its 623 postal branches.

PCK also plays a key role in support of e-commerce through the application of payment solutions (via banks, mobile money, cash card) and its last mile delivery through its own courier services. PCK also states that it has plans to set up cyber cafes and Wi-Fi for public use in its outlets, though it lacks the financial resources to implement its own modern ICT infrastructure and in some cases this is hindered by lack of electricity.

2.4   The Broadcast sector

Kenya's broadcasting market includes over 100 FM radio stations and around 40 digital Digital Terrestrial Television (DTT) sites to date, which will increase to more than 70 by mi-2016. Kenya is a leader in the conversion to DTT in Africa and has licensed two signal distributors – KBC Signet and Pan African Group (PANG) – which have contracted with the Government to cover more than 68% of the population by mid-2016.

In general, Kenya's TV household penetration rate was estimated at 32% in 2014[6]. Free-to-air broadcasting is still the primary access method in over 85% of households that own TVs, with Pay-TV services in main cities accounting for approximately 561,500 of the country's 12 million households. DTT has an overall 56% market share of total Pay-TV users, followed by DTH with 36%, and then the cable system of Zuku (Wanachi).

All counties will have at least one DTT transmitter and more than 47% of sub-locations will have greater than 90% signal coverage. Whereas there is a need for additional transmitters as well as enhancement of the signal power in some sites in the future to improve national coverage, the sector has commenced with adequate facilities for a number of program providers to distribute content via the national distribution networks.

---

[6] Ibid

3 Methodology

This section describes all elements of the methodology: data collection and analysis of ICT service coverage and identification of remaining gaps. It provides a description of:

- *The two population databases used for coverage analysis, including the use of the LandScan satellite imaging to identify population distribution within the ward and sub-location boundaries provided by KNBS;*

- *The specific data collected from telecommunications operators, PCK and broadcasters;*

- *The development of the Geo-Portal and use of its GIS software for identifying area and population coverage of ICT service providers (particularly the mobile operators and broadcast stations) as well as the unserved areas, and displaying the many fibre-optic routes interconnecting every county; and*

- *The geo-referenced Excel-based Access Gap model which is used to analyse the data received from the GIS coverage calculations to identify the gap areas, develop and cost subsidy projects, combine these into competitive budding lots and estimate subsidy requirements.*

3.1   Overview

The ICTs Access Gaps Study has been actualised through a series of steps specified as follows:

1. Stakeholders consultations and workshops;

2. Market study and individual industry consultations to discuss ICT service coverage and network build unit costs;

3. Secure GIS maps from the Authority, operators and KNBS as follows:

    - Population GIS mapping to the ward and sub-location level nationally;

    - Operator signal prediction coverage maps for 2G (i.e., voice) and 3G data services;

    - Optical fibre route mapping (NOFBI and other major routes);

    - Post office – main and sub post office locations with GPS positions as well as courier base locations

    - Broadcasting – Digital Terrestrial Television (DTT) sites contracted for establishment by the two licensed DTT signal distributors, Kenya Broadcasting Corporation (Signet) and Pan African Group (PANG).

    - Roads and electrification routes

    - All secondary and primary schools

4. Commission a GeoPoll mobile platform demand survey to update user affordability and demand from the previously most recent (2010) KNBS national ICT survey data.

5. Undertake GIS map overlays to identify coverage gaps and to calculate areas and populations uncovered.

6. Create an Excel based financial model (integrated with the GIS analysis) to assess the feasibility of network build into the access gaps and to estimate the financial resources required for closing the gaps

7. Create a GIS portal to enable visualisation of the access gaps and the strategic analysis of the subsidy estimation and USF project areas.

8. Stakeholder workshop, held ion 21st January 2016, to share the access gap model and analysis and to display the prototype GIS Portal, to engage industry, explain

assumptions, confirm or modify the potential strategies and potential tendering approach.

9. Finalise the portal design and access gap subsidy estimation model and the strategic project approaches for developing a prioritised list of gap areas and potential bidding lots. Install the GIS portal server at the CA premises and establish linkages to the CA website.

10. Prepare the Access Gap Analysis Report, providing the final GIS Portal descriptive report.

The following sub-sections sections provide more explanation of some of the critical data collection and analyses.

3.2   Population data estimation for gap areas

The securing of the latest population data was crucial for accurate gap analysis and revenue projection from the unserved populations and thus for subsidy calculations. GIS maps which included all administrative boundaries at county, constituency, ward and sub-location level were obtained from KNBS, as well as 2009 Census based population data at sub-location level. The census populations were scaled up at the national growth rate (average 2.6% per annum) to 2017, in order to project total populations to the anticipated date of initial UAF project roll-out.

The KNBS data was used for the basic population numbers within the administrative boundaries, while a LandScan dataset was used to identify population distribution as accurately as possible within each sub-location. This combination of datasets enables accurate estimates of human concentration and distribution within the administrative areas to its most recent issuance (year 2013). The LandScan methodology is described in Figure 3-1. This enabled accuracy and confidence in estimating unserved populations in the gap areas (i.e., in the areas uncovered by telecommunications and broadcast signals).

Figure 3-1: The LandScan population dataset

LandScan
Using an innovative approach with Geographic Information System and Remote Sensing, ORNL's LandScan™ is the community standard for global population distribution. At approximately 1 km resolution (30" X 30"), LandScan is the finest resolution global population distribution data available and represents an **ambient population** (average over 24 hours). The LandScan algorithm uses spatial data and imagery analysis technologies and a multi-variable dasymetric modeling approach to disaggregate census counts within an administrative boundary. Since no single population distribution model can account for the differences in spatial data availability, quality, scale, and accuracy as well as the differences in cultural settlement practices, LandScan population distribution models are tailored to match the data conditions and geographical nature of each individual country and region.

Landscan population database is available for Kenya (2013)

Using part of the North Eastern region as an example, Figure 3.2 indicates how the LandScan dataset's population densities (in progressively darker blue and 1 Sq. Km pixels) identifies where the population concentrations exist within each sub-location boundary. The GIS Portal's software was used to overlay mobile and broadcast signal coverage maps (as described in Sections 3.5.1, 4.1, 4.3 and Section 5) to calculate the percentage of total population served and unserved in each sub-location.

Figure 3-2: LandScan population densities
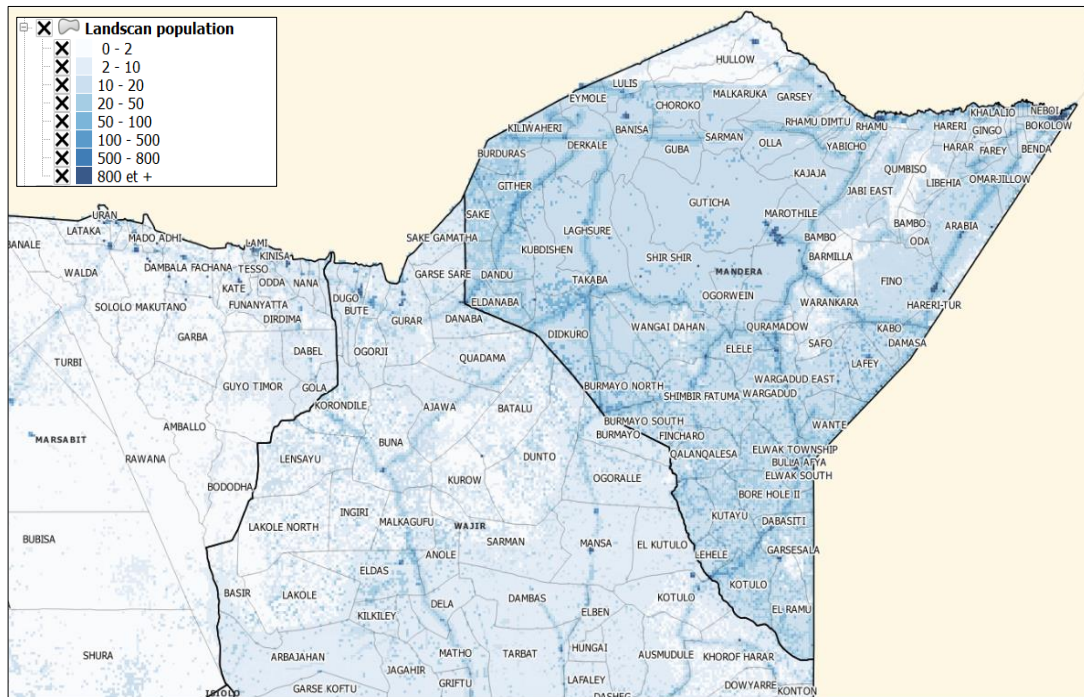
3.3   Mobile Platform Demand Survey

The consultant commissioned two limited scale national demand surveys to update the understanding of trends in ICT demand since the KNBS National ICT survey in 2010, which was published in June 2011.

The Terms of Reference and the timeline of the Access Gap Study did not provide for any field demand study. However, the ICT market, prices and usage trend can change drastically within a 5 year period. Therefore the consultant included in its methodology a fairly quick mobile survey to update selected key information that improves data input for the access gap model.

Whereas this scale of survey could not have the same depth, quality and statistically representative sample as a national face-to-face ICT survey, its main objective was to update and identify key usage trends for both voice and Internet services to increase the credibility and soundness of the data input for the Access Gap model.

The survey was executed by GeoPoll (http://research.geopoll.com), a well-known and leading mobile survey company with whom Intelecon has collaborated previously in East Africa for a mobile Internet user survey. The survey used a SMS text based data collection

technique. Respondents thus self-administered the survey and were incentivised to participate in the survey by the offer of a modest airtime credit for completing the survey.

A total of 1,000 mobile users were surveyed, divided into a sample of 600 voice service users in rural areas, and 400 mobile Internet users. The survey on voice services was a more general survey that also captured a question on the Internet e.g., how many rural users also use their mobile phone to access the Internet. This was designed to gauge the penetration of mobile Internet use among rural phone owners.

The survey on the 400 Internet users was more specialised by targeting only Internet users which had used the Internet in the last month. The purpose was to assess the usage level and patterns among more frequent Internet users. Also, as the access gap for (mobile) broadband Internet includes also some urban areas, the internet survey was not limited to only rural users but had a 50% split between urban and rural users, but both surveys excluded Nairobi County as that county is so much more developed in regards to ICT. A full description of the results of the surveys is described in Annex A.

A smaller, indicative face-to-face field survey will be carried out during the project preparation stage in areas that are potential USF pilots (see Section 5.2.6).

3.4   Postal and Courier data

The Postal Corporation of Kenya submitted a geo-referenced list of post offices to the study. These data have been incorporated within the GIS Portal map and an in-depth analysis is provided in Section 4.2.

3.5   Broadcasting data

A complete dataset of Digital Terrestrial Television (DTT) sites contracted for establishment to mid-2016 by the two licensed DTT signal distributors, Kenya Broadcasting Corporation (Signet) and Pana African Group (PANG) was obtained from the CA's Media Department database. A GIS overlay analysis of these data is provided in Section 4.3.

3.6   The GIS Portal and Gap Model Design

3.6.1   The GIS Portal

The GIS Portal has been prepared under the DYNMAP v9 proprietary webGIS software. It is capable of showing a full suite of topographical and physical infrastructure features as well as the telecommunications, postal and broadcasting presence. It provides all levels of administrative borders as well as the use of the LandScan dataset on population distribution, and advanced display and analysis functionalities. These are all described in detail in the report entitled "Interactive Geoportal Specification and GIS training needs assessment" which is attached as Annex B.

As noted in that report, although the CA Interactive Geoportal will eventually allow for public entry by various approved stakeholder user groups, it is more specifically intended for technical staff and decision-makers of the CA through an entrance login-secured / password. User groups of the portal have been aggregated as follows:

1) CA administrators and advanced users;
2) Government, other ministries and public bodies, Partners, donors;
3) Public users (view only).

Each user group will have different access rights in read / export / write in different map templates. These map templates will be designed first by the consultant, but the CA staff will be trained to completely administrate it and create / delete new users / groups.

The geoportal will be accessible through the CA website (tab, URL text) and from a dedicated URL link (to be defined), such as below (to be defined by CA).

- http://geoportal.ca.go.ke
- http://www.ca.go.ke/geoportal
- or…(to be defined by the authority)

The map template design for the CA Interactive Geoportal offers all the functionalities to work with a GIS / WebGIS tool showing the geographic, topographic and physical infrastructure features of Kenya, as well as ICT service and social infrastructure layers such as schools and in due course health centres. The template is adapted to user's rights. Depending on the rights, logged users will have access to specific functionalities, as illustrated in Figures 3-3 and 3.4.

Figure 3-3: GIS Portal Map Template – Entry (1)
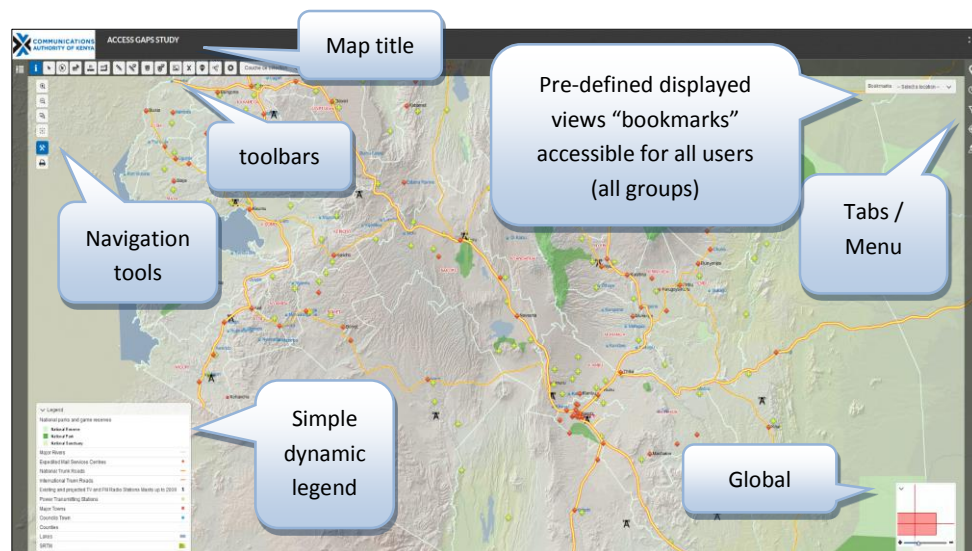
Figure 3-4: GIS Portal Map Template – Detailed Layers (2)
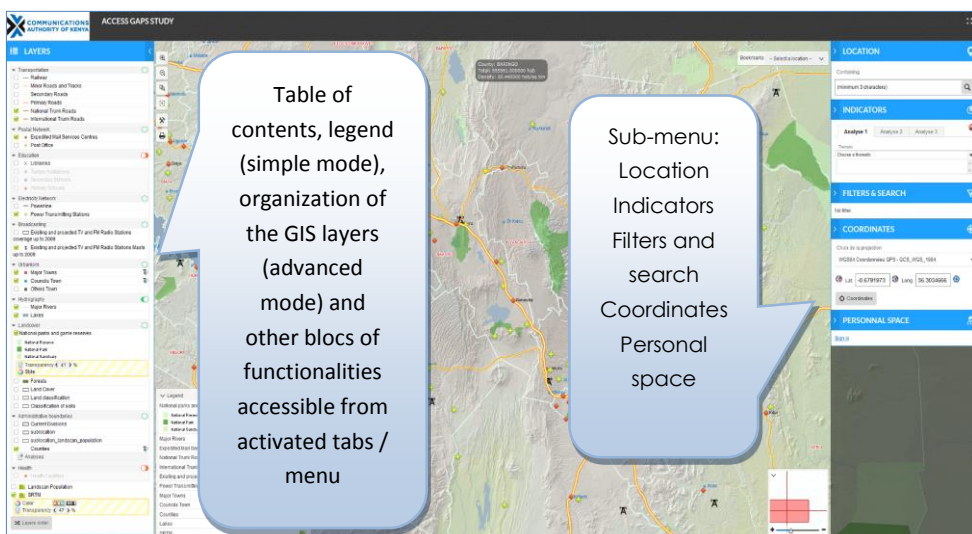
Figure 3-5 illustrates how the Portal GIS software can be used to show, for example, the combined mobile coverage over sub-location and ward boundaries, population density and concentrations, proximity to fibre and power line routes, as well as the location of schools, post offices and other institutions. As well as calculating service coverage and identifying service gaps, the portal software is also a planning tool to identify and optimise the scale and targeting of projects. The GIS map legend indicated in this example includes the following:

- 2G coverage
- 3G coverage
- Fibre routes, including NOFBI, KETRACO and KPLC
- Potential USF projects
- Primary, secondary and tertiary education institutions

Figure 3-5: Use of the GIS software for Gap Analysis and Project Planning
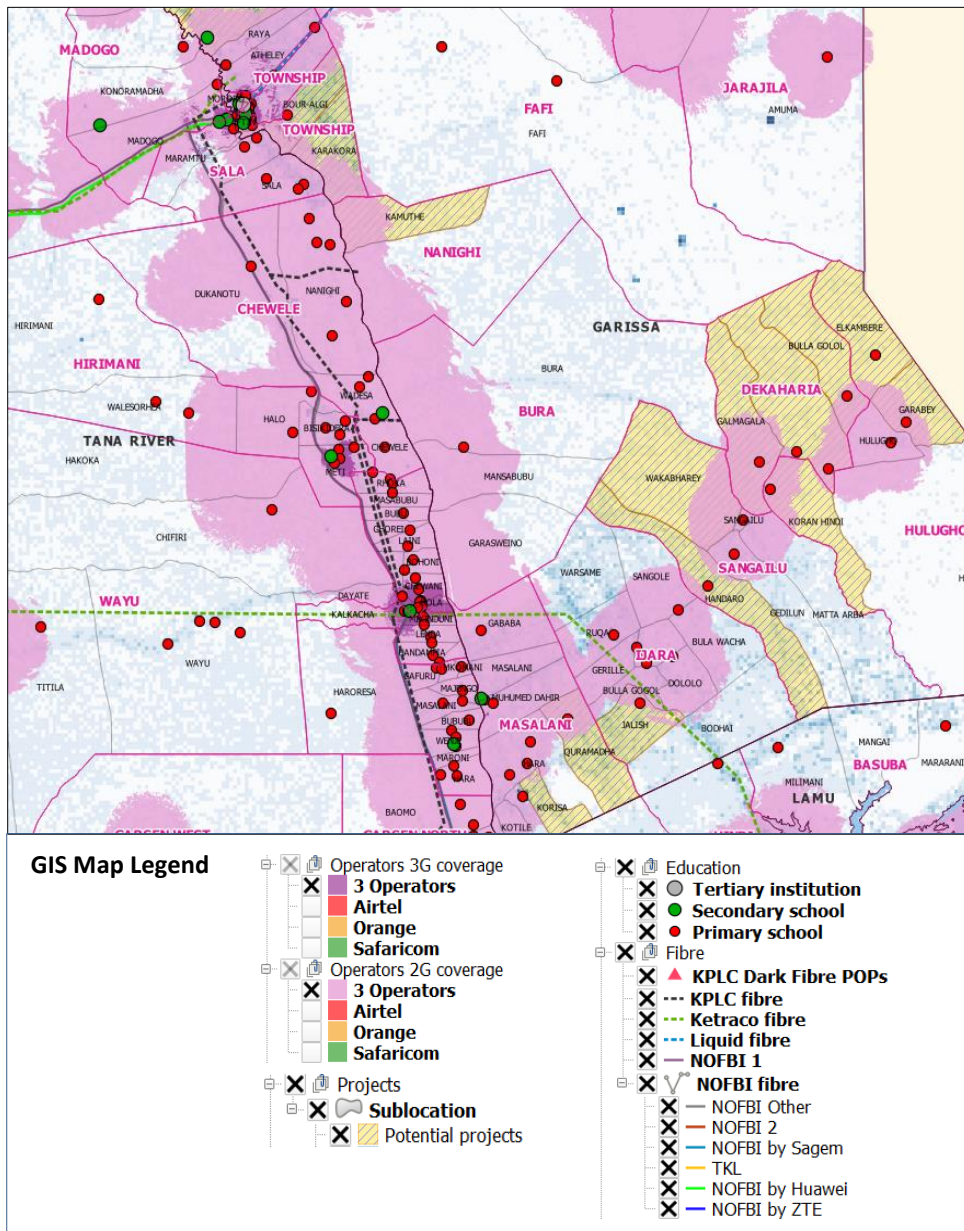
3.6.2   The Access Gap Model

The overall Gap Model process illustrated in Figure 3-6 comprises:

- **The suite of GIS software** within the Portal capable of integrating GIS maps and geo-referenced data (i.e., data with GPS coordinates) from several different standards into a single model displaying the boundaries of counties, constituencies, wards and sub-locations, natural and infrastructure features, populations and population distribution, 2G and 3G mobile signal coverage maps, fibre routes and the locations of schools, health centres and post offices.

- **A complex Excel spread sheet**, which is referenced to the GIS software, calculates the areas and populations covered and uncovered by 2G and 3G mobile and DTT broadcast signals. This allows calculations that enable estimation of the subsidies required to fill the mobile signal coverage gaps, including required transmission routes. This Excel model includes all demand and cost data relevant to the estimation of the commercial viability and subsidy requirements for providing telecommunications services to the gap areas.

Figure 3-6: The Integrated Geo-referenced Access Gap Mode

Inputs from KNBS, Operators and other infrastructure & service providers	**The GIS Portal Software** Integrates all data and provides output to the Gap Model Then displays the results	**Excel Spreadsheet** The Access Gap Feasibility Model	Gap projects and estimated Maximum Subsidies for each sub-location
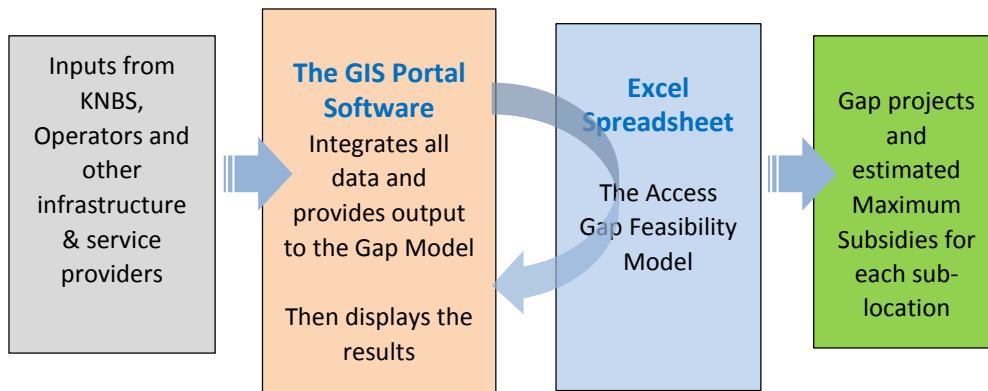
3.6.3   Gap Analysis applied to National Mobile Coverage

The basic Excel model accepts population coverage data from the GIS software, as illustrated above, and performs a gap analysis, estimating:

- which areas of the country are fully or partially covered with usable mobile signal - conservatively set above the licence requirements of the mobile operators at -90 dBm, both for 2G basic services and 3G broadband;

- the extent to which areas are uncovered (percentage of area and population); and

- The feasibility of extending 2G voice and 3G (or 4G) broadband coverage into the gap areas.

