



“Triple Play”

Pilot Case Studies for the Open Animal Resource Information System (ARIS)

April 30, 2010

Submitted by
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Table of Contents

Project Task and Deliverables	4
Background	4
The Current State of Triple Play in Africa.....	5
Voice, Internet, TV and Radio	5
Infrastructure and Regulations	6
Spectrum Use and Allocation	7
Market Demand	8
Pilot Country Case Studies	8
Current State of Triple Play	8
Rwanda	8
Kenya	9
Uganda	9
Ghana	9
Voice, Mobile, TV and Radio	11
Rwanda	11
Kenya	11
Uganda	11
Ghana	12
Triple Play Networks and Infrastructure.....	12
Rwanda	12
Kenya	13
Uganda	13
Networks and Infrastructure	14
Spectrum Use and Allocation	14
Rwanda	14
Kenya	14
Uganda	15
Ghana	15
The Market.....	15
Rwanda	15
Kenya	16
Uganda	16

Ghana	17
Constraints of Triple Play	17
Rwanda	17
Kenya	17
Uganda	18
Ghana	18
Customer Utilization.....	18
Rwanda	18
Kenya	19
Uganda	19
Ghana	20
The Future of Triple Play.....	21
Rwanda	21
Kenya	21
Uganda	22
Ghana	22
Triple Play and Open ARIS	23
Introduction.....	23
Enabling Regulations for Triple Play and Open ARIS	24
Barriers for Triple Play and Open ARIS.....	25
Opportunities for ARIS and Triple Play	26
APPENDIX.....	28
Uganda Ministry of Agriculture Letter	29
Ghana National Communications Authority Meeting Notice	31

Project Task and Deliverables

The primary objective of this project task is to identify ways to enhance the capacity of telecommunications regulators in developing countries to deal effectively with fast-moving changes in technologies and best practices in telecommunications law, as well ensure that these telecom regulators are well versed in the latest business and technical models related to pro-competitive service delivery and commitment to serving rural and underserved customers. The objective of this specific task is to conduct pilot projects that target regulatory practices and needs to facilitate wide access to uniform and bundled distribution of internet data, telephony, and broadcast mediums.

Under the direction of the SRA TP2R project team, the Subcontractor (VIA Consulting) was to pilot an existing online application; to test the existing telecomm and regulatory preparedness for accommodating a single source or entity for a convergence of digital communication mediums. VIA Consulting used the Open Source Animal Resource Information System (Open ARIS) application as a test case for helping to determine the infrastructure and gaps for successful launching and operation of the system utilizing voice, text, and broadcast mediums. Through this piloting process the regulatory, technical and digital prerequisites or hindrances for launching such a system were to be considered, as well the types of legislation necessary for safe and secure transmission of Open ARIS data.

The primary deliverables for this task are case studies resulting from conducting the pilot projects in up to four countries. Since Open ARIS is currently being utilized in Ghana, Rwanda, Uganda and Kenya; VIA Consulting choose those countries mentioned above as pilot countries to perform the case studies. The case studies are to include the types of legislation and requirements necessary to transmit Open ARIS data, barriers and solutions for the barriers, total cost of ownership of such technology, costs to consumer, and other pertinent and relevant information.

Background

In the United States and other countries, telecom providers are offering “Triple Play” options to consumers, to deliver simultaneously data via the Internet, telephone services, and television to the household. It is conceivable that in a few years, these services will be bundled and delivered entirely via the Internet, and companies like Microsoft are developing applications for this type of convergence. Similarly, mobile phones are increasingly being used for applications far beyond voice, essentially becoming mini-computers that can deliver Internet data (video, audio, and text), provide GPS-enabled services, etc. This type of convergence is likely to occur quickly in developing countries where the demographics are favorable (e.g., Brazil, India, Indonesia, South Africa) and where the telecom providers are highly sophisticated and well-

financed.

The Telecommunications Policy Regulatory Reform (TP2R) Project funded by the United States Agency for International Development (USAID) and implemented by SRA International, Inc. (SRA) focuses on improving the telecommunications policy and regulatory environments in developing countries. One of the key tasks of the TP2R project is media/digital convergence. Under this task, SRA assists regulators with understanding such issues as spectrum allocation in the area of digital convergence/roll-out of broadband Internet infrastructure, and how regulatory responsibilities should be allocated (i.e. the overlap of television and radio broadcasting with telecommunications). To this end, SRA is implementing pilot projects that consider the types of enabling legislation necessary for regulators to effectively manage digital convergence.

The Current State of Triple Play in Africa

Africa's Information Communication Technologies (ICT) sector is the fastest growing sector globally. The impact of ICT's in Africa is catalyzed through the expanding penetration of the Internet, mobile services, and convergence, also known as "Triple Play" or the bundling of voice, Internet, and television/video.

As networks and new applications spread, it is widely recognized that that Triple Play in Africa has the potential to shape the delivery of government services (education and health included), redefine the way businesses operate and provide individuals with as yet unimagined information and communication services. Landlocked African countries are now being assured of high-speed bandwidth capacity due to undersea cable consortiums and many African governments have begun to prioritize ICTs in their national agendas, appreciating the great contribution that communications play in the development process.

The actual delivery of Triple Play services in Africa however faces major barriers such as limited penetration of telecommunication networks into rural areas, varying regulatory environments, inadequate resources for infrastructure development and the inability to efficiently manage spectrum allocation. African leaders and industry heads as well as CEOs of leading ICT companies from around the world are discussing ways of resolving these barriers to establish Africa as a leader in Triple Play service delivery.

Voice, Internet, TV and Radio

The growth in Africa's Internet and Broadband sector has accelerated in recent years due to improvements in infrastructure, the arrival of wireless access technologies and lower tariffs. Broadband is rapidly replacing dial-up as the preferred access method, and this process has been completed in the continent's highly developed markets. All the most recent and reliable surveys agree that radio is still the dominant mass-medium in Africa (Balancing Act 2008), with the

widest geographical reach and the highest audiences compared with TV, newspapers and other ICTs. While being the world's most rapidly growing market for mobile telephony, Africa is also home to some of the fastest growing fixed-line markets in the world. However, the difficulty of rolling out fixed-line networks across its vast land has resulted in mobile users constituting the majority of all African telephone subscribers.

There are a number of ways a Triple Play offer can be delivered in the African context using one or a combination of the following: DSL over a fixed copper line; fixed wireless; satellite; mobile wireless using 3G and upwards to mobiles; and Fiber-To-The-Home (FTTH) for more affluent countries or for more affluent communities within countries. Many African countries now have commercial DSL services, but their growth is limited by the poor geographical reach of the fixed-line networks. The rapid growth of Internet access has therefore been mostly confined to the capital cities. The introduction of mobile data and 3G broadband services however is changing this, as mobile networks bring Internet access to many areas outside of the main cities for the first time. [Source: Balancing Act: Triple Play]

Africa currently