The areas are initially analysed at the sub-location level. Where practical, the feasibility analysis of USF subsidised expansion projects may be increased to the *ward* or *partial ward* level. For example, in some areas sub-locations may not be feasibly supported as individual areas (or too small to justify a new base station), but may be a viable project if combined with one or more other sub-locations in the same ward.

The critical drivers of the model are the:

- The uncovered populations per sub-location estimated from the GIS software (using Census figures per sub-location projected forward to 2017 and the LandScan for identifying population distribution within the sub-location borders);

- The demand side assumptions – user penetration and average revenue per user (ARPU);

- The number of mobile base stations estimated to be required to cover the population concentrations within the unserved geographical areas – based on assumed tower height and coverage radius within the uncovered areas

- The cost side assumptions, obtained from consultation with the operators and the consultant's general knowledge on costs in Africa, namely:

  a) Per base station CAPEX costs (including towers, power supply, security, backbone transmission extension and the electronic equipment);

  b) Per base station OPEX costs, including equipment operation & maintenance (O&M), fuel, security and spectrum fees; and

  c) Direct cost of sales, usually estimated as a percentage of revenues, covering the costs of customer acquisition, agents' fees, and incremental sales and marketing and commercial fees for service roll-out in the new areas.

The above critical drivers are illustrated graphically in Figure 3-7 and the assumptions are described in Section 5 (Costs of closing the gaps).

Figure 3-7: Features of the Geo-referenced Access Gap Model

Demand Side (estimate)
- Unserved Populations
- Latest Census based population mapping
- LandScan distribution
- Affordability & Revenues based on KNBS and mobile platform demand survey
- Projected Penetration
- Projected ARPUs

Cost side
- Geographical distances from nearest access points and existing coverage
- Unserved geographical areas beyond existing coverage based on Admin boundaries
- Backbone & access system unit costs (e.g., per BTS)
- Optimal BTS Line-of sight transmission
- Terrain factors to reflect levels of difficulty & cost

Financial analysis
- Rate of return or loss per area
- Commercial viability or loss
- Subsidy requirement / financial gap to achieve viability (e.g., 5 year payback net of OPEX costs
- Cost/benefit indicators per area
- Individual and combined calculations on alternative administrative area bases

Strategic analysis
- Total subsidy costs
- Prioritize most viable "smart subsidy" areas
- Backbone & other technical / policy considerations
- Important service points and targets within clusters (e.g., schools, clinics, POs, key villages, etc.
- Develop Strategy
- Recommend programme & project(s)
- Identify candidates and recommendations for first project(s)

4   Findings of the Gap Analysis

This section provides the findings of the gap analysis and states the extent of geographical and population coverage achieved in basic and broadband telecommunications services, postal and courier services and digital television transmission (DTT) broadcast services. GIS maps are presented to show the specific coverage in each sector.

It is demonstrated that since the last access Gaps Study in 2011, very significant strides have been made in the reach and coverage of 2G basic voice telephone and data services – to 94.4% of the population - and broadband (3G mobile to 78% of the population as well as fibre optic transmission systems to all county headquarters). It is also demonstrated that Kenya's transition to digital television is establishing a DTT presence in each county and 69% population coverage. The gaps are also analysed to the sub-location level and comments are made relative to universal service expectations.

The geographic extent of postal offices are presented and analysed. The expectations of universal postal service in terms of geographic or population proximity have yet to be clearly defined for the sector and recommendations are made for policy development.

4.1   Telecommunication

4.1.1   Voice service coverage

The gap analysis shows that only 5.6% of Kenya's population has no access to voice communications services. The GIS Portal has incorporated the latest coverage maps of all three mobile operators and created a combined signal coverage map for -90dBm service quality as shown in Figure 4-1.

Figure 4-1: Combined operator 2G coverage at -90 dBm signal strength
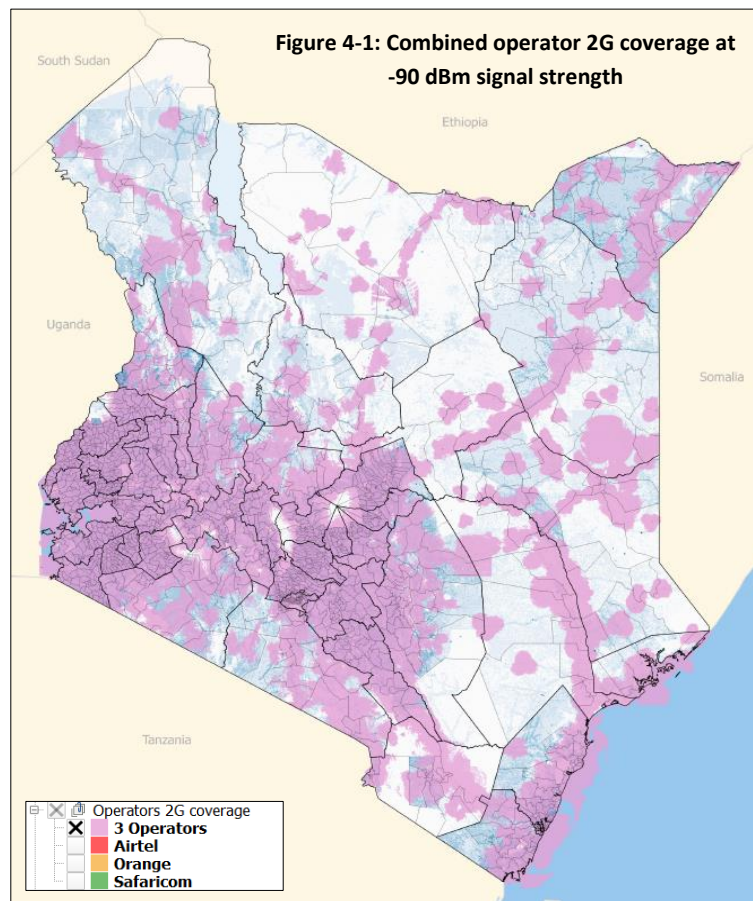
The overlay of the 2G coverage maps of the three mobile operators over population distribution has shown that whereas the geographical coverage is only 45% of the land area of Kenya, 94.4% of the population are covered.

4.1.1 The uncovered sub-locations

Based on the gap analysis model, only 164 out of a total of 7,149 sub-locations remain totally uncovered (0%), while a further 418 have less than 50% of their populations covered. Table 4-1 summarises the GIS coverage analysis.

Table 4-1: Sub-location population 2G coverage				
Coverage	**100%**	**>90%**	**50% - 90%**	**< 50%**	**0%**
Sub-locations	**5,657**	**485**	**425**	**418**	**164**

As can be seen from Figure 4-1, virtually all the major unserved areas are in the North Rift and North Eastern regions of the country, as well as in the Southwest border counties of Kajiado and Narok. A list of all Sub-locations with zero coverage is provided in Annex D.

4.1.2 The 3G Broadband Gap

The analysis established that significant progress has been made in extending 3G coverage with up to 78% of the population in Kenya having access to 3G coverage. The combined 3G signal coverage map for 3G service at -90dBm signal level is as shown in Figure 4-2. The GIS overlay has shown that whereas the geographical coverage is only 17% of the geographical land area, 78% of the population is covered, thus the access gap for 3G broadband service is at 22% of the population. The regional disparity for 3G is even more pronounced than for 2G, even though the population coverage has improved significantly in recent years.

Figure 4-2: Combined operator 3G coverage at -90 dBm signal strength
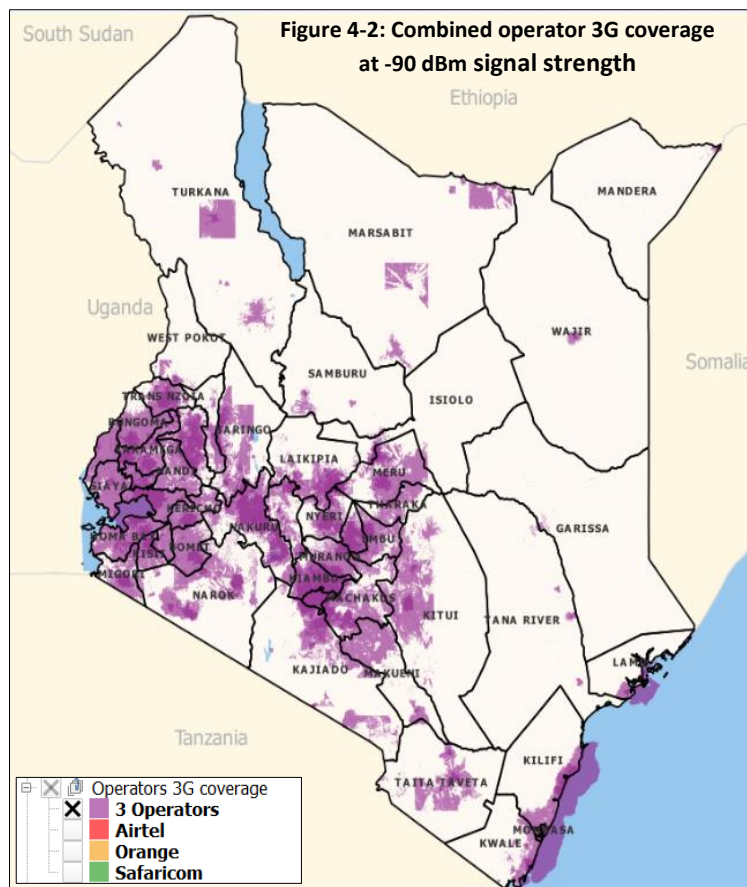
Every County in Kenya has at least a proportion of its population covered by 3G except Isiolo, which has zero percent coverage. Across the country, 1,244 sub-locations have zero 3G coverage and 977 have less than 50% coverage as shown in Table 4-2.

Table 4-2: Sub-location population 3G coverage					
Coverage	100%	>90%	50% - 90%	< 50%	0%
Sub-locations	2,454	1,324	1,146	977	1,244

Figure 4-3 illustrates the broadband coverage including the NOFBI and private fibre routes as well as the power line routes of Kenya Electricity Transmission Company (KETRACO) and Kenya Power Company and Lighting Company (KPCL) which either have or could be equipped with fibre routes. As indicated, while every county centre has been reached by NOFBI at least, the extension of broadband transmission into the large geographical gap areas would still be a costly undertaking.

Figure 4-3: 3G coverage and Fibre Routes
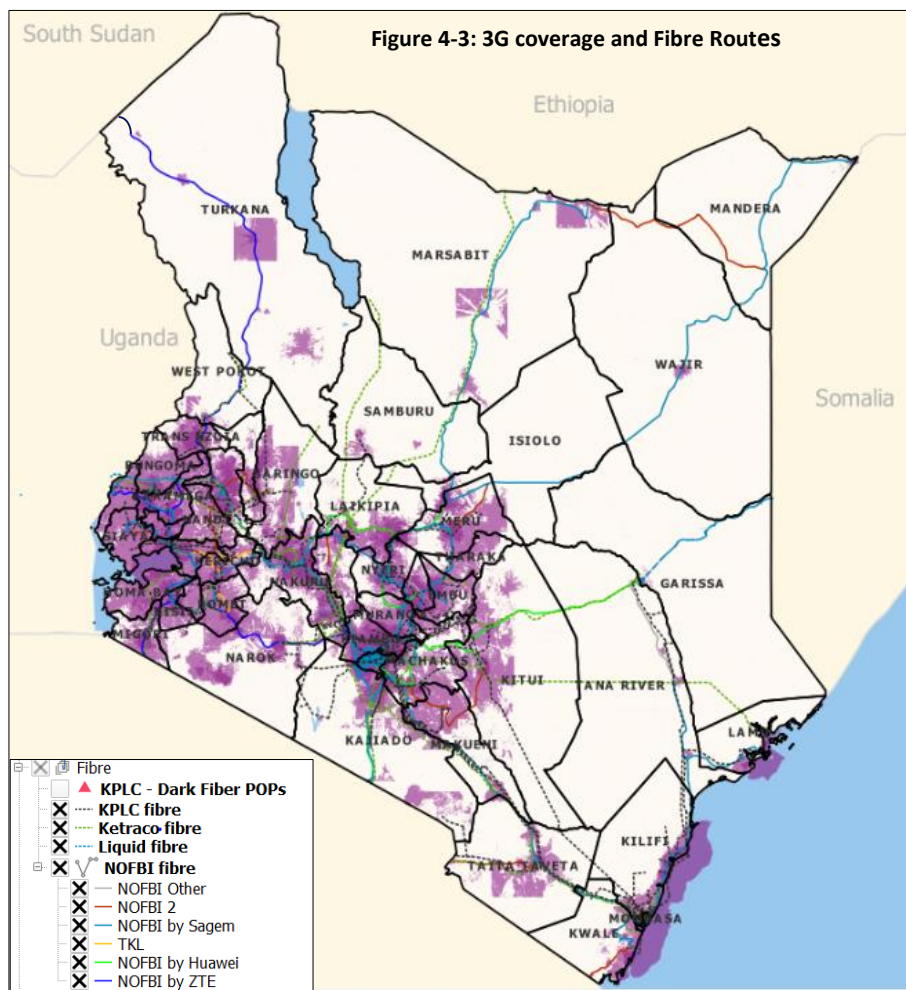
However, as illustrated by Figure 3-5 in Section 3.5.1 and discussed in Section 5.3, many thousands of potential broadband users who are not yet connected, such as primary and secondary schools, health centres, government offices, etc., are located within less than 1 Km of a fibre route. Thus there is very good potential for a USF supported broadband outreach program to reach key sectors with demand, which would greatly benefit from connectivity within the short term. This would also further stimulate broadband demand generally and create ICT capacity. General users of 3G will continue to adopt the services and grow in accordance with the increase in general demand for data communications and the commercial expansion of the networks.

4.2   The Postal and Courier Sector

4.2.1   Overview

Based on the latest data received from the Postal Corporation of Kenya (PCK) there are 623 post offices country-wide. The spread of PCK outlets in Kenya are shown in Table 4-3.

Analysis of the post office outlets by County and constituency shows that all counties have at least two (2) post offices, though the representation of the Northern and Eastern regions as well as Narok and Kajiado in the Southwestern border is sparse.

Table 4-3: Post Office National Administrative Structure		
General Post office	2	• Nairobi and Mombasa
Head Post Office	29	• Nairobi and Laikipia have 2 • 25 other counties have 1 • 20 counties have no Head Post Office
Departmental Post office	447	• Minimum of 1 per county • 40 in Nairobi county • Average 9 in other counties
Sub Post Office	145	• Generally located remote from county headquarters
Total	623	

4.2.2   PCK administrative representation

Out of the 623 PCK offices, 544 provided to the Study had geographical coordinates and could therefore be identified to the sub-location level, whereas 79 had no geographical coordinates and could not be located exactly, except to the constituency in which the PCK list placed them. Table 4-4 provides the perspective on distribution of post offices at the various administrative levels:

Table 4-4: Country wide distribution of Post Offices					
Administrative Level	Total	At least one PO present	Penetration of post offices		
			Min	Average	Max[7]
County	47	47	2	13	55
Constituency	295	264	0	2	14
Ward	1,450	480	0	33%	10
Sub-location	7,149	524	0	7%	7

Although the number of sub-locations with at least one post office has reduced from 677 recorded at the 2011 Access Gap Study to little more than approximately 524 today[8], constituencies appear to have a PCK post office and therefore 31 constituencies, it can be noted that almost all constituencies have post offices. Today, 264 out of the total 295 mostly in the North Rift, North Eastern and South Western border counties named above, are without a sub-post office.

---

[7] The maximum PO penetrations at all administrative levels is generally in Nairobi and other urban centres.
[8] Out of the total of 79 post offices listed by PCK which did not have geographic coordinates. The consultant's analysis showed that around 60 of these cases are additional post offices in constituencies in the GPS list, while the remainder are in other constituencies. The final estimate of the number of wards and sub-locations was made based on reasonable assumptions for cases where sub-locations and wards also have more than one post office.

Figure 4-4 provides a complete summary of the county distribution and Figure 4-5 on the following page provides a coverage map.

Figure 4-4: Post Offices per County

County	Post Offices
NAIROBI	55
MACHAKOS	31
KISUMU	25
KIAMBU	21
BUNGOMA	20
NAKURU	20
KISII	20
KAKAMEGA	19
VIHIGA	18
HOMA BAY	18
MAKUENI	18
MERU	18
MOMBASA	17
NYERI	17
SIAYA	16
MURANG'A	16
UASIN GISHU	15
KITUI	15
KERICHO	12
EMBU	12
TAITA TAVETA	12
BUSIA	11
NYAMIRA	11
THARAKA	11
KIRINYAGA	11
NYANDARUA	11
BARINGO	10
MIGORI	10
BOMET	9
KAJIADO	9
KWALE	9
LAIKIPIA	8
NAROK	7
ELGEYO-MARAKWET	7
TRANS NZOIA	7
KILIFI	7
NANDI	6
WEST POKOT	6
SAMBURU	5
TURKANA	5
MANDERA	5
MARSABIT	5
LAMU	5
TANA RIVER	5
GARISSA	3
WAJIR	2
ISIOLO	2

Figure 4-5: Map of Post Office Distribution
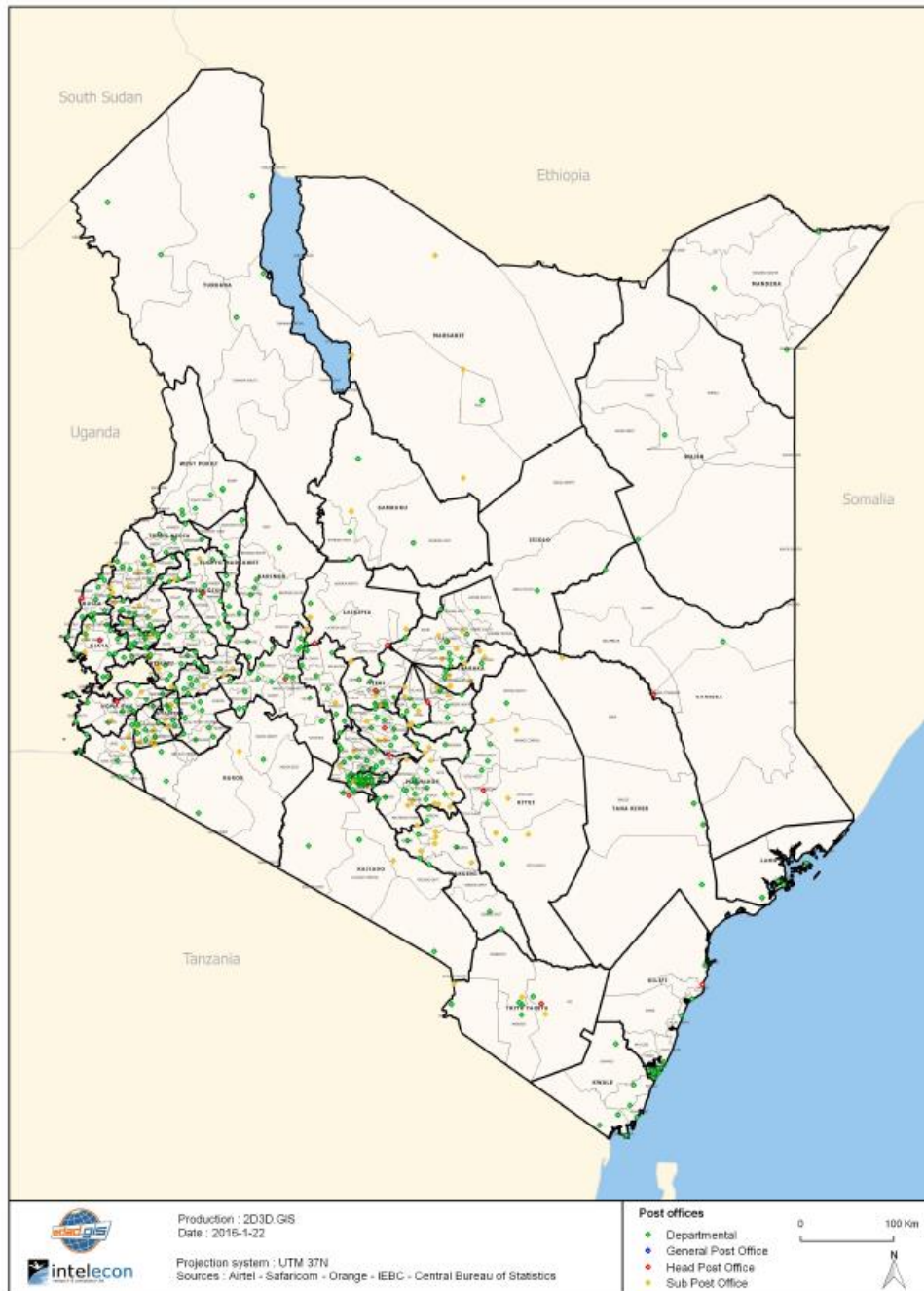
4.2.3   Postal Service Quality Standards

CA publishes service quality standards for PCK which set targets for mail and other service delivery (e.g., PO boxes) for urban and rural areas separately. PCK publishes its own standards of service delivery which are slightly different. PCK is expected to deliver 65% of its mail within the targets.

Whilst there is a general understanding that PCK is unable to meet the cost of providing its universal service obligations, a 2014 postal sector study report noted that there is currently

no understanding of the true cost of providing universal service[9]. Such costs are not published in detail. However, it is important that PCK (as a commercial business) and the Government (as the owner of PCK) understand the true cost of providing universal service. Further, it needs to investigate the options available to reduce this cost and to fund the service, since the principles of the USF would not allow its involvement in funding PCK's obligation unless both the access targets, detailed costing and alternative means of meeting financial deficits are explicitly known.

The CA noted in its Q1 2015/2016 report that although the number of letters sent domestically is continuing to drop quarter by quarter, the number of letters or packets received from abroad is increasing and the major international courier companies are active in this market. Complementing the international courier companies, a large number of licenced local courier companies (over 100) have many outlets in major towns. The CA Q1 2015/16 report also noted that: "……. Emergence of new markets such as e-Commerce will present a prime opportunity for the (postal) market to make a turnaround and begin to record growth as it provides physical delivery services for online transactions." Thus, while the traditional business of PCK – mail delivery - has declined somewhat in the last few years, new growth opportunities through e-commerce present themselves.

However, the evidence appears to suggest that private operators are taking most of this growing market, while the USO operator PCK has yet to record a change in its business position.

4.2.4   Universal postal services

The aforementioned 2014 postal sector study report noted postal population service penetration to be approximately one post office per 65,000 population, which is mid-range of African benchmarks used in the study. However, the study also noted that Kenya's regional penetration varies from one post office per 25,000 persons in Nairobi to one per 178,000 in the northern counties. The report recommended that the decline in the number of post offices be halted.[10] A list of all 24 recommendations are provided in Annex G.

The study also noted that the definition of the universal postal service is based on that of the Universal Postal Union (UPU)[11]. Whilst the UPU defines the products to be included in universal service, it does not specify the *level of access* to these services (distribution of post offices, etc.), nor the quality or price. While Kenya has defined the USO products, there is as of yet no definition of access arrangements. Recommendations 8 to 12 addressed specifically the issue of universal service and the potential role of the USF and included a recommendation on development of access standards in terms of population, distance and administrative boundaries. While not specifically defined in any legal or regulatory document, by reference to UPU requirements, the universal standards shown in Table 4-5 apply in Kenya:

---

[9] Final Report: "Diagnostic Analysis, Recommendations and Implementation Plan", Report for the Communications Commission of Kenya, 4 June 2014, Analysis Mason, with Sunflower Associates, Postal & Logistics Consulting Worldwide.
[10] Ibid
[11] Ibid

Table 4-5: Universal Service standards in Kenyan postal sector[12]	
Universal Service Standard	**Definition in Kenya**
Scope of universal service	National and international services for: • letters to 2kg • registered and insured letters to 2kg • postal items for the blind to 7kg • letters with expedited delivery to 2kg • parcels to 30kg.
Frequency of delivery	Delivery in Kenya is made through PO boxes placed at post offices and sub-post offices. Post offices should receive delivery on a daily basis six times per week and sub-post offices at least twice per week.
Number of post offices	Not defined
Density of post offices	Not defined
Number of street letter boxes	Not defined
Quality of service targets	Defined by CA

Table 4-6 breaks down the number of post offices, sub-post offices and associated PO boxes for each region at the time of the 2009 Census, from which the number of post offices at least had reduced by approximately one third.

Table 4-6: Post offices, sub post-offices and PO Boxes by Region[13]					
Region	**Population (Area)**	**Post Offices (PO Boxes)**	**Sub post offices (PO Boxes)**	**Pop'n per outlet (Per PO Box)**	**Area per outlet**
Western	4,334,282 (7,400 Km²)	49 (26,250)	23 (2,250)	60,198 (152)	102 Km²
Central	4,383,743 (11,449 Km²)	29 (19,270)	18 (1,750)	93,271 (209)	1,234 Km²
Eastern	5,668,123 (140,698 Km²)	27 (15,800)	22 (1,610)	115,676 (326)	2,871 Km²
Northern	2,310,757 (127,358 Km²)	13 (4,450)	0 (n/a)	177,750 (519)	9,796 Km²
Nyanza	5,442,711 (12,477 Km²)	75 (36,345)	32 (2,100)	50,866 (142)	116 Km²
Rift Valley	10,006,805 (182,505 Km²)	119 (66,240)	10 (900)	77,572 (149)	1,412 Km²
Coast	3,325,307 (79,686 Km²)	56 (46,740)	3 (240)	56,361 (71)	1,350 Km²
Nairobi	3,138,369 (696 Km²)	105 (204,145)	15 (1,320)	26,153 (15)	6 Km²
Total	38,610,097 (562,269 Km²)	473 (419,240)	123 (10,170)	64,782 (92)	943 Km²

Despite the changes which have taken place since 2009 with increased population and reduced number of post offices, the access indicators which existed then provided an understanding of the regional variations today, in terms of order of magnitude. In the worst case of the Northern region, it is evident that the area per outlet (9,796 Km²) yields an average geographical "reach" for each post office of almost 100 Km², implying maximum

---

[12]Source: Analysys Mason Report, 2014
[13] Source Analysys Mason

travel distances to a post office of 50 Km or more, whereas the national average is around 30 Km^2 and the most urbanized region is less than 2.5 Km^2.

4.2.5   Demand for postal services

The National ICT Survey (2010) by KNBS and Communications Authority of Kenya included postal services. Table 4.7 shows the yearly demand for sending and receiving letters.

Table 4.7 Demand for sending and receiving letters within one year			
Receiving letters	**None**	**1-10 letters**	**More than 10 letters**	**No answer**
	63.8%	23.7%	4.9%	7.6
Sending letters	**None**	**1-10 letters**	**More than 10 letters**	**No answer**
	76.9%	6.4%	21.1%	14.5%

It can be seen from the data above that the *majority* of people do not send or receive letters. Less than 25% of the respondents in the nationally representative survey receive between 1 to 10 letters a year, while only around 5% receive more than 10 letters per year and only a combined 27.5% of respondents send letters.

These data indicate that postal services are not heavily used. It is also possible that the number of letters sent and received has even fallen further since 2010, as people migrate to SMS, WhatsApp or e-mail for basic communications. The requirement for physical delivery of a paper-written letter will increasingly be limited to documents that need an original signature and cannot be replaced by SMS, e-mail or scanned documents.

Postal services obviously include more than letters; however, letters are a key postal service. The demand data indicates that the need for postal services such as letters is low for the majority and very infrequent. Especially if compared to voice communications services where the mobile survey showed that 56% of respondents make 1 to 10 calls *per day*, and 35% make more than 10 calls *per day.*

4.2.6   Conclusions regarding universal postal services

It is important to recognize that the postal and courier sector is quite different to the telecommunications sector – in terms of demand, in terms of market structure (e.g., only one government-owned operator – PCK – is the USO provider, versus several national mobile and broadband operators) and in terms of service provision, among other factors. In many regards, it therefore needs a different perspective and different solutions in regards to universal service requirements. This does not necessarily imply that the USF must be used either to compensate for losses or to expand its services.

The gap analysis has detailed post offices'
- typical administrative coverage,
- averages of population per postal outlets per regions,
- established existing maximum travel distance,
- existing national distribution of postal offices via GPS data, and
- coverage by mobile networks of postal offices.

Following the recommendations of the 2014 postal sector report, Kenya's policy-makers now need to develop minimum universal access requirements for postal offices and set these out in a stand-alone postal sector policy as recommended by the 2014 report (Recommendation 13). The access requirements ideally are expressed by answering the following key questions:

- To which administrative level is a postal outlet required?

- Is it feasible to define access by a specific number of population served per postal outlet (e.g., for every 50,000 people a postal outlet)? And

- What is an acceptable distance to travel to the nearest postal outlet considering that latest data suggest that only around 29% of the population send letters and 28% receive letters and do so only a number of times per year, most between 1 to 10 times.

These targets ideally should be developed in a consultative manner and consider key aspects such as:

- Actual demand of the universal postal services today,

- The sustainability and feasibility of access targets,

- The net cost of USO today (which the 2014 report noted has not been defined),

- New potential business models that could reduce costs of providing universal postal services,

- Innovative partnerships that can enhance PCK's position in fields such as e-Government (i.e., Huduma Centres at County level and possibly below), and

- Whether delivery targets of (e.g., 6 times a week, twice per week) can be differentiated further to match the infrequent demand.

4.2.7   Communications coverage of Post Offices

From the perspective of connectivity of post offices, a full 100% of post offices are already covered by at least 2G voice with basic data services. However, some consideration should be given in the USF Five Year Plan to supporting PCK's ability to compete in the e-Commerce sector. This could include, for example, the targeting of Departmental Post Offices or Huduma Centres for broadband (i.e., at least with 3G service), for which it would be expected for PCK to supply a list of existing and planned locations, with rationale for broadband service provision.

4.2.8   Private courier sector

Overview

The statistics of the private postal / courier outlets published by CA imply that a recent change in reporting parameters has taken place, as well as a change in the number of couriers officially licensed. However, clearly the increase is in the liberalised segment of the market, namely:

> Conveyance and delivery of packets, documents, parcels, direct mail marketing services, postal financial services, electronic and hybrid mail services agency services, distribution of publications courier services and other postal articles as determined by the authority.

There may be over 1,000 courier operators, most of whom are reported by the Courier Industry Association of Kenya (CIAK) to see no value in becoming licensed by CA. Currently there are 141 licenced private courier operators with licenses in the following categories:

- 25 International
- 11 Regional

- 91 Intra-country
- 14 Intra-city

CIAK has stated that about 70-80% of the domestic couriers are active only in Nairobi. The remainder have some country-wide reach, but this is often limited to a single region or area (e.g., Mombasa / coast) with an office in Nairobi. Less than 10% have a truly national reach while up to 30% have a region to region reach.

Largest companies

G4S is a major international security solutions company and among the largest operating nationally in Kenya. It has a footprint of 41 main branches (handling security as well as courier services) and 100 sub-branches that are company staffed courier collection points – smallest offices being a single 10' x 10' room. Vehicles and motor bikes are used for pick-up and delivery to company or personal premises.

In remote areas, the company might collaborate with 3rd party couriers for last mile delivery on an ad hoc basis. As yet no formal tariffed partnership arrangements between courier companies exist.

Wells Fargo / Fargo Courier, also provides security and courier services, has around 90 outlets in Kenya.

Most other large international firms have only a few outlets - Nairobi and two or three other major cities – e.g., Mombasa & Kisumu.

Easy Coach operates a transportation network from Nairobi to Western Kenya. Its letter and parcel business is just 10% of total revenue. This is also typical of several other transportation companies.

CIAK has reported that e-commerce activity is just 10% of business today but is becoming a very significant and growing segment of the courier industry's business. Most of the large companies have signed collaboration agreements with the most heavily used e-commerce sites, in order to create a seamless delivery process for users whereby the cost of courier is incorporated into the transaction.

Issues which the courier industry faces

The courier industry feels generally that the sector suffers from the fact that the vast majority of companies operating as couriers are unlicensed and therefore unregulated. There is thus little cohesion or industry-specific standards or training to bring unity. The industry also has some limitations because of the lack of a national addressing system since it is unable to utilise PO Boxes which come under PCK's monopoly.

While the industry uses the mobile phone network extensively to ensure communications are kept, the poor road system in rural areas is considered to be the industry's main hurdle.

Also, companies such as G4S which operate in remote areas face the same economic viability concerns as the post office. The company lists 26 of its 141 points of presence as unviable and thus further expansion is unlikely to occur without financial assistance. In some very remote areas, there are initiatives for national and local couriers to come together to share costs in locations where the volume of deliveries is very sparse.

The 2014 Postal Sector Report referenced in Section 4.2.7 also addressed issues in the courier market segment, recommending that:

- CA in conjunction with the Courier Industry Association of Kenya (CIAK) should develop a mail integrity document to which all operators sign up. The document would provide best practice and minimum standards in ensuring the integrity and security of mail during the operational processes. It would include levels of protection for buildings, vetting of staff, mail handling procedures, dealing with undelivered items and protecting employees and staff (Recommendation 20), and

- CA should set up a licensing and market information forum that meets regularly (e.g. annually) to discuss compliance requirements, reporting, action on unlicensed operators, etc. (Recommendation 21).

The consultant believes that these measures are relevant to the challenges facing the courier industry and also need to fall within the Stand-alone Postal and Courier Sector Policy recommended in the 2014 report. Furthermore, as a precursor to any participation of the USF in courier development, there should be a mechanism for consideration of postal and courier issues, based on the above recommendations. As for issues facing the postal sector, the consultant shall include consideration of this in the Five Year Strategic Plan to be submitted at the end of the Access Gap consultancy.

4.3   The Broadcasting Sector

4.3.1   Digital Terrestrial Television (DTT) Network Roll-out

In September 2015, the Authority engaged and licensed two broadcast signal distributors (BSDs) with the objective of negotiating DTT rollout plans for the financial year 2015/2016 that would result in realizing the DTT coverage target of at least 65% of the population. This entailed ensuring that the BSDs include in their rollout plans sites that had never had terrestrial television coverage previously. In addition, rollout timelines were adjusted to fall within the current financial year. The two BSDs are:

- Kenya Broadcasting Corporation – SIGNET
- Pan African Network Group (PANG)

These two companies submitted their rollout targets for the financial year 2015-16 as required by their licenses and have committed to rollout a total of twenty nine (29) sites during the financial year. These are largely covering the same locations and thus provide two distribution networks for every major population centre in the country.

The Authority monitors the progress made in implementing the rollout plans and prepares quarterly reports on the same. The BSDs must update the Authority on a bi-monthly basis on the status of rollout of the sites.

4.3.2   SIGNET roll out plans

By June 2015, SIGNET had rolled out in Nairobi, Mombasa, Nakuru, Eldoret, Webuye, Nyeri, Machakos, Kisumu, Murang'a, Naivasha, Narok, Siaya, Nyambene, Embu, Malindi, Kisii, Vuria and Nyadundo. By September 2015, Kitui, Mbuinzau, Lamu and Namanga were also added. The negotiated roll out plan for SIGNET for the financial year 2015/16 comprised a further 17 sites to be on the air by June 2016.

4.3.3 PANG roll out plans

By 30[th]June 2015, PANG had rolled out DTT transmitters in the following locations: Eldoret, Kericho, Kisii, Kisumu, Limuru, Upper Hill Nairobi, Meru, Malindi, Meru, Mazeras, Nakuru, Narok, Nyahururu, Nyeri and Webuye. Following negotiations, PANG's agreed a roll out plan for the financial year 2015/16 comprising a further 16 sites.

There is an existing agreement between the Kenya Government and the Spanish Government who are providing a grant to finance DTT in 10 sites. However, since the arrangement under this grant is likely to be affected by factors that may lead to delays, SIGNET's interim plan has been to install low power transmitters already procured for the targeted areas as agreed in their rollout plan, so as to comply with the deadlines. Later in the year, the low power transmitters would be relocated to some key towns with no DTT coverage.

4.3.4 Current coverage of DTT service

Based on the tower height and transit power of existing and contracted sites, DTT coverage had increased from 58% to 60% by 30th September 2015. Figure 4-6 shows all DTT coverage contracted and expected by mid-2016. Every county will have at least one DTT station.

Figure 4-6: Digital TV Stations (contracted to Mid-2016)
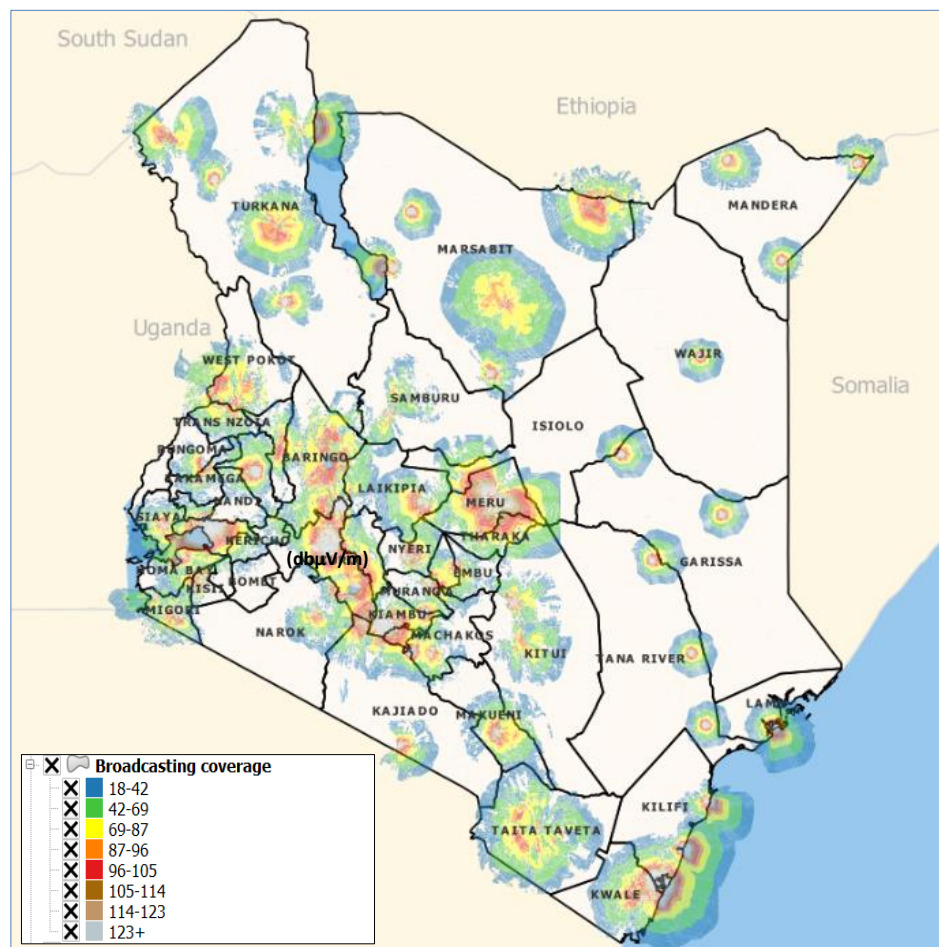
The GIS portal software has calculated that the extent of usable signal from all of the stations contracted to roll out by mid-2016 will cover 69% of the population. The analysis summarised in Table 4-8 shows the positive extent to which the roll-out of DTT services has progressed and extended across the country to date, with 47% of sub-locations (3,381) having more than 90% useable signal coverage and a further 884 above 50%. The gap analysis shows that for now 1,927 sub-locations will be without any useable DTT signal coverage and another 957 will have less than 50% coverage.

Table 4-8: DTT Broadcast coverage to the sub-location level (% of population)					
Coverage	100%	>90%	50% - 90%	< 50%	0%
Sub-locations	2,704	677	884	957	1,927

The study considers digital television broadcasting service not to be part of universal service since penetration of television ownership is reported at only 32 percent of the population in 2014[14]. Further, DTT broadcast has achieved good strides and will likely expand over the next few years. It should not be considered a target for USF investment until television ownership becomes a social norm (e.g., beyond 75% household penetration). The consultant therefore recommends that broadcasters should not necessarily be required to contribute to the USF until this point is reached.

---

[14] Ibid

5 Cost to address the 2G gaps and project development

This section sets out the general principles used and the assumptions made based on consultations with industry for estimating the costs of projects to close the basic voice service voice gap and for the development of a priority broadband project.

Basic voice - The total cost of closing the gaps in every sub-location with greater than thirty (30) percent population coverage would be around US$ 157M before considering operators' licence obligations. Using international best case practice for development of sustainable "smart-subsidy" USF projects that meet the national objectives, a total of 348 sub-locations are identified as priority areas. After considering the prior licence roll-out obligations of the mobile operators Safaricom and Airtel for the years 2016 to 2018 (which overlap with these priority sub-locations), a net total of 214 sub-locations are left for USF consideration in Year 1. These are estimated to carry maximum subsidies totalling approximately US$ 22.2M, which will likely reduce to around US$ 15M after submission to tender, the competitive bidding and completion of the subsidy award evaluations.

A description of how the approximately 214 sub-locations will be subjected to further analysis and combined into final bidding lots, using the GIS mapping tool and Excel Gap Model are explained and illustrated with maps in this section.

Broadband Project - Three practical options on how to extend the coverage and bring increasing impact of broadband service development to the country are presented. These include two supply-driven options for expanding the technical availability of 3G mobile broadband services, while the third option is to address the demands of the priority education sector that is currently poorly served for broadband Internet connectivity. The third option is selected as promising the best value and impact on ICT capacity development and future demand. Thus a first year project to connect a minimum of one secondary school or tertiary college in each county and up to 300 in total is developed. The budget for this First Year Educational Broadband Project is set at US$ 5M (KES 500M).

5.1 Introduction

The evaluation of costs and strategic options for the USF to close the voice gaps have been considered in the context of several important factors and constraints, which are the following:

1) The priorities which have been established through the previous Gap Study (2011) and national concerns for universal access, especially that all Kenyans should have access to basic communications;

2) The directions set through the National Broadband Strategy and ICT Master Plan in seeking to make access to broadband available on a national scale;

3) The financial resources available to the USF in the coming 5 year period and beyond, as described fully in Section 6;

4) The role of policies such as infrastructure sharing and radio spectrum, in particular the prices set by the Authority;

5) Consultation with stakeholders, especially with ICT operators whose buy-in and support are paramount to the success of the USF program;

6) The commercial and legal commitments already made by mobile operators to roll out services to specific, named sub-locations as obligations negotiated and

recorded as part of their 2015 licence renewals (these commitments should not be subsidised by the USF);

7) The need for improved security in specific areas of the country under threat; and

8) The guiding principles of the USF as outlined in the established Guidelines, in particular those of transparency and open competition in the distribution of USF resources.

In order to facilitate all of the above by means of successful competitive tendering, the "Smart Subsidy" principle is used to develop a logical set of projects that are attractive to the private sector and strategic for the USF for competitive bidding purposes.

This means that USF selected projects must be sustainable after the subsidies is received, within the existing policy framework. These are planned and rolled out in a logical, affordable and step-by-step program over the foreseeable life of the USF. This commences as described in Section 6 with an initial set of priority and suitable projects for Year 1 which a first analysis provides. These shall be subjected to closer examination and refinement before finalisation at the design stage of the consultancy.

5.2   The Basic Voice Telecommunications Gap

5.2.1   Model assumptions (2G Voice and Basic Data Services)

The Demand side Assumptions

Based on an update of the previous Gap Study (2011) by the results of the mobile platform survey (see for details Annex A) and consultation with operators, the following demand assumptions were made:

• Expected user penetration 30% (compared to the national average of almost 90%). This is based on operator expectations that there will be *at least* one subscriber per rural homestead in the gap areas (i.e., minimum 20%);

• Average revenue per user (ARPU) from private subscribers will be around 250 KES, comprised of 200 KES voice plus 50 KES data. This projection has been developed from basic economic affordability assumptions as well as validated from the results of the Mobile Platform Survey which is described in detail in Annex A. This figure also was confirmed by the expectations of the operators during consultation.

Cost assumptions

Based on the consultant's interviews with operators and data received, the following cost assumptions have been made:

• BTS CAPEX KES 32 Million (US$ 320,000) assuming the site has a 70 metre tower for rural reach, is off-grid with duel diesel generators, plus solar and hybrid batteries, 16 Mbps transmissions bandwidth and 8 TRXs. This also includes an average allowance for multi-hop backbone bandwidth upgrade from the new BTS to the nearest base station controller (BSC). This is near the highest cost estimates for Kenya from the operator interviews and response to the consultant's detailed data questionnaire. *The estimate is 30-50% higher than costs witnessed in some other East and Southern African countries. However, the operational reliability (e.g., power system back-up) is believed to be built to a higher standard and the site security costs are legitimately higher. Also, these Capex figures have not changed appreciably since the 2011 Access Gap Report.* The consultant believes that the use of the higher cost assumption should be able to guarantee that all operators will participate in the competition. It is expected that the competitive pressure will reduce the actual subsidy cost.

- OPEX costs KES 550,000 (US$ 5,500) per BTS site per month covering all equipment and site operation & maintenance, fuel, lease costs, security and spectrum fees. As above, this is the higher end but plausible detailed estimate received from operators. Again, this is higher than observed elsewhere in the region and appears to result from a combination of less total reliance on Solar power (i.e., use of more fuel) for reliability reasons and additional security.

- Direct cost of sales 35% of revenues to cover interconnection, customer acquisition, commissions paid to agents, etc. This is in line with figures observed elsewhere, but may be reduced in the final analysis depending on some follow-up with operators and CA, and can be switched off in the model.

Radial coverage distance

- Coverage calculation of the number of sites required to cover gaps areas is based on 12 Km radial coverage from a single BTS in the basic model analysis, even though greater distances can be achieved in rural areas with directional antenna optimisation.

- In sub-locations where the coverage requirement to meet the unserved area is less than one full BTS (and many are a small fraction), a minimum cost of KES 5 M (US$50,000) for mini signal extension sites or other forms of cell optimisation is assumed. If at least seventy five percent (75%) of a BTS is required to cover an unserved area, the full cost has been assumed. The consultant will investigate during the project planning phase, through ongoing use of the GIS tool, the aggregation of multiple sub-locations within a single Ward or partial Ward projects. This will identify where a small sub-location should be combined with other adjacent sub-locations to achieve viability or where an additional sub-location should be added to increase contiguity with existing network coverage and to eliminate the use of costly repeaters.

- Where the requirement is for more than one full base station, the fractional multiple has been taken as the cost (e.g., where an area requires, say, 1.3 or 1.7 x the area covered by one BTS). However, for largest sub-locations theoretically requiring more than 3 BTS's and where population distribution is uneven, an allowance has been made to reduce the coverage required where multiple sites will not be required to reach a high percentage of the population. *The GIS maps and model assumptions will continue to be used to check population distribution and cost factors, to optimise project comparison and design.*

Viability conditions for financial gap calculation – maximum subsidy required

- This assumes that the net revenues must pay back the capital investment in 7 years. Net revenue is defined as EBITDA in normal accounting practice: revenues minus direct costs and site monthly OPEX, totalled for 7 years. The number of years, as well as the demand and cost factors, can be varied under sensitivity analysis.

- The USF **Financial Gap** calculates a one-time subsidy contribution, assuming the payback condition cannot be met commercially, bringing the required CAPEX investment by the operator down to the point where its 7 year payback is met.

- Since the consultant is using conservative demand and cost factors, this subsidy estimate is considered to be an estimate of the maximum required per Bidding Lot. It is expected that the competition will reduce the actual required subsidies below the maximum estimates.

5.2.2   Selecting best practice USF "Smart Subsidy" projects

The following priority selection conditions are recommended based on the consultant's experience in many other countries, in Africa and elsewhere:

Financial gap criteria

- Projects should be able to generate at least 20% of the required revenue to meet the payback criteria and qualify as sound "smart subsidy" USF projects, otherwise projects may be chronically unviable and not sustainable in the long run, even after receipt of the subsidy;

- Further, above 90%, the project is so close to be commercially viable that it should not be considered a high priority for the fund;

- In summary, the consultant has selected projects showing between 20% - 90% viability, i,e., with a financial gap up to a maximum 80% of CAPEX as best candidates for funding in the short term;

- However, in the final analysis some sub-locations showing a lower ratio may be selected for inclusion into "bidding packages" if they form single hop bridges to more suitable sub-locations (i.e., higher unserved populations) that are more remote and would otherwise require expensive repeaters to reach them.

Populations uncovered

- The study recommends that in the initial phases of a USF program, sub-locations under consideration should ideally have at least 50% uncovered population, in order to create a significant or biggest impact in the USF's first round. *However, the analysis has considered greater than 30% uncovered as the potential trigger point in order to be as inclusive as possible of areas that are in need of coverage.*

- As a counter-balance to this low trigger point, to ensure that projects target significant unserved populations, the model also uses a *minimum population trigger*, such that uncovered population below 1,000 are discarded to ensure that Year 1 projects focus on larger unserved populations and meet as many unserved people in total as possible.

5.2.3 Consideration of unserved areas which have been committed by operators under their Licence Obligations negotiated in 2015

As noted in Section 5.1, two of the mobile operators, namely Safaricom and Airtel, have made licence commitments to roll out services in a number of sub-locations that are either unserved or under-served in terms of percentage of population covered, over the next 5-6 years, corresponding to the intended forward plan of the USF. The following commitments have been made:

Table 5-1: Operator roll-out licence commitments (Number of sub-locations)		
Years of commitment	**Safaricom**	**Airtel**
2016	243	10
2017/18	138	30
2019/2020	140	9
2021/2022	71	22

These specific commitments have been taken into consideration in the strategic project options for the USF. All have been entered into the Access Gap Model and those committed up to 2018 have been excluded from the funding program.

5.2.4 Model output for addressing the 2G service gaps

The following presents the findings of the model to meet the 2G gap areas:

Highest potential subsidy requirement to close all gaps

The total subsidy to meet all uncovered areas, prior to considering operation licence commitments or best practice project selection criteria, based on a trigger point of filling all gaps in sub-locations with over 30% uncovered population could be over US$ 157 million based on the modelling assumptions made. Aggregation of many projects to the ward or partial ward level would reduce this significantly. This highest estimate would cost more than US$ 59 (KES 5,900) per unserved person, which is generally high but not unexpected when seeking to cover the last 5% of population. Nevertheless, this estimate is notional only because of the considerations not included in this estimate.

Increasing the gap trigger point to sub-locations with more than 50% uncovered population reduces the overall subsidy requirement to US$133 million, while covering fewer people.

Smart Subsidy optimal approach

The gaps interim selection of best practice viable smart subsidy USF projects for the short term, which meet the above criteria (minimum 30%) and minimum population of 1,000 identifies ***approximately 348 sub-locations for potential investment,*** which would carry a total maximum subsidy of approximately US$ 41.4 million and reach more than 2.7% additional population (1.3 million and half of the total unserved population). This would cost around US$ 31.80 (KES 3,180) per additional consumer.

Operator commitments through License Obligations

However, referring to the licence obligations made by Safaricom and Airtel and recorded in Section 5.2.3, eighty one (81) sub-locations committed by the operators in 2016 overlap with the above list of 348 and a further fifty three (53) in the period 2017/18.

5.2.5   Interim conclusion on recommended USF First Year Program

After considering the above commitments up to 2018 only, the total number of sub-locations recommended as potential candidates for USF projects would thus reduce to 214 and the maximum subsidy to close the gaps is estimates at US$ 22.2 million. After the tender competition, it is projected that the USF would actually expend only two-thirds (67%) to 70% of this amount, due to the competitive bid pressure and expectation that all Bidding Lots may not be attractive enough to operators to bring in responsive bids. This is normal as observed in other jurisdictions. Thus the expectation is for a USF funding commitment of around US$15 million. Further analysis of the operator commitments beyond 2018 would reduce the selection of priority projects below this. However it is not recommended to exclude these from the bidding on account of the priority placed upon serving sub-locations which are identified as priority targets for the 2016/17 time frame.

Figure 5-1 (following page) illustrates potential cell-sized Gap Projects in Mandera and Wajir Counties. The map illustrates the potential for more than one sub-location to be combined into a multi-cell Ward or partial Ward bidding lot in some cases, for combined economy and reduced subsidy.

Figure 5-1: Illustration of potential USF Sub-location Gap Project Bidding Lots
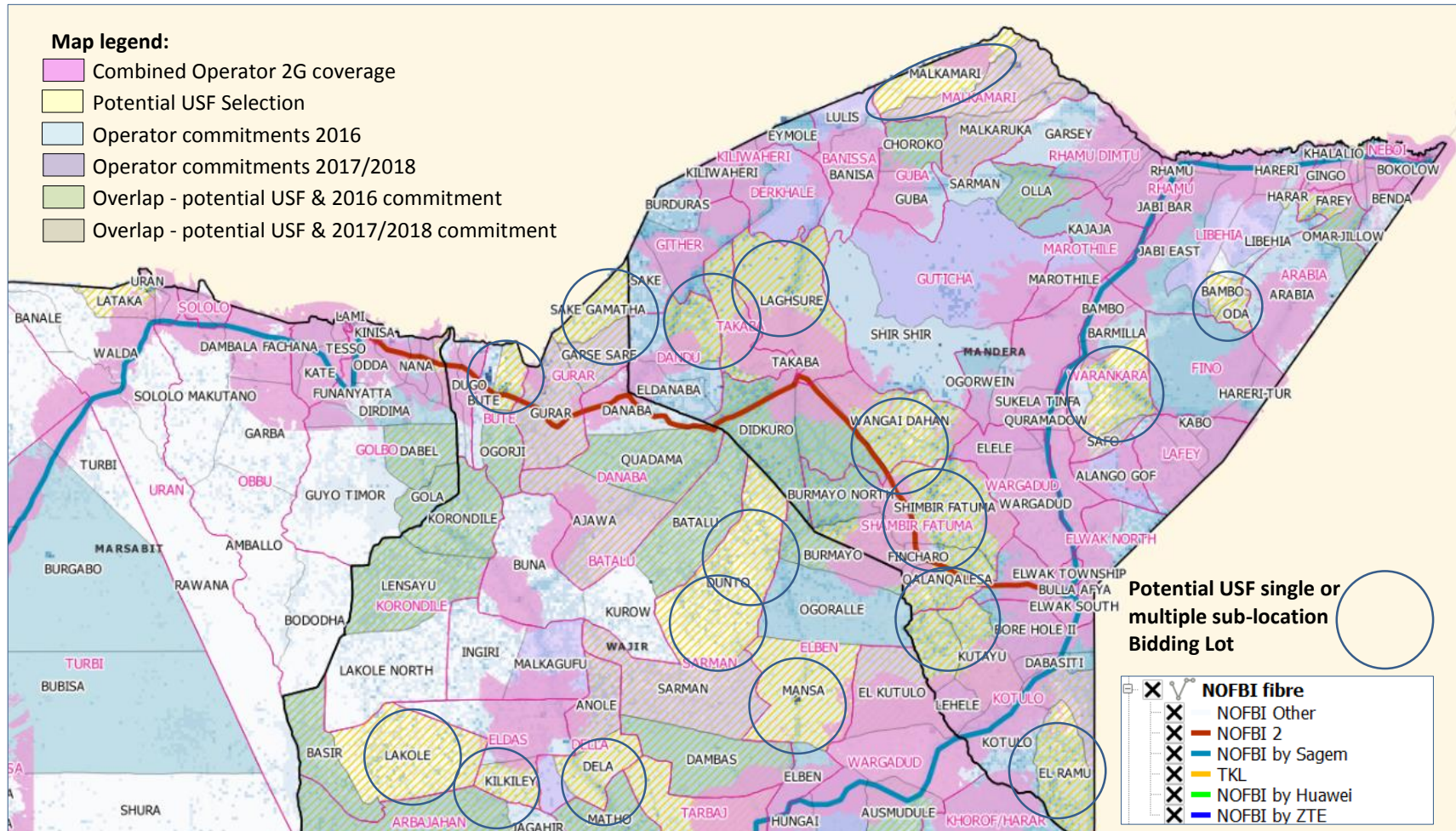
5.2.6   Next steps in Project Refinement, Design and Appraisal

The identification of best candidates for smart subsidy competitive tendering presented in this report represent an interim projection for the Year 1 USF investments and will also lead to the setting out of priorities for the longer term.

Optimising project design by combining contiguous coverage areas

All gap areas will be subjected to closer examination, including further study of terrain factors, and to a sensitivity analysis test in order to optimise project designs and Bidding Lots for the tender competitions. For example, Figure 5-1 illustrated a few cases where:

a)   More than one sub-location can be combined into a single bidding Lot. This allows economies in site costs to be realised and that locations which require less than a single incremental cell can be afforded for the subsidy amount calculated;

b)   Some sub-locations should also be grouped with neighbouring sub-locations in order to ensure that network build-out can achieved contiguously from existing coverage areas, thus avoiding costly repeaters to reach remote targeted areas; and

c)   One or more sub-locations which were calculated to be unviable on their own may be viable for smart-subsidy when combined with a neighbouring sub-location, especially considering b) above.

The principle of combining viable with less viable areas into a larger Lot encompassing partial wards is also shown in Figure 5-2 , illustrating Magadi Ward in Kajiado County and Loita Ward in Narok. Populated parts of two less viable sub-locations – Lenkobei and Oloika – can also be covered together with more distant and heavily populated sub-locations in Magadi Ward – Shompole, Endoinyo-Olasho and Pakase - as well as mountainous sub-locations in Loita Ward – to create a viable combination of BTS sites which are contiguous (within one microwave hop) of existing coverage and reachable without costly repeaters.

Figure 5-2: Incorporation of Viable and less-viable sub-locations into Bid Lots
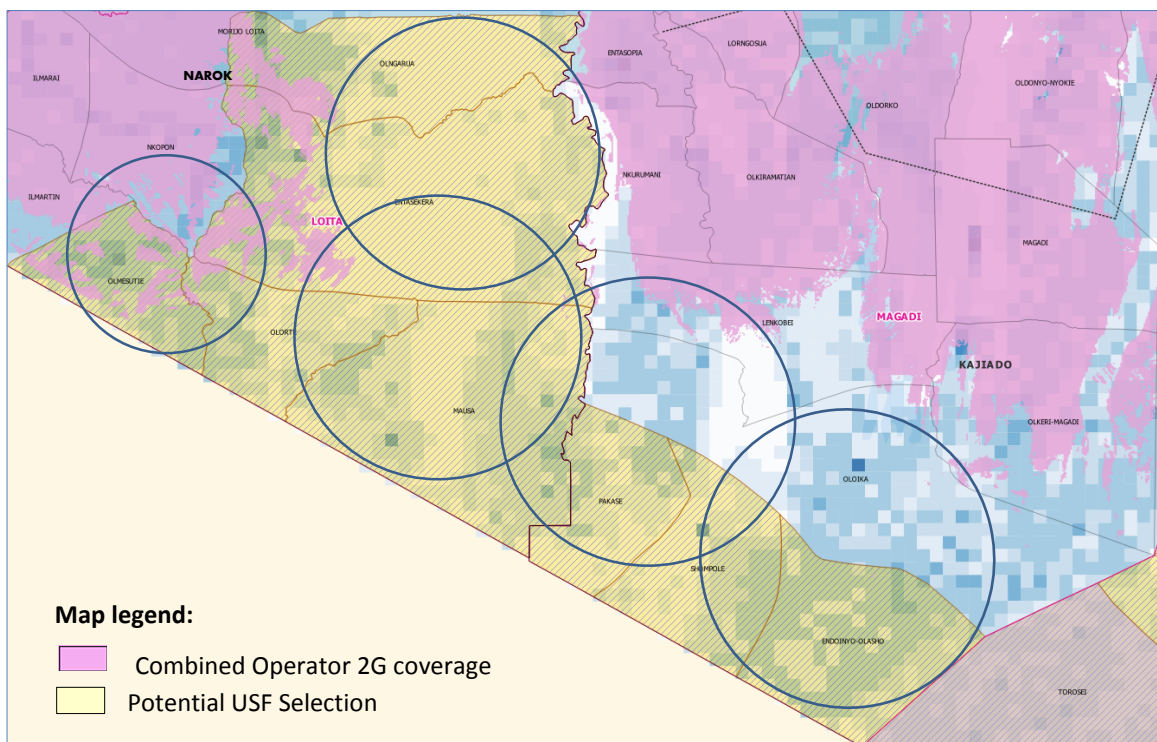
Reviewing terrain related CAPEX and OPEX assumptions in project design

Each county will also be reviewed to consider topographical features, transportation and backbone proximity factors in order to ensure that the site placements and that the CAPEX and OPEX assumptions are reasonable. For example, in some cases it is expected that coverage assumptions and antenna orientation and reach could be adjusted due to terrain, or access roads may be required. In cases where adjustments should be made, these will be incorporated into the model to be reflected in the final project design and subsidy estimation. An example of where terrain factors and evident population concentration (as indicated by the LandScan darker pixels) can be considered is in West Pokot. Creative use of terrain, site placement and antenna patterns may enable some areas that are initially calculated as unviable by the Access Gap Model to be combined with areas estimated as potential subsidy projects, in order to create a ward project, such as Alale ward illustrated in Figure 5-3.

Figure 5-3: Potential Ward-level solution in difficult terrain in West Pokot
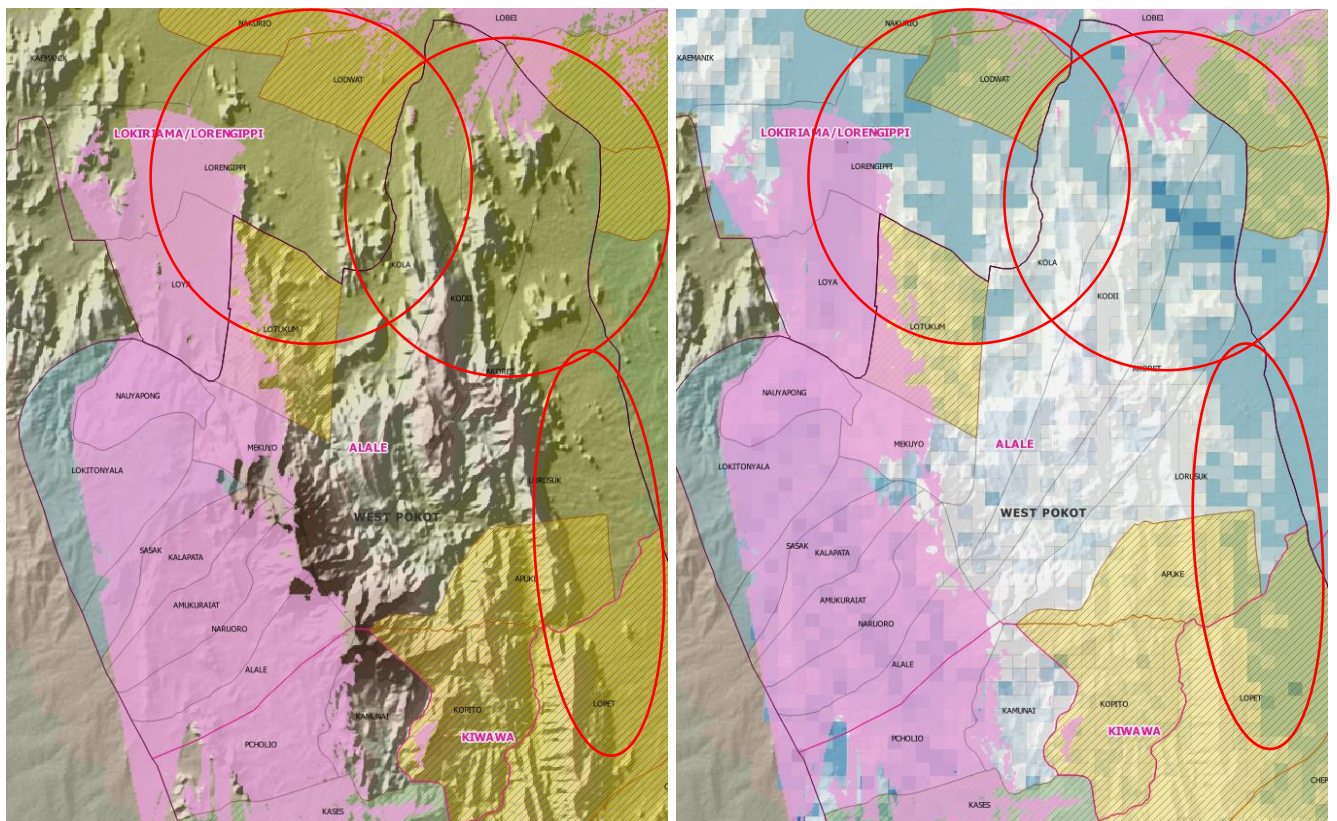
Spectrum fees

The cost of spectrum fees can amount to around 27% of the OPEX, depending on a number of factors. The consultant has conferred with CA and agreement has been concluded that spectrum fees shall be waived on USF projects for the course of the subsidy contracts, in order to reduce OPEX and thus reduce subsidy costs. This also has the impact of enabling a greater number of sub-locations to be reached by the USF.

Security issues

The consultant will continue to confer with operators and with advisors through the USAC in order to consider the cost of security in areas, and potential BTS sites considered most at risk and needing additional security resources.

Site visits to validate demand and user profiles

The appraisal of project designs includes a brief two-week visit to a small number of representative gaps areas by the consulting team to carry out community and topographic assessment and indicative assessments of user demand. The team will visit a sample of the sub-locations and institutional beneficiaries within priority areas before finalising the project feasibility analysis and selection. The purpose for this shall be to check and refine the consultant's knowledge of the characteristics of typical gap areas as candidates for USF projects, regional differences, additional cost factors such as access roads, and terrain factors for wireless coverage and subsidy estimates.

This exercise may result in some final adjustments to the project list or subsidy amounts from those contained in this report, as envisaged in Phase 2 of the project's terms of reference, prior to submission of the project designs and Bidding Documents to the Authority and Industry Stakeholders. The projects' design flow outcome is described in Sub-section 5.2.7.

A qualitative sampling of demand shall be included as part of the site visits, in order to increase confidence with interpretation of ICT demand survey data already available to the team from the KNBS and mobile platform surveys.

5.2.7   Project Design and Planning Report

This report will provide the following information to the Authority, ahead of the Project Design industry stakeholders workshop planned for June 2016. It will provide the following information and analyses:

- The final prioritised gap areas, projects and potential bidding lots identified as "best case" gap areas targeted for early USF implementation and support;
- The methodology used to appraise the projects – i.e., re-iteration of the Gap Model's subsidy estimation;
- Revenue assumptions based on all available demand survey data;
- Sensitivities to revenue, cost and other factors identified during the site / field surveys;
- Risks and best/worst/expected case outcome analyses;
- Cost/benefit and prioritization indicators beyond financial performance (e.g., subsidy per inhabitant, likely impact in terms of user benefits);

The report will conclude with a set of overall project appraisals and recommendations for:

- The most viable projects to proceed on a "smart subsidy" basis in the projects' implementation phase;
- The bidding Lots and tender strategy;
- A set of maps to show clearly the geographical, population and institutional targets;
- First draft of the Bidding Documents;
- The contractual template (e.g., the Draft Service Agreement); and
- The proposed bidding schedule, in accordance with the contractual timetable.

Project Design Industry Stakeholders' Workshop

The above report shall be delivered first to the Authority and presented to industry stakeholders one or two weeks later or as otherwise agreed and scheduled.

The Consultant will present the report through PowerPoint and online reference to the Web-GIS Portal which will contain the original access gap maps and information.

Since the workshop is a critical part of the consultation and buy-in process with operators and other stakeholders, the views and responses of the participants will be incorporated into the final design document.

5.2.8   Stakeholder and Operators' Report

Following receipt of opinion and discussion with CA, any recommended or necessary adjustments to the project plan and detail may then be incorporated into the project plan as required.

The revised report shall then be re-issued as the Stakeholders and Operators' Report. This report may include draft versions of the Bid Documents and Draft Contract Templates as annexes.

5.3   Addressing the 3G and Broadband Gap

The project appraisals will include also a major broadband component.

Three different approaches to address the huge geographic and large population gap in broadband service have been considered. These are:

A. **Cover all proposed voice projects in identified gap areas with UMTS900 3G base stations**, which would possibly maximise revenues in these areas, and offer broadband to schools and institutions not covered to date. This could be achieved in some (though not all) cases with minimal additional cost over 2G provision;

B. **A supply driven strategy** in which the USF would finance the upgrade of existing 2G sites to 3G throughout the country (using 900 MHz if feasible on a national scale), including the establishment of public access vehicles such as telecentres as well as connecting schools and other social infrastructure institutions within range (e.g., health centres);

C. **A demand-driven approach,** gearing the first stage of broadband advance to a schools or college connectivity program, educating and assisting the emerging generation of broadband users to become more IT literate. This would be focussed on institutions that demonstrate a readiness and demand for service.

5.3.1   Option A - All proposed voice projects to have UMTS900 3G base stations

As noted, this option could offer some considerable benefit to operators and users in the form of meeting additional demand for broadband service.

Two challenges would need to be overcome however. These are:

1. Whereas the cost of the BTS electronics and antennas would be approximately similar to 2G equipment, in some cases the cost of upgrading the capacity of transmission systems to the adjacent BTS and backhaul to the core network, would be costly and thus the incremental costs of the long distance backbone circuits could be significantly higher than that for 2G; and

2. The high percentage of new customers in those areas who may have very basic voice-only or feature phones (50-60%). This means they are not able to access 3G

at 900 MHz and this would limit the user penetration. The operator would then need to install both 2G and 3G base stations at additional cost (including additional power supply), or offer smartphones at a reduced price to encourage user take-up.

On balance this options is not recommended, except that a small number of the gap areas could possibly be assessed in the final project design as suitable for extension of the country's 3G coverage into the new areas.

5.3.2   Option B - A supply driven strategy to add 3G onto existing 2G sites in areas without broadband

The costs associated with the upgrading of sites with only 2G services today are relatively straight forward. These comprise:

a) incremental BTS electronics,
b) antenna enhancement,
c) more bandwidth accessing the backbone, and
d) some core network capacity augmentation.

However, the demand and incremental revenues are less certain, and difficult to predict. The results of the Mobile Platform Survey (Annex A) finds that many respondents are already using the basic GPRS and Edge capacity of 2G sites. The pace of increasing and *incremental* demand due to 3G availability is driven by the adoption rate of smartphones as well as user practices and affordability.

As well, considering that the current 3G reach of the leading operator is significantly more extensive than the other two operators, there is considerable risk that 3G upgrades could also distort the market which is emerging commercially. Further, the overall cost to the fund could be high.

As recommended by the 2011 Access Gap Study also, the consultant advises that this option may best be undertaken as a second priority, in the medium-long term, in favour of focusing the USF's first year broadband priority on the following option C.

5.3.3   Option C – Focusing on connectivity for secondary schools and tertiary institutions (below university)

There is a *national gap* in access to broadband connectivity for the education sector – encompassing both primary and secondary schools as was as the tertiary institutions below university. The gap includes most urban as well as rural schools. There are more than 22,000 primary and 7,000 secondary schools, very few of which have connectivity. Several operators – in particular Wananchi, Safaricom and Airtel - have gained some experience in connecting schools under their Corporate Social Responsibility (CSR) banner or small-scale, limited commercial basis. *It is also understood that operators are currently offering to connect primary schools to the Internet in a complementary activity with the primary schools e-learning (laptop) initiative currently underway.*

Why secondary and tertiary college institutions?

It is recommended to focus on the secondary and tertiary sub-university colleges for the following reasons:

• Due to having an established KCSE examinable computer studies curriculum, secondary schools are likely to have a cadre of more internet ready, better equipped teachers with ICT qualifications.

- In addition, colleges with appropriate facilities and skills are expected to exist, though they have to date not been able to afford the computer networking on offer to universities ;

- ICT skills are more urgent for the secondary and above student generation as they prepare for graduation and entering the workforce; and

- There is already some activity by operators to focus on primary schools because of the e-learning laptop initiative.

An approach focusing mainly on addressing this *national gap* identified in secondary school connectivity as well as in tertiary institutions below university level[15], in collaboration with the Ministry of Education Science and Technology (MoEST) and the Kenya Institute of Curriculum Development (KICD) is therefore proposed for the USF's Year 1 Program.

This will expect to employ a competitive combination of 3G, 4G, fixed wireless and fibre technical solutions for last mile access, though operators have generally advised during the consultation phase that schools need dedicated fibre or fixed point-to-point, point-to-multipoint or Wi-Fi wireless solutions.

In order to develop the details for this potential program, the consultant engaged in a round of data gathering with government and industry, as well as consulting with other stakeholders such as the Kenyan Educational Network (KENET), which has drawn support from some USF stakeholders as a potential player in the program.

Key criteria for success

Experience from many countries indicates that to be effective, an education connectivity program cannot focus on connectivity alone but needs to give attention to the whole ecosystem of Internet readiness, which include all of the following elements:

- **Electricity and computer lab** - The institution must have reliable electricity supply (which is now 80-90% the case in Kenya) and a sound existing IT infrastructure, generally in the form of a secured and well organised computer lab with local area network and /or Wi-Fi system *(or this would need to be provided or augmented under the connectivity program itself);*

- **ICT teacher capacity** –it must be demonstrated that the institution has trained or ICT-skilled teaching staff, *or this must also be provided through capacity building under the connectivity project itself or agreed flanking measures provided by other institutions;*

- **Curriculum readiness** – Secondary schools should already be on track with an established examinable computer and/ or ICT studies program approved or supported by the MoEST. The consultant has obtained an official list of 1,243 secondary schools which offer computer studies courses under the KCSE Program in 2015. It is expected that suitable schools for the USF program will be amongst this list.

- **Bandwidth** –The service should have sufficient access to international Internet bandwidth, e.g., at least 1MBps per connected computer, to ensure quality of experience;

- **Access to educational content and resources** – Either the school should have its own approved educational software or access to an expert and specialised gateway (Portal)

---

[15] Tertiary institutions are generally not served under the KENET network. They include colleges, vocational schools, colleges, technical training institutes ("polytechnics"), community colleges, nursing schools, research laboratories, centers of excellence, and distance learning centers, or other Post-secondary institutions. They offer diplomas or certificates for courses lasting anywhere from a few months to 4 years. Typical courses offered are accounting (including CPA), nursing, IT, Culinary studies, tourism, metalwork, teacher training, etc.

into cloud-based educational software which has been endorsed by the MoEST and KICD and provides necessary filtering, protection and security;

- **Available technical support** – School networks in particular often operate well below efficiency or availability because of lack of technical support. This would be best enabled by a call-centre help-desk staffed by technical experts. This should help both with problems of network connectivity as well as the internal lab connectivity and computer maintenance issues (e.g., viruses). This will help reduce the chances of school network mal-function, unaddressed operational and virus conditions due to lack of knowledge of teaching staff.

- **Subsidisation period and affordability** – The Capex and recurring service costs for schools at least need to be near 100% subsidised for at least three or four years in order to give the school sufficient time to budget for sustainability. Following the subsidisation period, the ongoing cost should be geared to reasonable budget affordability and this may be below $100 per month. This is based on the views of several stakeholders and on CA's experience with previous school based ICT pilot projects in Kenya.

Envisioned school connectivity approach

A proposal has already been made to the CA by the Kenya Education Network (KENET) and reviewed by the consultant. KENET is Kenya's National Research and Educational Network (NREN) and there is some international precedent for a solution administered by the national NREN[16]. KENET's proposal meets many of the above listed success criteria and therefore offers a favourable environment as the core of USF's education connectivity project for the secondary school sector. KENET already has experience of connecting a few schools that have proximity to a university campus as well as over 100 schools in Nairobi County under an initiative with Zuku of the Wananchi Group (K) Limited.

However, the costs of establishing a dedicated physical network appear to be higher than is affordable for schools in the long run. Various adaptations of the proposal are under consideration. These explore whether a closed network solution would meet the guidelines of the USF, or can be made more economical through competitive supply of the network technology and last mile connectivity. Ultimately, the solution needs to become an attractive platform for schools to connect at affordable costs at an increasing rate in future years.

In principle, the USF connectivity project would provide free or subsidized access to Internet / cloud based educational resources, but would not provide the in-campus ICT infrastructure (i.e., computers, computer lab and LAN or Wi-Fi). The main elements of the proposed project are as follows:

- **Selection of Internet ready schools and institutions -** USF will make a public advertisement for secondary schools to respond to, which demonstrates they meet minimum Internet readiness criteria to become participants in the project, with approval of MoEST. The criteria shall be as follows:
    - o Grid supplied electricity;
    - o A secured computer laboratory with at least 10 modern, working computers;
    - o ICT trained teachers and resource staff;
    - o Offering students an examinable Computer studies program under the Kenya Certificate of Education (KCSE).

---

[16] Examples of NREN's partnering or administering school connectivity initiatives include HEAnet Ireland (4,000 schools), FCCN Portugal 10,400 schools), GRNET Greece (15,305 schools), RNP Brazil (64,879 schools), CENIC California (all K-12 schools).

The requirements for participation by tertiary institutions would be equivalent, demonstrating the institution's readiness for USF support.

Because of the Year 1 project scheduling constraint, specifically the requirement to bid this project in parallel with the 2G Voice Gap project, the number of schools and colleges to be included in the bidding competition will be limited to the best selection of schools and institutions who respond and meet the readiness criteria prior to the bid document submission date (expected in first week June 2016).

- **Minimum regional representation -** At least one school or college (preferably at least two) will be targeted in each county. However as noted in Figure 5-4, the number of schools in the northern and eastern counties which have strong KCSE Computer Studies Programs are few.

Figure 5-4: Schools with more than 10 entrants to Computer Studies KCSE Exams
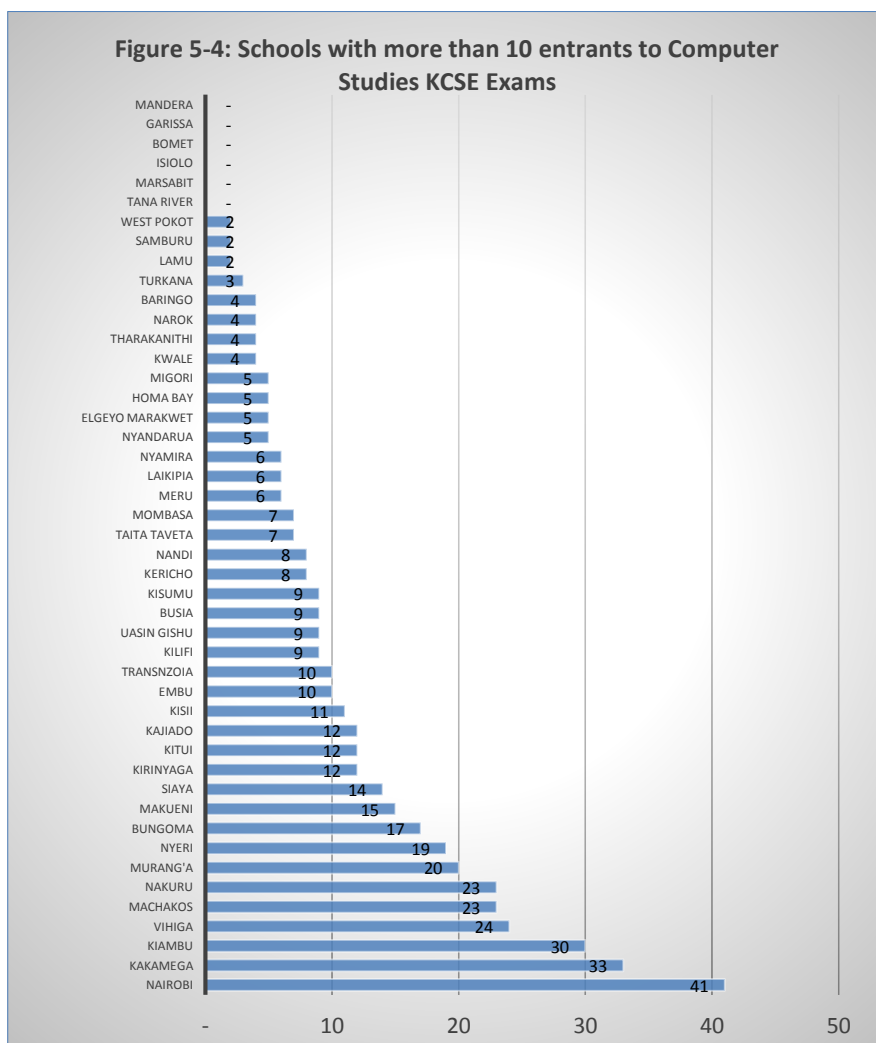
Therefore because of the risk of low e-readiness compliant responses:

- o USF and its implementation partner (e.g., KENET) will need to make every effort through direct contact with schools and institutions known to be offering computer studies courses to ensure that acceptable applications are received from every county;

- o County Governments and community groups will also be solicited as partners to support the application process, including to finance schools'

or institutions' readiness where existing infrastructure and capacity needs development;

   o An option to supply additional finance to purchase computers or improve computer labs to make schools Internet-ready under the USF project will be considered in a minority of counties, where judged necessary.

• **An educational portal** is envisaged to provide a gateway into the range of approved educational resource content available locally, e.g., existing Kenyan digital curriculum content from KICD, as well as to international resources approved by KICD, together with necessary security provisions. The portal could be provided by KENET or directly by KICD under its "Kenyan Education Cloud" and Learning Management System (LMS) initiative expected to be established in 2016.

• **An expert call-centre Help Desk** staffed by qualified IT specialists, e.g., under KENET or KICD management to support the schools;

• **Local in-premise ICT experts,** where required, to support the schools technically;

• **Teacher ICT and Internet training** for the participating schools, or demonstration by candidate schools that they already meet the minimum capacity criteria;

• **Competitive supply of network infrastructure and last mile access** by several telecom operators under the USF's principle of transparency and competition.

   o If access is directly to the Internet, operators must include a security / filtering function for content, as well as help-desk support;

   o Alternatively, the last mile access may be aggregated at regional nodes and provide leased line access into the KENET or KICD Portal.

The details of the above outlined project will be the subject of further discussion between CA, KENET and KICD prior to preparation of the Project Design and Planning Report described in Section 5.2.7. The specific breakdown of costs and competition methodology will also be developed and presented in the Project Design and Planning Report to be delivered to CA and stakeholders in May 2016.

Budgetary Cost

The Year 1 project will be budgeted at a maximum of KES 500 million (US$ 5 million). The initial expected cost breakdown is summarised approximately in Table 5-2. This is using primarily the costs provided by KENET with some important adjustments. These adjustments allow to increase the number of schools from 47 initially proposed to a *maximum* of 300. Subsidisation of the operating costs will continue through the second year within fiscal 2016/17 but will also need to be continued to the third and fourth years.

Table 5-2: Approximate Budgetary cost for the Broadband Education Initiative (KES millions)				
Details	**Qty**	**Year 1** **CAPEX**	**Year ½** **Recurrent**	**Total**
School ICT Infrastructure	10 max	50		70
Last Mile costs	300	300	50	350
International capacity	1		45	45
Schools Portal cost	1	17	10	27
ICT Capacity development	1	20		20
Network operations	1		9	9
Project management	1	7		
Subtotal		394	114	521

The consultant will confer with KENET, KICD and industry further in order to investigate:

- Minimisation of recurring / operating cost expectations in order to establish a price that is affordable to schools in the longer term, and

- Potential to increase the number of schools by several hundred in each year.

The consultant shall ensure that KENET's and/or KICD's role in the project includes close collaboration with MoEST on school selection and that the relationship is governed through a Memorandum of Understanding between KENET, MoEST, KICD and the CA.

Schools location data

The geographical location of approximately 90% of primary and secondary schools (public and private) and tertiary institutions were secured from the Kenya Open Data Portal (https://opendata.go.ke). Information received from operators and GIS Portal analysis (as illustrated by Figure 3-5 in Section 3.6.1) indicates that many thousands of schools – in both urban and rural areas – are located within 100-200 metres of an optical fibre route or within good radio line-of-sight of an operator's network node or university campus. These will provide the population of schools from which the initial "Internet Ready" secondary school candidates will be selected.

It is believed that many vocational or technical training institutions will also be suitably located for participation in the Year 1 project. This will be confirmed during the project design stage.

The education connectivity competition

It is envisioned that the USF may partner with KENET as the educational network integrator, while the schools connectivity provision will be competitively tendered in accordance with Kenya's Procurement Act and regulations including the existing USF Guidelines and regulations. The competitions will be organised to facilitate several bidding lots to be offered, evaluated and awarded in parallel with the 2G infrastructure services project under the Year 1 program.

As noted previously, because of the timing constraint, the number of schools and colleges to be included in the bidding competition will be limited the best selection of schools and institutions who respond and meet the readiness criteria prior to the bid document submission date (expected in first week June 2016).

6   USF Resources and Gap Project Planning

This section sets out the financial resources that will be available to the USF over the next five years, commencing with an account balance of KES 2.9 Billion at year-end 2015 plus and estimated KES 800-900 M in 2016, expanding in scale each year due to market growth. The total available funds over five years to 2020 will amount to KES 8-9 Billion.

The section also explains the principles of sound USF financial and project planning, e.g., for the fund to maintain first year expenditures at a maximum of fifty percent (50%) of total start-up resources, so that the fund can maintain momentum. As well, the increase in human resources that will be required for the USF to have the capacity for successful project development, management and monitoring is explained. A five year perspective of USF receipts and expenditures on projects, showing the year-on-year balance and resource depletion and replacement is provided.

6.1   USF Income Profile

Assuming the consultant's conservative assumption that the total contributions to the fund are around KES 800-900 M per annum (i.e., US$ 8-9M), and that the current account stands at 2.9 billion KES (i.e., US$ 29M), the future revenues of the fund for the next five years have been projected as shown in Figure 6-1, based on minimum and maximum assumptions of 2-9% growth in US$ terms per annum:

Figure 6-1: USF Income based on 0.5% Gross Levy (US$ Mn)
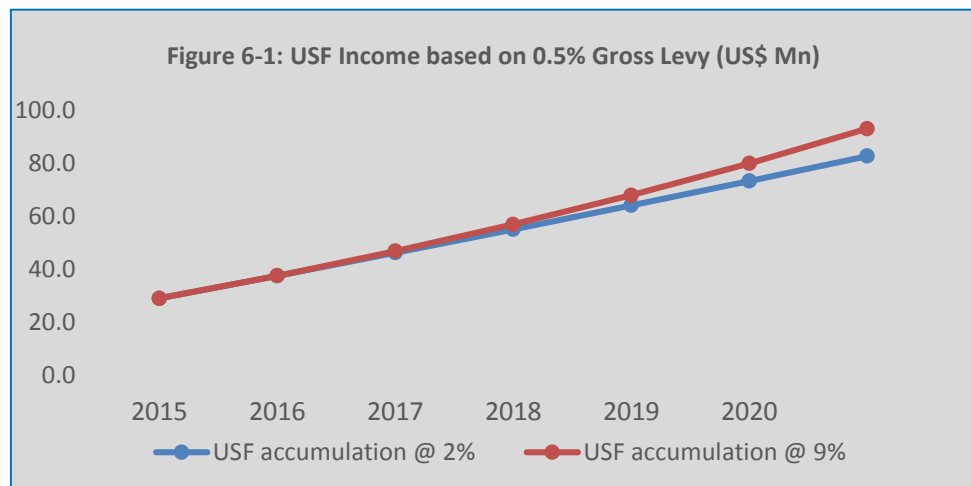
6.2   Recommended expenditure on first projects

Based on capacity considerations and the need to balance expenditures over a five year program, the consultant advises that the first year's projects in fiscal 2016/2017 should be conservatively projected at no more than a maximum of 50% of the total amount in the fund account including the expected 2016 contributions. The actual amount of disbursement might well be lower and this is prudent during the initial implementation of the USF. This will ensure that the fund's program will commence soundly, lower the risk during the first round of competitive bidding of the USF, and enable the growth of expenditures and resources to be in balance in future years.

Based on normal distribution cycles of typical USF subsidy projects and the date of program commencement, around 67-70% of the total subsidy commitments in the Year 1 projects would be distributed within the first fiscal period of 2016/17. USF subsidy contracts are typically distributed over more than 12 months, for example:

- 30% on contract,
- 30% when equipment delivered and into country or on site,
- 30% on service commissioning, and
- 10% holdback until 3-6 months satisfactory service.

It is possible that some project Lots will proceed rapidly (dispersing up to 90% in the year), while others will suffer delays, which are normal, and achieve no more than 60%.

As noted above, the planning target will be to deplete the resources in the fund at a controlled pace so that there remains sufficient funds for the following year, while increased revenue injections (e.g., from the CA's reserve) could allow for an acceleration in the level of investment on a year to year basis, provided there remain needy projects that can be funded on a "smart subsidy" competitive basis. However, based on USF international experience in the past, many USFs are challenged to develop and implement suitable projects at this high rate, and thus actual disbursements are sometimes slower.

Based on the consultant's experience, the amount of resource accumulation will be more than sufficient to match the USF's capacity for project planning and implementation.

6.3   Five year perspective

Assuming growth in the fund's resources as shown in Figure 6-1, the projection in Table 6-1 shows the total subsidy expenditures, commencing at US$ 19M commitments in year 1 (2016) reducing to US$ 15 million in years 2 to 6 (2021). This continuous flow of projects is an optimal disbursement scenario assuming the USF is operating at full capacity. International experience shows that few funds have been able to perform at this level. In order to maintain this, the number of projects requiring to be managed and monitored assumes that the USF builds up its establishment capacity to around 9 persons, including senior persons with engineering and project management skills.

Table 6-1 shows that the amount of resources in the fund would be depleted after 5 years under the slower 2% market growth scenario if the USF maintained the level of investments shown. International experience shows that the USF will be hard pressed to maintain such an intensive program after conclusion of the Year 1 assistance project. If the program can be maintained, the fund would be able to eventually hold and maintain a minimum balance for future years' requirements under the more optimistic 9% growth assumption.

Table 6-1: USF Resources and Expenditure Projections							
Year	2015	2016	2017	2018	2019	2020	2021
Amount in fund (USD Mn)	29.0						
Build-up@ 2% growth		37.5	46.2	55.0	64.0	73.2	82.6
Build-up @ 9% growth		37.5	46.8	56.9	67.9	79.9	92.9
Project commitment		19.0	15.0	15.0	15.0	15.0	15.0
Distribution (70% fiscal year)		13.3	10.5	10.5	10.5	10.5	10.5
To disburse in next year		5.7	4.5	4.5	4.5	4.5	4.5
Balance remaining if 2% market growth		24.2	16.7	10.5	4.5	-1.3	-6.9
Balance remaining if 9% market growth		24.2	17.3	12.4	8.4	5.4	3.4

It is expected that the basic voice projects will reduce from year 2 onwards, while the broadband program including education and other sector projects will increase in importance and accelerate in expenditure.

7 Conclusions

7.1 The gaps

The study has demonstrated that the telecommunications gaps are as follows:

7.1.1 Telecommunications

Voice services

The basic mobile voice service gap has reduced to 5.6% of the population which is a major achievement as the gap was still 11% of the population in 2011. This is largely due to expansion by the commercial operators, market forces and a well-regulated competitive sector. Only 164 sub-locations, mainly in the North Rift and North Eastern regions of the county remain with zero coverage and another 414 sub-locations have less than 50% population coverage. Geographical coverage of 2G mobile signals reach only 45% of the land area of Kenya and achieving full coverage to the remaining parts of the country would be an immense and costly challenge and should not be attempted as that would not be sustainable.

Almost 50% of this gap could be closed shortly by 2018. Nearly half of the sub-locations with zero coverage – a total of 114 - including well over half of the uncovered population- could be addressed in the first year of USF operations or are committed under licence obligations by Safaricom and Airtel between the years 2016 to 2018. A further 31 sub-locations are covered under operator licence obligations in the period between 2019 and 2022. Table 7-1 summarises the status of all 164 sub-locations.

Table 7-1: Summary of the status of 164 sub-locations with zero coverage in 2015							
	USF Year 1	Operator licence commitments					Remainder
		2016	2018	2020	2022	2024	
Sub-locations	42[17]	43	18	25	6	-	44

From the total of 44 remaining, seven (7) are estimated to be commercially viable and will likely be covered without intervention. The remaining have very low viability and many are geographically very large areas, but most will be considered for partial coverage (i.e., covering the pockets of stable population) under the USF five year strategy for future years.

A complete list, with commitments and comments is provided in Annex D. These, as well as other underserved areas, will be studied further and recommendations made under the 5 year strategic plan to be prepared by Intelecon at the conclusion to this study.

Broadband services

While 3G services cover only 17% of the geographical area of Kenya, they reach 78% of the population. Furthermore, a substantial portion of the remainder of the population as well as the vast majority of schools, tertiary and other social infrastructure institutions, can be reached within a short distance of the main optical fibre routes which now have a presence in every county.

---

[17] Ten of the sub-locations currently under consideration for the USF Year 1 Program are also covered under operator licence obligation in 2019/2020 or 2021/2022.

Post and courier services

All counties in Kenya have at least 2 post offices, and on average 13 post offices, though with regional variations. Almost all constituencies (264 out of 295) have at least one post office, and a third of the wards has a post office. This study also detailed a range of other postal access and distribution data and communications coverage of postal services.

However, access standards for universal postal services are as of yet to be developed by policymakers, based on actual demand, actual net cost of USO, possible new business models and sustainability considerations, which is recommended in the 2014 Postal Sector Report referred to in Section 4.2.

Television Broadcasting

Kenya is a leader in the conversion to Digital Terrestrial Television (DTT) in Africa and to date has implemented DTT stations through the two licensed signal distributors KBC – Signet and Pan African Group (PANG) - to cover 60% of the population. This will reach 69% by mid-2016 as already contracted sites will be brought on stream. All counties will have at least one transmitter and more than 47% of sub-locations will have greater than 90% signal coverage. Another 12% will have better than 50% coverage. 1,927 sub-locations will still remain without any coverage.

The most recent TV penetration estimate noted in this report indicated that only 32% of Kenyan households own a TV. It is therefore advised to allow market adoption to increase before USF investment to push for more coverage at this stage.

7.2   The USF resources

The USF currently has KES 2.9 billion (US$ 29M) available finance and this will grow by a further KES 800-900 million minimum (US$ 8-9M) in 2016. Thus the fund's resources in late 2016, when the first subsidy contracts are awarded will be over KES 3.5 billion. The USF's resources will grow at a rate estimated between 2% and 9% in US dollar terms over the next 5 years and will enable investments to be made of between KES 8-9 billion (US$ 80-90M) by the year 2020/21.

The consultant has previously advised that the USF should expand it human resources, targeting a capacity of 7-9 persons in the next year, in order to have the capacity for multiple project planning, design, management and monitoring. At least one, ideally two of the additional staff should have a telecom engineering background for project development, design and management and additional deputies should also have technical skills. Without these increases, CA would need to enlist consulting resources to assist with continuation of the USF program until its own resources are augmented.

7.3   The Proposed Priority Projects

This report is proposing a first year strategy which focuses on meeting the priorities which have emerged during consultation, namely:

- **Voice services** – Make a large contribution to closure of the remaining gap in basic voice services. This will reduce the population coverage gap from 5.6% of the population to 2.8% by 2018, combining USF investments with the licence obligations already accepted in 2015 by the two leading operators, Safaricom and Airtel.

- **Broadband** - Establish a first step towards addressing the *critical national gap* which exists in connectivity of secondary schools and tertiary college institutions.

These priorities shall be implemented under the accepted guidelines of the USF, which stress transparency and competition in the distribution of funds and have led to development of the following two projects for the first year of the USF's operation:

7.3.1   Voice Gap Project

The Voice gap project will be developed and tenders as a multiple bidding lot project in which operators will be able to bid for as many or few of the Lots as interests them.

A total of 348 sub-locations have been selected (reduced to 214 after consideration of operator licence obligations between 2016 and 2018) as the cases which best meet the performance criteria as suited to smart subsidy competition, as presented in Section 5.2.

These will be subjected to refinement and combined into optimal ward or partial ward sized lots according to the following principles:

- Facilitating network build-out projects on the basic of contiguous growth from the existing network coverage to progressively more remote sites and areas;
- Creating sustainable projects after the subsidy period;
- Provision of opportunities which will interest all the operators in bidding;

Next steps to project finalisation and implementation

Following a brief field validation visit to representative gap areas and further study through the GIS mapping tool, the consultant will prepare a Project Design Report (scheduled for 27th May 2016) that will finalise all details of the project and bidding lots for submission to an Industry Workshop in the first week of June 2016. Bidding Documents will be available for the subsidy competitions at end of June 2016. Awards are expected to be made by early November 2016.

Expected Budget

As described in Section 5.2.5, the budgeting for USF projects needs to consider three stages of cost allocation and disbursement, illustrated as shown in Figure 7-1.

Figure 7-1: Voice Gap Budgeting

Maximum subsidy estimate
US$ 22.2 M

Expected award amounts
US$ 15 M

Distribute in Fiscal 2016/17
US$ 10 M
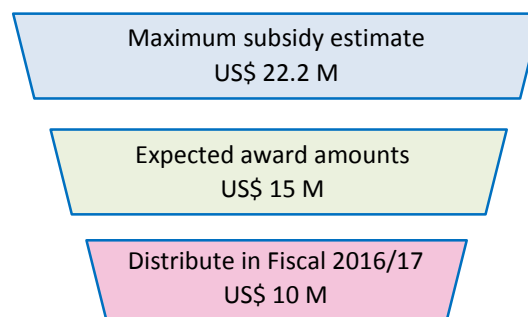
Steps to Fiscal 2016/2017 Expenditure

1. As currently estimated the maximum subsidies calculated if all tender lots are bid would be US$ 22.2 M. Each Tender Lot will have a declared maximum subsidy amount which proponents must bid below.

2. Since the cost estimates are on the high side and the revenues are slightly under-estimates, it is expected that various factor could yield lower bids. As well, some Lots may not attract bidders. Thus the expectation is that the total of awards made will not exceed 67-70% of the sum of maximum estimate before project finalisation, reducing the total project budget to approximately US$ 15 M.

3. Since, as noted in Section 6.2, subsidies are distributed on a progressive basis, on average it is not expected that the USF will distribute more than 67% of the awards made in the first fiscal year of operation (2016/17), thus the final amount distributed in 2016/17 on the voice service project will be approximately US$ 10 M (KES 1 billion).

7.3.2   Schools Broadband Connectivity

A holistic, multi-faceted and national approach to Internet connectivity for the nation's secondary schools and tertiary college (sub-university) institutions is recommended. This is envisaged to include:

- The identification or creation of Internet ready ("e-ready") schools and institutions in each county. In particular, a main focus will be secondary schools that are already teaching the KCSE Computer Studies curriculum and offering students for examination;

- The provision of necessary ICT training to the teachers in participating institutions to ensure that they are well prepared to make use of connectivity;

- Provision of broadband connection and support to the "Education Cloud" portal – the Learning Management System - that is to be established by the Kenya Institute of Curriculum Development (KICD). This will facilitate ready access to digital content developed by KICD as well as to other approved education content and resources; and

- Technical support to ensure that the connected schools are not hindered by technical problems from fully benefitting from broadband connectivity.

The first year project is envisaged to be a demonstration pilot after which it is expected that an increasing number of "e-ready" secondary schools will subsequently prepare themselves and come forward for connectivity under USF support in future years.

The project is currently planned to be organised as follows:

- A strategic partnership with an educational network agency, the Kenya Education Network (KENET) is under consideration, though not at this stage concluded. KENET has the ability and capacity to support schools networking and to support and advise the consultant and CA during the procurement cycle as well as to operate the network. However long term budget affordability and sustainability concerns will also be influential in the final decision;

- Careful selection of at least one school or institution per county – with the support of County Governments and Ministry of Education, Science and Technology (MoEST);

- Technical assistance to a minimal number of schools in the most needy counties, for provision of their ICT infrastructure and digital learning materials, if necessary;

- Connection of a number of additional schools and institutions nationally (up to 250) that meet specific, published criteria for Internet readiness. These criteria will include: a) possession of a secured computer lab with at least 10 modern PCs or laptops, b) trained ICT teachers, and c) active participation in the KCSE computer studies curriculum;

- Supply of "last-mile" access and connection to dedicated access nodes (still to be determined), with unlimited data volume and bandwidth of at least 1 MBps per connected computer;
- Support the establishment through KENET or directly via KICD (to be determined) a portal through which educational content as well as other approved content, can be secured and supported;
- Provide ICT training course(s) and ongoing webinar-based ICT based pedagogical support for teachers joining the project;
- Provide access to a help-line staffed by dedicated IT experts and technical support.

Expected budget for the Broadband project

This first year USF education project will have a budget of US$ 5 M (KES 500 M) including Capex and school access and network operating subsidy during the first year. Similar financial support network access will be provided for a further three (3) years.

Next Steps to project implementation

The Education Connectivity project will follow the same schedule as the Voice Access Gaps Project. Some schools and institutions will be visited during the field validation visit. The project shall also be included in the Project Design Report (scheduled for 27th May 2016) that will finalise all details of the project and bidding lots for submission to an Industry Workshop in the first week of June 2016. Bidding Documents will be available at end of June 2016. Awards are expected to be made by early November 2016.

The consultant will confer with KENET, KICD, MoEST and industry further, prior to project final design in order to ensure that the project will be affordable and financially sustainable for scaling up to a large numbers of schools and institutions in the following years.

The consultant shall also ensure that all participants' roles in the project includes close collaboration on school selection and that the overall relationship is governed through a Memorandum of Understanding between KENET, MoEST, KICD and the CA.

All technology supply, "last-mile" and Internet connectivity will be tendered competitively under a Bidding Lot basis, in order to reduce unit costs from the initial estimate and provide the opportunity for several operators to win award contracts for the supply and operation of the services.

Annex A: Access Gaps Study - Terms of Reference

The specific terms of reference for the consultancy cover activities which are undertaken in two separate phases (Phase 1: Access Gap Study; and Phase 2: First Project Implementation and USF Operating Manual and other Documentation), and are as follows:

Phase 1 – Access gap study for communications services

a) Conduct an in-depth analysis of communication services in the country and map out access gaps in voice, data, broadcasting and postal and courier services at sub-location level across all counties in Kenya.

b) Develop an interactive portal for regular updates and definition of the gaps for each service area giving GPS coordinates for selected USF clusters, including existing institutions, businesses and commercial Centres within the selected cluster such as schools, universities, hospitals, airports, government offices, major road and energy networks in the area.

c) Hold consultations with operators (licensees) and other relevant stakeholders to identify areas requiring Universal Service Fund support.

d) Design an economic/ financial model for estimating capital and operating expenditure, expected revenue and subsidy requirement for projects.

e) Determine the cost of bridging identified gaps.

f) Carry out stakeholder workshops to disseminate study outcomes.

g) Train staff on Subsidy estimation modeling.

h) Generate a Final ICT Access Gaps Report based on a GIS platform hosted on a portal which can be updated periodically.

Phase 2- Design initial USF projects and assist competitive tendering

i) Map out viable bidding lots for network expansion projects/programs.

j) Undertake a project appraisal for the bidding lots.

k) Prepare investment, expense and revenue forecast and risk assessment for each bidding lot.

l) Recommend estimated cost/ benefit results for each project/ bidding lot

m) Develop bidding documents/templates.

n) Undertake consultation with industry on network expansion project with a view to seek inputs and ensure participation in the project.

o) In consultation with industry design licenses/ contract templates for USF projects/programs.

p) Support the fund in pre-bidders meetings, evaluation and contract negotiation processes.

q) Prepare a final report on the project

r) Develop a 5 year implementation strategy based on projected funding

s) Review and align Universal Service Fund operating / Implementation manual to the Authority's internal processes and procedures, Public Procurement Act, the Kenya Information and Communication Act and the Public-Private Partnership Act 2013.

Annex B: Mobile Platform Demand Survey

[Separately delivered file]

Annex C: Interactive Geoportal Specification and GIS training needs assessment

(File supplied separately)

NO.	COUNTY	WARD	SUBLOCATION	UNSERVED POP'N	CELLS REQ'D TO COVER AREA	USF YEAR 1 PROJECT LIST	OPERATOR LICENCE COMMITMENT
1	BARINGO	CHURO/AMAYA	MUKEKAMAR	5,441	0.06	-	(commercially viable)
2	BARINGO	SILALE	NASOROT	6,939	0.10	-	(commercially viable)
3	BARINGO	TANGULBEI/KOROSSI	MAKANY	2,954	0.08	-	Safaricom 2016
4	BARINGO	TIRIOKO	AKORET	1,869	0.16	Yes	-
5	BARINGO	TIRIOKO	KAPUNYANY	4,061	0.11	-	Safaricom 2016
6	BARINGO	TIRIOKO	LOKIS	2,445	0.27	Yes	-
7	BUNGOMA	CHEPYUK	KUBURA	3,890	0.04	-	(commercially viable)
8	GARISSA	DANYERE	DAGOOB	2,995	0.47	Yes	Safaricom 2016
9	GARISSA	DANYERE	LIBAHILOW	7,308	0.85	Yes	Safaricom 2017/2018
10	HOMA BAY	MFANGANO ISLAND	WAKULA NORTH	9,027	0.04	-	(commercially viable)
11	ISIOLO	CHARI	KOM	648	4.40	-	-
12	ISIOLO	CHERAB	DUMA	438	2.83	-	-
13	ISIOLO	CHERAB	URURA	1,298	3.97	-	-
14	ISIOLO	KINNA	KORBESA	2,172	1.25	-	-
15	ISIOLO	KINNA	MODOYAKA	1,337	1.21	-	-
16	KAJIADO	MAGADI	ENDOINYO-OLASHO	1,728	0.41	Yes	-
17	KAJIADO	MAGADI	PAKASE	3,377	0.25	Yes	Safaricom 2019/2020
18	KAJIADO	MAGADI	SHOMPOLE	2,085	0.32	Yes	-
19	KAJIADO	MOSIRO	EMBARBAL	2,429	0.72	-	-
20	KAJIADO	MOSIRO	OLDORKO	3,180	0.51	Yes	Safaricom 2016
21	KAJIADO	OLOODOKILAN	EMUKUTAN	1,109	0.37	Yes	-
22	KAJIADO	OLOODOKILAN	TOROSEI	3,813	1.26	Yes	Airtel 2017/2018
23	KILIFI	ADU	MATALONI	2,064	3.72	-	-
24	KILIFI	BAMBA	GOSHI	1,206	0.17	Yes	-
25	KILIFI	GANZE	MWAMBANI	3,094	0.24	Yes	Airtel 2016
26	KILIFI	SOKOKE	DIGIRIA/MAPOTEA	3,200	0.19	-	Safaricom 2017/2018
27	KITUI	KANZIKO	KEITUNDA	2,264	0.08	Yes	-
28	KITUI	KANZIKO	KITUVWI	2,388	0.21	Yes	-
29	KITUI	KANZIKO	KYANYAA	1,513	0.04	Yes	-
30	KITUI	KANZIKO	MIVUNE	1,701	0.03	Yes	-
31	KITUI	KANZIKO	NDILILI	1,697	0.04	Yes	-
32	KITUI	ZOMBE/MWITIKA	KAVINGO	3,088	0.11	-	-
33	LAMU	BASUBA	MANGAI	309	-	-	-
34	LAMU	KIUNGA	KIWAYUU	669	0.01	-	
35	MANDERA	GUTICHA	SARMAN	7,859	0.40	-	Safaricom 2017/2018
36	MANDERA	LIBEHIA	BAMBO	1,017	0.22	Yes	-
37	MANDERA	LIBEHIA	LIBEHIA	14,807	0.37	-	Safaricom 2019/2020
38	MANDERA	LIBEHIA	ODA	1,669	0.16	Yes	-
39	MANDERA	MALKAMARI	HULLOW	7,556	1.20	Yes	Safaricom 2017/2018
40	MANDERA	MALKAMARI	MALKARUKA	10,361	1.05	Yes	Safaricom 2017/2018
41	MARSABIT	DUKANA	BALESA	4,661	3.55	-	Safaricom 2019/2020
42	MARSABIT	DUKANA	EL-HADI	3,051	2.61	-	Safaricom 2021/2022
43	MARSABIT	DUKANA	SABAREI	5,342	7.52	-	-

NO.	COUNTY	WARD	SUBLOCATION	UNSERVED POP'N	CELLS REQ'D TO COVER AREA	USF YEAR 1 PROJECT LIST	OPERATOR LICENCE COMMITMENT
44	MARSABIT	GOLBO	DABEL	5,299	0.86	Yes	Safaricom 2016
45	MARSABIT	GOLBO	GOLA	3,883	0.50	Yes	Safaricom 2016
46	MARSABIT	ILLERET	ILLERET	12,022	11.03	-	Safaricom 2016
47	MARSABIT	KARARE	SCHEME	1,530	0.36	Yes	-
48	MARSABIT	KARGI/SOUTH HORR	ARGE	1,304	1.32	-	-
49	MARSABIT	KORR/NGURUNIT	ILLAUT	3,248	1.13	-	Safaricom 2017/2018
50	MARSABIT	KORR/NGURUNIT	NGURUNIT	3,728	1.22	Yes	Safaricom 2019/2020
51	MARSABIT	LOIYANGALANI	MOITEI	2,285	1.19	-	-
52	MARSABIT	MAIKONA	HURRI HILLS	2,973	3.66	-	Safaricom 2016
53	MARSABIT	NORTH HORR	CHARI GOLLO	1,940	3.19	-	-
54	MARSABIT	NORTH HORR	DARATE	2,450	7.14	-	-
55	MARSABIT	OBBU	AMBALLO	1,706	2.44	-	-
56	MARSABIT	OBBU	BODODHA	1,011	1.63	-	-
57	MARSABIT	URAN	BANALE	383	0.50	-	-
58	NAROK	LOITA	MAUSA	3,575	0.87	Yes	Safaricom 2019/2020
59	NAROK	MOSIRO	ENKOIREROI	1,275	0.18	Yes	-
60	NAROK	MOSIRO	MOSIRO	1,590	0.22	Yes	-
61	SAMBURU	BAAWA	LBUKOI	1,365	0.67	-	-
62	SAMBURU	BAAWA	MORU	1,843	0.87	-	-
63	SAMBURU	NDOTO	ARSIM	1,886	0.91	-	-
64	SAMBURU	NDOTO	ILLAUT	1,017	0.33	Yes	Safaricom 2017/2018
65	SAMBURU	NDOTO	LATAKWENY	2,537	1.08	-	Safaricom 2019/2020
66	SAMBURU	NDOTO	LOIKUMKUM	3,255	1.11	-	Safaricom 2019/2020
67	SAMBURU	NDOTO	LOODUA	2,074	0.80	-	-
68	SAMBURU	NDOTO	NGURUNIT	1,611	1.66	-	Safaricom 2019/2020
69	SAMBURU	NDOTO	SEREN	2,988	1.44	-	Safaricom 2019/2020
70	SAMBURU	NYIRO	IJUUK	589	0.33	-	-
71	SAMBURU	NYIRO	LKAYO	3,581	0.64	Yes	Safaricom 2019/2020
72	SAMBURU	NYIRO	NAKWEI	1,979	0.69	-	-
73	SAMBURU	NYIRO	WASO RONGAI	2,433	0.13	-	-
74	SAMBURU	SUGUTA MARMAR	IMAIYA	507	0.18	-	-
75	SAMBURU	WAMBA NORTH	ENKARE NAROK	3,626	4.03	-	Safaricom 2016
76	TANA RIVER	BANGALE	ODOWAN	2,177	0.22	Yes	-
77	TANA RIVER	GARSEN WEST	KONE	1,289	9.56	-	Safaricom 2016
78	TANA RIVER	WAYU	WAYU	5,175	4.44	-	Airtel 2017/2018
79	TURKANA	KAALENG/KAIKOR	KAALEM	7,538	2.19	Yes	Safaricom 2016
80	TURKANA	KAALENG/KAIKOR	KAKELAE	3,080	0.58	Yes	Safaricom 2017/2018
81	TURKANA	KAALENG/KAIKOR	KARACH II	1,799	1.66	-	Safaricom 2016
82	TURKANA	KAALENG/KAIKOR	KOTOME	2,821	1.71	-	Safaricom 2016
83	TURKANA	KAALENG/KAIKOR	LORUTH ESEKON	3,285	1.79	-	Safaricom 2016
84	TURKANA	KAERIS	KAERIS	6,808	1.44	Yes	Safaricom 2016
85	TURKANA	KAERIS	KANAKURUDIO	5,515	3.04	-	-
86	TURKANA	KAERIS	KANGAKIPUR	2,956	0.94	-	Safaricom 2016
87	TURKANA	KAERIS	MILIMA TATU	5,676	2.35	-	Safaricom 2016

NO.	COUNTY	WARD	SUBLOCATION	UNSERVED POP'N	CELLS REQ'D TO COVER AREA	USF YEAR 1 PROJECT LIST	OPERATOR LICENCE COMMITMENT
88	TURKANA	KAERIS	NADUNGA	5,248	2.38	-	Safaricom 2016
89	TURKANA	KAKUMA	TARACH	7,289	0.33	-	Safaricom 2017/2018
90	TURKANA	KALAPATA	NAKALALE	8,822	1.28	Yes	Safaricom 2016
91	TURKANA	KALOBEYEI	OROPOI	5,927	1.53	Yes	-
92	TURKANA	KANGATOTHA	LOMOPUS	3,044	0.75	Yes	Safaricom 2016
93	TURKANA	KAPEDO/NAPEITOM	EKIPOR	1,961	1.47	-	-
94	TURKANA	KAPEDO/NAPEITOM	KAMUGE	6,267	2.18	-	Safaricom 2021/2022
95	TURKANA	KAPEDO/NAPEITOM	NADOME	3,653	0.77	Yes	Safaricom 2019/2020
96	TURKANA	KAPEDO/NAPEITOM	NAPEITOM	7,742	2.41	Yes	Safaricom 2016
97	TURKANA	KAPEDO/NAPEITOM	NGILUKIA	4,356	0.95	Yes	Safaricom 2019/2020
98	TURKANA	KATILIA	KATILIA	9,513	2.22	Yes	Safaricom 2021/2022
99	TURKANA	KATILIA	PARKATI	11,455	4.84	Yes	Safaricom 2019/2020
100	TURKANA	KERIO DELTA	KANGIRISAE	4,473	1.24	Yes	Safaricom 2016
101	TURKANA	KERIO DELTA	NAKORET	5,155	0.62	Yes	Safaricom 2019/2020
102	TURKANA	KIBISH	KAITEDE	6,333	0.56	Yes	Safaricom 2019/2020
103	TURKANA	KIBISH	KARACH 1	5,502	1.10	Yes	-
104	TURKANA	KIBISH	KIBISH	1,405	1.93	-	-
105	TURKANA	KIBISH	KOYASA	-	-	-	-
106	TURKANA	KIBISH	LOKOMARINYANG	4,192	2.69	-	Safaricom 2017/2018
107	TURKANA	KIBISH	NAITA	3,723	5.53	-	Safaricom 2016
108	TURKANA	KIBISH	NATAPAR	5,458	2.02	-	-
109	TURKANA	LAKEZONE	KANAMKUNY	2,740	0.10	-	(commercially viable)
110	TURKANA	LAKEZONE	KATABOI	5,161	0.79	Yes	Safaricom 2016
111	TURKANA	LAKEZONE	KATIKO	2,494	0.51	-	Safaricom 2017/2018
112	TURKANA	LAKEZONE	KOKISELEI	3,969	0.33	Yes	Safaricom 2017/2018
113	TURKANA	LAKEZONE	LOMEKWI	3,103	1.19	-	Safaricom 2016
114	TURKANA	LAKEZONE	RIAKOMOR	7,012	0.31	-	Safaricom 2019/2020
115	TURKANA	LAKEZONE	TODONYANG	3,421	1.44	-	Safaricom 2016
116	TURKANA	LAPUR	KAREBUR	2,434	0.76	-	-
117	TURKANA	LAPUR	LEWAN	3,436	1.13	Yes	Safaricom 2016
118	TURKANA	LAPUR	NAPEIKAR	3,424	0.74	Yes	Safaricom 2019/2020
119	TURKANA	LAPUR	SASAME	2,592	0.38	Yes	Safaricom 2016
120	TURKANA	LETEA	KATELEMOT	4,920	0.48	Yes	Safaricom 2016
121	TURKANA	LETEA	LOITO	6,616	0.64	Yes	Safaricom 2017/2018
122	TURKANA	LETEA	LOKIPOTO	18,956	1.76	Yes	Safaricom 2019/2020
123	TURKANA	LETEA	LORITIT	10,471	1.57	Yes	Safaricom 2016
124	TURKANA	LETEA	NAMOR-KIRIONOK	3,059	0.45	Yes	-
125	TURKANA	LETEA	TULABALANY	5,160	2.20	-	Safaricom 2019/2020
126	TURKANA	LOIMA	PUCH	12,002	3.75	Yes	Safaricom 2019/2020
127	TURKANA	LOKIRIAMA/LORENGIPPI	ATALA KAMUSIO	4,888	0.27	-	Safaricom 2016
128	TURKANA	LOKIRIAMA/LORENGIPPI	KAEMANIK	1,482	0.52	-	-
129	TURKANA	LOKIRIAMA/LORENGIPPI	LOCHOR LOMALA	7,170	1.17	Yes	Safaricom 2017/2018
130	TURKANA	LOKIRIAMA/LORENGIPPI	LOKIRIAMA	4,439	0.45	Yes	Safaricom 2016
131	TURKANA	LOKORI/KOCHODIN	LOCHAKULA	1,923	0.63	-	-

NO.	COUNTY	WARD	SUBLOCATION	UNSERVED POP'N	CELLS REQ'D TO COVER AREA	USF YEAR 1 PROJECT LIST	OPERATOR LICENCE COMMITMENT
132	TURKANA	LOKORI/KOCHODIN	LOTUBAE	22,129	2.75	Yes	Safaricom 2019/2020
133	TURKANA	NAKALALE	LOSAJAIT	2,643	1.21	-	Safaricom 2016
134	TURKANA	NANAAM	LOMEYAN	11,600	3.43	Yes	Safaricom 2017/2018
135	TURKANA	NANAAM	LOTIKIPI	9,094	4.47	-	Safaricom 2016
136	TURKANA	SONGOT	LOKANGAE	11,599	2.96	Yes	Safaricom 2019/2020
137	TURKANA	SONGOT	LOKUDULE	3,216	1.00	Yes	-
138	WAJIR	BATALU	BATALU	6,980	1.55	Yes	Safaricom 2016
139	WAJIR	BATALU	KUROW	3,129	1.00	Yes	Safaricom 2021/2022
140	WAJIR	BUR-DER	GULET DERE	2,875	1.16	-	Safaricom 2016
141	WAJIR	DANABA	QUADAMA	9,798	1.42	Yes	Safaricom 2016
142	WAJIR	DELLA	DELA	10,376	0.66	Yes	Safaricom 2019/2020
143	WAJIR	DIFF	GERILLE	2,613	1.39	-	Safaricom 2016
144	WAJIR	ELNUR/TULA TULA	BASIR	4,807	0.91	Yes	Safaricom 2016
145	WAJIR	GURAR	SAKE GAMATHA	5,111	0.53	Yes	-
146	WAJIR	HADADO/ATHIBOHOL	ATHIBOHOL	4,411	2.95	-	Safaricom 2016
147	WAJIR	HADADO/ATHIBOHOL	LOLKUTA NORTH	2,291	0.62	-	Safaricom 2017/2018
148	WAJIR	IBRAHIM URE	HANDAKI	2,387	1.32	-	Safaricom 2019/2020
149	WAJIR	KHOROF/HARAR	KONTON	4,422	0.81	Yes	Safaricom 2016
150	WAJIR	KORONDILE	KORONDILE	14,901	1.01	-	Safaricom 2016
151	WAJIR	KORONDILE	LAKOLE NORTH	3,239	1.85	-	-
152	WAJIR	SARMAN	DUNTO	10,733	2.50	Yes	Safaricom 2021/2022
153	WAJIR	SARMAN	SARMAN	8,952	1.90	Yes	Safaricom 2017/2018
154	WEST POKOT	ALALE	AKORET	1,235	0.54	-	-
155	WEST POKOT	ALALE	APUKE	1,442	0.29	Yes	-
156	WEST POKOT	ALALE	LORUSUK	1,169	0.53	-	-
157	WEST POKOT	ENDUGH	KRIICH	2,769	0.15	-	(commercially viable)
158	WEST POKOT	KASEI	KORPU	1,067	0.23	Yes	-
159	WEST POKOT	KIWAWA	KAURIONG	3,667	0.21	-	Safaricom 2017/2018
160	WEST POKOT	KIWAWA	LOPET	2,300	0.71	-	-
161	WEST POKOT	MASOOL	AMALER	2,478	0.52	-	Safaricom 2019/2020
162	WEST POKOT	SEKERR	CHEPKONDOL	4,093	0.20	-	Safaricom 2021/2022
163	WEST POKOT	SEKERR	MBARA	5,389	0.10	-	Safaricom 2016
164	WEST POKOT	WEI WEI	WAKORR	1,846	0.07	Yes	-

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
BARINGO	MUKUTAN	MUKUTANI	1,284	58,865		
BARINGO	MUKUTAN	ARABAL	1,471	20,532		
BARINGO	MOCHONGOI	CHEBINYINY	1,240	25,166		
BARINGO	BARTABWA	KALABATA	1,003	29,923		
BARINGO	BARTABWA	KESUMET	1,088	28,212		
BARINGO	BARTABWA	KAPTURO	1,053	28,915		
BARINGO	TIRIOKO	ANGORITIANG	2,450	47,841		Safaricom
BARINGO	TIRIOKO	NGORON	1,501	19,937		
BARINGO	KOLLOWA	BARPELLO	3,050	64,942		Safaricom
BARINGO	TIRIOKO	LOKIS	2,445	37,496		
BARINGO	TIRIOKO	NGAINA	2,516	26,660		
BARINGO	TIRIOKO	AKORET	1,869	14,447		
BARINGO	TIRIOKO	KULAL	3,021	135,989		
BARINGO	TIRIOKO	KAPEDO NORTH	1,793	25,871		
BARINGO	RIBKWO	MORON	1,703	60,960		
BARINGO	LOIYAMOROK	PAKA	2,211	38,945	Safaricom	
BARINGO	TANGULBEI/KOROSSI	CHEMOIGUT	2,258	50,425		Safaricom
BARINGO	CHURO/AMAYA	PUTERO	2,670	8,408		Safaricom
BARINGO	CHURO/AMAYA	CHEPELOW	1,047	29,035		
BARINGO	CHURO/AMAYA	KAPTUYA	1,135	30,140		
BARINGO	EMINING	RADAD	1,190	26,177		
BARINGO	KISANANA	MUGURIN	1,003	29,908		
BUNGOMA	CHEPYUK	KORN'GOTUNY	1,886	12,232		
BUNGOMA	CHEPYUK	EMIA	1,452	20,920		
BUSIA	BUNYALA SOUTH	OBARO	1,340	23,158		
ELGEYO-MARAKWET	EMBOBUT/EMBULOT	KIPCHUMWA	2,061	8,732		
ELGEYO-MARAKWET	KAPSOWAR	TUIYOBEI	1,545	19,051		
ELGEYO-MARAKWET	EMSOO	EMSO	1,219	25,581		
GARISSA	TOWNSHIP	BOUR-ALGI	1,643	37,534		
GARISSA	TOWNSHIP	KARAKORA	2,542	47,617		
GARISSA	SAKA	SAKA	1,908	107,458	Safaricom	
GARISSA	SANKURI	SANKURI	2,119	90,746		
GARISSA	SANKURI	BALICH	1,329	56,052		
GARISSA	JARAJARA	KONE	3,674	39,483	Safaricom	
GARISSA	BALAMBALA	ASHADIN	4,910	221,672	Safaricom	
GARISSA	SAKA	KASHA	1,495	46,081	Safaricom	
GARISSA	BALAMBALA	SHIDLEY	7,112	16,257	Safaricom	
GARISSA	DANYERE	DAGOOB	2,995	90,065	Safaricom	
GARISSA	DANYERE	LIBAHILOW	7,308	173,653		Safaricom
GARISSA	DANYERE	URGAAD	1,068	70,026		
GARISSA	BENANE	TOKOJO	3,828	51,174	Safaricom	
GARISSA	MODOGASHE	ELDERE	6,188	102,855	Safaricom	
GARISSA	MAALAMIN	DIHILEY	5,471	79,122	Safaricom	
GARISSA	BARAKI	BARAKI	2,823	177,527	Safaricom	

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
GARISSA	GOREALE	GOREALE	4,523	323,893		
GARISSA	DERTU	DERTU	9,655	295,837	Safaricom	
GARISSA	ABAKAILE	KUMAHUMATO	4,443	252,231	Safaricom	
GARISSA	ABAKAILE	ABAKAILE	3,405	79,906	Safaricom	
GARISSA	LIBOI	HAREHARE	1,769	14,576		
GARISSA	NANIGHI	KAMUTHE	1,734	96,034	Safaricom	
GARISSA	DEKAHARIA	GALMAGALA	1,620	99,957	Safaricom	
GARISSA	DEKAHARIA	GUBIS	3,298	262,537	Safaricom	
GARISSA	DEKAHARIA	BULLA GOLOL	2,103	165,221	Safaricom	
GARISSA	HULUGHO	ELKAMBERE	6,299	193,854		Safaricom
GARISSA	HULUGHO	GARABEY	3,165	41,525		
GARISSA	HULUGHO	KORAN HINDI	1,881	133,337	Safaricom	
GARISSA	IJARA	JALISH	2,398	63,093	Safaricom	
GARISSA	SANGAILU	WAKABHAREY	9,721	151,270	Safaricom	
GARISSA	SANGAILU	HANDARO	5,102	241,196		
GARISSA	MASALANI	KORISA	1,166	47,190		
GARISSA	MASALANI	QURAMADHA	1,381	109,508		
HOMA BAY	RUSINGA ISLAND	WANYAMA	2,103	7,880		
ISIOLO	OLDONYIRO	LONKOPITO	3,262	254,682		Safaricom
ISIOLO	OLDONYIRO	KIPSING	4,142	74,156		Airtel
ISIOLO	OLDONYIRO	LENGURUMA	2,221	175,756		
ISIOLO	CHERAB	KORBESA	2,200	147,234		
ISIOLO	GARBATULLA	MALKADAKA	3,632	248,601		
ISIOLO	KINNA	KULAMAWE	3,532	285,947		
KAJIADO	OLOODOKILAN	SINGIRAINE	1,830	113,264		
KAJIADO	PURKO	ENKARONI	1,094	28,099		
KAJIADO	PURKO	ISIAIT	1,010	36,016		
KAJIADO	DALALEKUTUK	ENKORIKA	1,588	20,495		Safaricom
KAJIADO	OLOODOKILAN	KILONITO	1,499	110,109		
KAJIADO	OLOODOKILAN	LOODOKILANI	1,192	26,121		
KAJIADO	DALALEKUTUK	PELEWA	1,405	21,867		
KAJIADO	DALALEKUTUK	IMPIRO	1,715	22,146		Safaricom
KAJIADO	IMARORO	EMARTI	1,046	71,248		
KAJIADO	MATAPATO NORTH	EMOTOROKI	1,302	90,346		
KAJIADO	MATAPATO NORTH	OLMOLELIAN	2,429	80,132		
KAJIADO	MATAPATO NORTH	LORNG'OSWA	1,895	101,761	Safaricom	
KAJIADO	MATAPATO NORTH	RUANCHE	2,632	105,516		
KAJIADO	MATAPATO SOUTH	KUMPA	3,197	42,524		
KAJIADO	MATAPATO SOUTH	METO	4,813	32,381		Safaricom
KAJIADO	KEEKONYOKIE	KISAMIS	2,280	108,166		
KAJIADO	KEEKONYOKIE	LOODARIAK	2,587	71,689		Safaricom
KAJIADO	KEEKONYOKIE	OLTEPESI	2,400	141,246	Safaricom	
KAJIADO	EWUASO KEDONG	SAIKERI	2,134	81,823		Safaricom
KAJIADO	MOSIRO	EMBARBAL	2,429	181,129		

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
KAJIADO	MOSIRO	OLDEPE	1,353	22,911		
KAJIADO	MOSIRO	OLDORKO	3,180	99,108	Safaricom	
KAJIADO	EWUASO KEDONG	NAJILE	1,714	32,001		
KAJIADO	MAGADI	ENDOINYO-OLASHO	1,728	95,339		
KAJIADO	MAGADI	PAKASE	3,377	12,008		
KAJIADO	MAGADI	SHOMPOLE	2,085	59,911		
KERICHO	KUNYAK	KAPKWEN	1,290	24,166		
KIAMBU	NACHU	NACHU	2,230	5,344		
KILIFI	SOKOKE	NDUGUMANI	1,123	27,504		
KILIFI	SOKOKE	MWANGEA	1,215	25,670		
KILIFI	GANZE	MWAMBANI	3,094	14,046	Airtel	
KILIFI	BAMBA	KARIMANI	1,438	21,199		
KILIFI	BAMBA	GOSHI	1,206	28,653		
KILIFI	MARAFA	DAKACHA	6,551	188,807		
KILIFI	ADU	KAMALE	1,252	89,914		
KILIFI	JILORE	MKONDONI	1,572	18,517		
KITUI	VOO/KYAMATU	MUTHUNGUE	3,943	297,977		Airtel
KITUI	ZOMBE/MWITIKA	KILAA	1,628	17,398		
KITUI	ENDAU/MALALANI	MALALANI	2,136	116,047		
KITUI	ENDAU/MALALANI	MAKUKA	2,033	115,793		
KITUI	MUTITU/KALIKU	KAVUTEI	1,105	27,878		
KITUI	MUTOMO	KIBWEA	2,233	5,287		
KITUI	MUTHA	KAATENE	1,117	27,631		Airtel
KITUI	VOO/KYAMATU	KYANGO	2,082	8,311		
KITUI	MUTHA	NDAKANI	3,251	29,565	Safaricom	Airtel
KITUI	KANZIKO	NDILILI	1,697	16,014		
KITUI	KANZIKO	MIVUNE	1,701	15,940		
KITUI	KANZIKO	KITUVWI	2,388	18,768		
KITUI	KANZIKO	MWANIANGA	1,804	13,866		
KITUI	KANZIKO	KYANYAA	1,513	19,703		
KITUI	KANZIKO	SIMISI	2,063	8,677	Safaricom	Airtel
KITUI	KANZIKO	ILAMBA	1,467	35,998		
KITUI	WAITA	NYANYAA	1,582	18,313		
KITUI	WAITA	KATITIKA	1,486	20,244		
KITUI	WAITA	THONOA	2,125	7,442		
KITUI	NUU	KYANGATI	2,183	6,272	Safaricom	
KITUI	NUU	MALAWA	4,352	321,705		
KITUI	KYUSO	KAMULA	1,241	25,139		Safaricom
KITUI	NGOMENI	KIMELA	2,161	122,220		
KITUI	TSEIKURU	KITOVOTO	4,929	234,443	Safaricom	
KITUI	MUMONI	KAKUYU	1,611	17,739		
KWALE	PUMA	BUSA	7,323	192,784		
KWALE	PUMA	VIGURUNGANI	3,244	108,710		
KWALE	NDAVAYA	MWANDIMU	8,925	141,252		

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
KWALE	MACKINON ROAD	KILIBASI	1,139	40,123		
KWALE	MWERENI	KASEMENI	3,060	151,329		
KWALE	MWERENI	KILIMANGODO	10,848	599,571		
LAIKIPIA	MUGOGODO WEST	TURA	1,689	29,227	Safaricom	
LAIKIPIA	MUGOGODO EAST	SIEKU	1,880	103,704		
LAIKIPIA	MUGOGODO WEST	ILMOTIOK	3,577	10,065	Safaricom	
LAIKIPIA	MUGOGODO WEST	EWASO	1,584	18,282		Safaricom
LAIKIPIA	SOSIAN	LUONIEK	1,447	91,006		
LAIKIPIA	SOSIAN	KARIWO	1,641	28,394		
LAIKIPIA	SALAMA	MUTARA	1,637	17,207	Safaricom	
MANDERA	GUTICHA	OLLA	7,349	62,426	Safaricom	
MANDERA	KOTULO	EL RAMU	9,165	179,903		
MANDERA	KOTULO	GARSESALA	5,403	59,340		Safaricom
MANDERA	KOTULO	BORJI GARSE	3,525	100,792		
MANDERA	KOTULO	KUTAYU	3,447	51,324		
MANDERA	SHAMBIR FATUMA	BURMAYO NORTH	5,905	86,511	Safaricom	
MANDERA	SHAMBIR FATUMA	BURMAYO SOUTH	1,952	10,899		
MANDERA	SHAMBIR FATUMA	QALANQALESA	7,877	75,338		
MANDERA	SHAMBIR FATUMA	SHIMBIR FATUMA	14,433	130,738		
MANDERA	WARANKARA	WARANKARA	9,387	132,005		
MANDERA	WARANKARA	SAFO	2,415	10,356		Safaricom
MANDERA	ARABIA	OMAR-JILLOW	4,501	25,216	Safaricom	
MANDERA	LIBEHIA	ODA	1,669	16,580		
MANDERA	LIBEHIA	BAMBO	1,017	50,665		
MANDERA	LIBEHIA	HARAR	1,469	20,575		
MANDERA	ARABIA	FAREY	1,134	27,297		
MANDERA	DANDU	KUBIHALO	4,675	68,727		
MANDERA	MALKAMARI	MALKARUKA	10,361	128,483		Safaricom
MANDERA	MALKAMARI	HULLOW	7,556	233,649		Safaricom
MANDERA	GUBA	CHOROKO	6,508	30,477	Safaricom	
MANDERA	LAGHSURE	LAGHSURE	10,203	253,753		
MANDERA	TAKABA SOUTH	DIDKURO	14,107	127,840	Safaricom	
MANDERA	TAKABA	KUBDISHEN	6,938	35,231		
MANDERA	TAKABA SOUTH	WANGAI DAHAN	10,763	167,602		
MARSABIT	KARARE	SCHEME	1,530	84,627		
MARSABIT	KARARE	KARARE	2,576	138,517		
MARSABIT	KARARE	SONGA	1,084	28,293		
MARSABIT	KARARE	KITURUNI	1,230	53,787		
MARSABIT	SAGANTE/JALDESA	BADASA	1,204	25,888		
MARSABIT	LAISAMIS	IRIR	1,360	49,071		
MARSABIT	LAISAMIS	NDIKIR	1,814	147,994		
MARSABIT	GOLBO	DABEL	5,299	213,886	Safaricom	
MARSABIT	GOLBO	GOLA	3,883	80,906	Safaricom	
MARSABIT	GOLBO	GODOMA	2,084	8,273		Safaricom

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
MARSABIT	URAN	URAN	1,735	15,244		
NANDI	SONGHOR/SOBA	CHEPTONON	1,022	29,532		
NAROK	MOSIRO	MOSIRO	1,590	39,267		
NAROK	MOSIRO	ENKOIREROI	1,275	31,929		
NAROK	MELILI	ENAIBOR AJIJIK	1,872	12,515		
NAROK	MAJI MOTO/NAROOSURA	MAJI-MOTO	1,251	91,453		
NAROK	MAJI MOTO/NAROOSURA	ELANGATA ENTERIT	3,831	142,523		
NAROK	MAJI MOTO/NAROOSURA	ENKUTOTO	4,568	114,694		
NAROK	MAJI MOTO/NAROOSURA	ENTUROTO	2,306	35,836		
NAROK	NAIKARRA	OSARARA	1,224	42,326	Safaricom	
NAROK	SIANA	OLKINYEI	3,309	253,737		Safaricom
NAROK	NAIKARRA	OLDERKESI	2,891	62,250		
NAROK	NAIKARRA	ESOIT	4,852	68,799	Safaricom	
NAROK	LOITA	OLNGARUA	1,499	119,707		
NAROK	LOITA	OLORTE	3,114	42,291		
NAROK	LOITA	MAUSA	3,575	248,413		
NAROK	LOITA	OLMESUTIE	2,031	29,776		
NAROK	SAGAMIAN	TENDWET	2,188	96,709		
SAMBURU	ANGATA NANYUKIE	LOIBASHAE	1,476	36,898		
SAMBURU	PORRO	SEKETET	1,666	16,634		
SAMBURU	PORRO	MUGUR	1,204	25,897		
SAMBURU	PORRO	MALASO	1,259	24,788	Safaricom	
SAMBURU	BAAWA	NONKEEK	1,679	122,374		
SAMBURU	WAMBA WEST	LTIRIMIN	2,033	47,895		
SAMBURU	EL BARTA	MASIKITA	2,201	145,142		
SAMBURU	NDOTO	LESIRIKAN	2,678	140,463		Safaricom
SAMBURU	NYIRO	LONJORIN	2,164	88,087		
SAMBURU	NYIRO	LKAYO	3,581	134,207		
SAMBURU	NDOTO	ILLAUT	1,017	83,740		Safaricom
TAITA-TAVETA	BURA	NYOLO	1,857	46,525		
TAITA-TAVETA	WUMIGU/KISHUSHE	KISHUSHE	1,377	100,990		
TANA RIVER	MADOGO	BUWA	1,663	92,910	Safaricom	
TANA RIVER	BANGALE	BOKA	2,120	30,686	Safaricom	
TANA RIVER	BANGALE	ODOWAN	2,177	28,027		
TANA RIVER	MADOGO	ASAKO	1,010	66,878	Safaricom	
THARAKA-NITHI	GATUNGA	TWANTHANJU	3,782	22,191		
THARAKA-NITHI	CHIAKARIGA	KAMANYAKI	1,033	29,315		
TURKANA	KERIO DELTA	NAKURIO	9,426	470,565		
TURKANA	KERIO DELTA	KANGIRISAE	4,473	307,683	Safaricom	
TURKANA	KERIO DELTA	NAKORET	5,155	93,789		
TURKANA	KERIO DELTA	LORENGELUP	2,428	42,577		
TURKANA	LOIMA	LOCHOR-EDOME	2,588	84,853	Safaricom	
TURKANA	LOIMA	PUCH	12,002	599,376		

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
TURKANA	LOIMA	NAMORUPUTH	3,629	91,902	Safaricom	
TURKANA	LOKIRIAMA/LORENGIPPI	NAKURIO	1,012	49,477		
TURKANA	LOKIRIAMA/LORENGIPPI	LODWAT	1,615	17,667		
TURKANA	LOKIRIAMA/LORENGIPPI	LOKIRIAMA	4,439	54,070	Safaricom	
TURKANA	LOKIRIAMA/LORENGIPPI	LOCHOR LOMALA	7,170	230,311		Safaricom
TURKANA	KALOKOL	KAPUA	4,585	345,658	Safaricom	
TURKANA	KANGATOTHA	LOMOPUS	3,044	178,536	Safaricom	
TURKANA	KOTARUK/LOBEI	KALEMUNYANG	3,299	57,608		Safaricom
TURKANA	TURKWEL	LOMEYAN	5,825	372,626		Safaricom
TURKANA	TURKWEL	KAPUS	8,320	261,674		
TURKANA	KOTARUK/LOBEI	NAIPA	4,207	78,621		
TURKANA	KOTARUK/LOBEI	LOKIPETOT ARENGAN	4,861	112,982		
TURKANA	LAPUR	KACHODA	1,964	10,670		
TURKANA	LAKEZONE	KATABOI	5,161	216,640	Safaricom	
TURKANA	LAKEZONE	KATIKO	2,494	112,751		Safaricom
TURKANA	LAKEZONE	KOKISELEI	3,969	25,742		Safaricom
TURKANA	LAKEZONE	LOWARENGAK	6,327	18,706	Safaricom	
TURKANA	LAKEZONE	NACHUKUI	7,326	16,714	Safaricom	
TURKANA	LAPUR	NAPEIKAR	3,424	167,242		
TURKANA	LAPUR	SASAME	2,592	69,890	Safaricom	
TURKANA	KIBISH	KARACH 1	5,502	242,575		
TURKANA	KIBISH	KAITEDE	6,333	53,458		
TURKANA	KAALENG/KAIKOR	NALITA	3,339	153,123	Safaricom	
TURKANA	KAALENG/KAIKOR	KAALEM	7,538	548,685	Safaricom	
TURKANA	KAALENG/KAIKOR	KAKELAE	3,080	125,206		Safaricom
TURKANA	KAERIS	KAERIS	6,808	323,300	Safaricom	
TURKANA	LETEA	LORITIT	10,471	294,048	Safaricom	
TURKANA	LETEA	KATELEMOT	4,920	53,735	Safaricom	
TURKANA	LETEA	LOKIPOTO	18,956	184,507		
TURKANA	LETEA	LOITO	6,616	70,930		Safaricom
TURKANA	KALOBEYEI	NALAPATUI	4,783	84,124	Safaricom	
TURKANA	KALOBEYEI	OROPOI	5,927	369,442		
TURKANA	LETEA	LORENG	3,823	243,428	Safaricom	
TURKANA	LETEA	NAMOR-KIRIONOK	3,059	83,377		
TURKANA	LOPUR	LOPUSIKI	3,947	71,818		
TURKANA	SONGOT	LOKUDULE	3,216	255,594		
TURKANA	SONGOT	LOKANGAE	11,599	716,359		
TURKANA	NANAAM	MOGILA	17,684	153,147		Safaricom
TURKANA	NANAAM	NANAM	6,536	501,764	Safaricom	
TURKANA	NANAAM	LOMEYAN	11,600	535,406		Safaricom
TURKANA	LOKICHOGIO	LOREMIET	1,293	24,105		
TURKANA	LOKORI/KOCHODIN	KANGITIT	4,794	141,475		
TURKANA	LOKORI/KOCHODIN	LOTUBAE	22,129	436,995		
TURKANA	KATILIA	KATILIA	9,513	520,597		

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
TURKANA	KATILIA	PARKATI	11,455	855,227		
TURKANA	LOKORI/KOCHODIN	LOKWAMOSING	3,405	59,896		
TURKANA	KAPEDO/NAPEITOM	NAPEITOM	7,742	616,330	Safaricom	
TURKANA	KAPEDO/NAPEITOM	NADOME	3,653	246,839		
TURKANA	KAPEDO/NAPEITOM	NGILUKIA	4,356	232,772		
TURKANA	KALAPATA	KALAPATA	10,869	315,369		
TURKANA	KALAPATA	LOPEROT	7,344	541,955		
TURKANA	KALAPATA	NAKALALE	8,822	232,124	Safaricom	
TURKANA	LOKICHAR	LOCHWANGI KAMATAK	8,582	253,157		Safaricom
TURKANA	LOKICHAR	NAPOSUMURU	6,034	255,998		
WAJIR	LAGBOGHOL SOUTH	MACHESA	2,884	90,003	Safaricom	
WAJIR	LAGBOGHOL SOUTH	LEHELEY	3,219	144,372		Safaricom
WAJIR	IBRAHIM URE	KULAALEY	7,296	173,885		Safaricom
WAJIR	BUTE	OGORJI	3,962	89,776	Safaricom	
WAJIR	BUTE	ADADIJOLE	4,398	12,024		
WAJIR	BATALU	BUNA	3,465	257,589		
WAJIR	KORONDILE	LENSAYU	7,530	371,093	Safaricom	
WAJIR	MALKAGUFU	MALKAGUFU	1,902	152,360		Safaricom
WAJIR	BATALU	BATALU	6,980	357,527	Safaricom	
WAJIR	BATALU	KUROW	3,129	257,340		
WAJIR	GURAR	GURAR	12,259	108,947		Safaricom
WAJIR	DANABA	AJAWA	7,566	285,095		Safaricom
WAJIR	DANABA	QUADAMA	9,798	257,181	Safaricom	
WAJIR	GURAR	GARSE SARE	4,285	85,389		Safaricom
WAJIR	GURAR	SAKE GAMATHA	5,111	65,843		
WAJIR	KHOROF/HARAR	RIBA	11,042	504,956		
WAJIR	KHOROF/HARAR	KONTON	4,422	231,444	Safaricom	
WAJIR	KHOROF/HARAR	DOWYARRE	2,712	97,122		Safaricom
WAJIR	TARBAJ	TARBAT	7,486	372,569		
WAJIR	ELBEN	MANSA	12,247	290,816		
WAJIR	SARMAN	SARMAN	8,952	428,926		Safaricom
WAJIR	SARMAN	DAMBAS	7,762	245,345	Safaricom	
WAJIR	SARMAN	DUNTO	10,733	583,474		
WAJIR	ELBEN	BURMAYO	1,985	99,181	Safaricom	
WAJIR	WARGADUD	EL KUTULO	2,372	80,756		Safaricom
WAJIR	TARBAJ	DASHEG	3,803	103,642		Safaricom
WAJIR	WARGADUD	WARGADUD	2,954	137,899	Safaricom	Safaricom
WAJIR	WARGADUD	AUSMUDULE	4,766	224,556	Safaricom	
WAJIR	ELDAS	KILKILEY	4,107	39,288		
WAJIR	ELNUR/TULA TULA	LAKOLE	9,066	437,438		
WAJIR	ELNUR/TULA TULA	BASIR	4,807	223,723	Safaricom	
WAJIR	ARBAJAHAN	ARBAJAHAN	9,400	582,312	Safaricom	
WAJIR	ARBAJAHAN	GARSE KOFTU	10,493	529,613	Safaricom	
WAJIR	ELNUR/TULA TULA	MATHO	10,870	175,368	Safaricom	

COUNTY	WARD	SUBLOCATION	UNSERVED POPULATION	MAXIMUM SUBSIDY (US$)	COMMITTED IN 2016	COMMITTED IN 2017/18
WAJIR	HADADO/ATHIBOHOL	HADADO NORTH	10,387	344,984		Safaricom
WAJIR	HADADO/ATHIBOHOL	LOLKUTA NORTH	2,291	152,521		Safaricom
WAJIR	ADEMASAJIDE	LOLKUTA SOUTH	5,669	125,831		
WEST POKOT	RIWO	EMBOASIS	1,367	30,096		
WEST POKOT	RIWO	KAMAYECH	1,300	23,972		
WEST POKOT	ENDUGH	CHEPTRAM	1,357	22,827		
WEST POKOT	ENDUGH	CHEWARANY	1,981	29,775		
WEST POKOT	ENDUGH	KESOT	1,149	45,656		
WEST POKOT	SOOK	TAMUGH	1,681	16,340		
WEST POKOT	CHEPARERIA	CHESRA	1,891	12,128		
WEST POKOT	CHEPARERIA	SHALPOGH	4,248	58,409		
WEST POKOT	ALALE	APUKE	1,442	65,497		
WEST POKOT	ALALE	LOTUKUM	1,569	45,594		
WEST POKOT	KIWAWA	KASES	3,490	114,738	Safaricom	
WEST POKOT	KIWAWA	KIWAWA	4,613	44,990		Safaricom
WEST POKOT	KODICH	CHERENGAN	1,555	18,866		Safaricom
WEST POKOT	SUAM	KANYERUS	1,015	43,658		
WEST POKOT	SUAM	KOPULIO	1,873	50,966		
WEST POKOT	KASEI	KAPTOLOMWO	1,293	27,889		
WEST POKOT	KASEI	OMPOLION	1,682	63,113		
WEST POKOT	KASEI	KOROKOU	1,843	13,087		Safaricom
WEST POKOT	KASEI	KACHAWA	1,187	78,194		
WEST POKOT	KASEI	KORPU	1,067	51,235		
WEST POKOT	KIWAWA	CHEPROPOGH	1,394	66,336		
WEST POKOT	KIWAWA	LOPET	2,300	181,462		
WEST POKOT	LELAN	MESHAU	1,473	20,493		
WEST POKOT	WEI WEI	SOKA	1,102	27,926		
WEST POKOT	WEI WEI	WAKORR	1,846	13,038		
WEST POKOT	WEI WEI	YAW YAW	1,518	19,597		
WEST POKOT	MASOOL	AKIRIAMET	4,966	20,558		
WEST POKOT	MASOOL	AMOLEM	2,226	61,654	Safaricom	
WEST POKOT	WEI WEI	PTALAM	1,777	14,418		
WEST POKOT	BATEI	PUSOL	1,583	18,302		
WEST POKOT	TAPACH	SINNA	1,014	29,697		
WEST POKOT	TAPACH	KOKWOPSIS	1,156	26,847		
WEST POKOT	LOMUT	KOKWOSITOT	1,052	28,938		
WEST POKOT	LOMUT	KOKWOPTORIR	1,686	16,240		
WEST POKOT	LOMUT	MARUS	2,109	7,766		
WEST POKOT	LOMUT	PKOPOGH	1,288	24,198		
WEST POKOT	MASOOL	AMALER	2,478	118,162		

1. The exclusive right of the Postal Corporation of Kenya (PCK) to carry standard mail under 350g (subject to the five-times-tariff rule) should be phased out. We expect this move to have minimal impact on PCK, but to guard against the risk of unexpected consequences on universal service viability we recommend that this should be carried out in stages. We propose that, as a first step, the weight limit should be reduced to 100g and the minimum tariff that other licensed operators must charge should be reduced to three times PCK"s tariff. It is not recommended that more than one universal service provider (USP) be designated.

2. Further reductions to the weight limit and minimum tariff should be considered by CA within two years, subject to a review of the impact of the first reduction on the postal market with a view to removing the weight-limited reserved area within three years.

3. PCK should retain the exclusive right to issue postage stamps.

4. PCK's exclusive right to provide PO boxes should be retained.

5. CA should require PCK to present a plan to achieve the existing waiting time targets for PO boxes and to expand access to PO boxes through the provision of new sites and new services such as "virtual boxes".

6. In the event that PCK fails to meet agreed waiting time targets for the provision of PO boxes within three years, CA should consider licensing third parties to provide PO boxes in areas where there is excess demand.

7. PCK should be obliged to consider and willingly negotiate fair and reasonable requests from any licensed operator for wholesale access to its standard (slow speed) delivery pipeline, as well as its expedited (courier speed) delivery pipeline for items weighing more than the reserved weight. In due course, this may lead PCK to offer a standard, non-discriminatory reference access agreement, although we are not recommending this as an obligation at this stage.

8. CA should seek more data on the performance of PCK's standard (slow speed) service for packets and parcels (e.g. volumes by route, delivery times, level of complaints) and seek to ensure that agreed standards are met (see also Recommendation 10). CA should undertake independent, regular, third-party testing of PCK's quality of service performance.

   CA and PCK should work together to establish universal service access conditions to postal services. These should set national and regional standards based on population, distance and administrative boundaries. CCK and PCK should develop a universal service roadmap that shows how access to postal services will be improved over the next five years. Until these new measures are in place, it is recommended that PCK should not be permitted to close post offices without the express agreement of CA. We recommend that financial services and e- post services are not considered part of the USO.

9. CA and PCK should agree on a common set of delivery targets and expected levels of achievement. The achievement levels should be more challenging than the current 65% target. CA should then require PCK to report quarterly on its quality-of-service performance and should continue to conduct its own independent survey at least once a year.

10. CA and PCK should work together to establish the net cost of providing universal service to provide a basis for future discussion about the funding of universal service.

11. CA should make the universal service fund (USF) operational as soon as practicable and consider using part of the USF resources to expand accessibility to postal services by funding new postal outlets in rural areas, by utilising the sub-post office model and/or funding the development of "virtual PO boxes" that would be more attractive to occasional users. The weight limit for USF contributions should be aligned with the weight limit to which the USO applies

12. The Ministry of Information, Communications and Technology (MoICT) should develop a standalone sector policy for posts. This policy should reflect the latest policy imperatives enunciated in the Vision 2030 policy and the 2010 National Constitution, and into account the future needs of the sector as described in this report. The policy should be based on evidence and diagnosis on the issues specifically relevant to the sector in Kenya, rather than trying to replicate policies developed for other regions where market conditions are very different. Input from all postal stakeholders should be sought and reflected in the final draft.

13. The project to establish a national addressing system needs to be reviewed. In particular, the roles of the MoICT and CCK need to be reconsidered as leaders of this national project since the resources needed to implement a national addressing system go far beyond those available from postal stakeholders alone. At the same time, CCK should consider whether existing databases can be utilised by the postal sector as a whole and what role new technology, such as mobile and GPS co-ordinates, can play in addressing. It is recommended that CCK conducts a workshop with postal licensees to establish best practice in addressing systems.

14. The Ministry of Finance should introduce a minimum value threshold on imports below which no import duty, taxes, insurance or levies will be charged on imported items. The threshold should be determined with reference to the cost of collecting duties and taxes, but we suggest that a value of KES2000 should be considered. The Ministry of Finance should also examine the steps that can be taken to speed up the processing of imports that remain liable for import duty and taxes. Consideration should also be given to the overall level of charges on imported items.

15. CA should consider reducing the number of licence categories for private courier operators from the current six to a maximum of three (see Annex E for our proposals on how the licence categories could be amalgamated).

16. Licences for private courier operators should be simplified, taking into account the fact that they do not have to meet the regulations of the Universal Postal Union (UPU) (see Annex F for a detailed review of the areas where we believe that changes are most needed). At the same time, the licence for PCK needs to reflect the fact that it does need to meet UPU regulations. For all licences, there should not be a requirement to provide information that has already been provided to other government agencies. Furthermore, while the level of information currently required in reports from private operators should be maintained, CA should consider reducing the frequency from quarterly to annually to reduce administrative costs. The USP should be required to continue submitting quarterly reports.

17. It is recommended that the duration of private courier licences be reduced to five years, given that this is a dynamic market with many small players.

18. CA should expand the consumer section of its website to include advice that is relevant to the postal and courier sector, and amend its complaints form to include types of complaints that are relevant to this sector (e.g. damaged items and non-delivery). CA should also consider other ways to increase its level of engagement with postal and courier customers; for example, holding an annual conference on consumer issues

19. To enable the security performance of the operators to be effectively monitored and reviewed, CA should ask licensees to provide regular data on security issues. The level and frequency of reporting should be appropriate to the category of licence (see Recommendation 16) but at least in the case of the USP it should cover: level of customer complaints and resolution performance; level of losses; level of criminal incidents, including physical attacks on staff, burglaries, robberies, theft of mail from vehicles; performance in apprehending and prosecuting perpetrators.

20. CA in conjunction with the Courier Industry Association of Kenya (CIAK) should develop a mail integrity document to which all operators sign up. The document would provide best practice and minimum standards in ensuring the integrity and security of mail during the operational processes. It would include levels of protection for buildings, vetting of staff, mail handling procedures, dealing with undelivered items and protecting employees and staff,

21. CA should set up a licensing and market information forum that meets regularly (e.g. annually) to discuss compliance requirements, reporting, action on unlicensed operators, etc.

22. CA should set up a universal service and access forum that meets regularly (e.g. annually) to establish sector priorities, implementation programmes and inter-operator co-operation.

23. CA should set up a security forum that meets regularly (e.g. annually) to exchange information on best practice and new risks.

24. CA should consider whether staff involved in postal regulation would benefit from further training in this area.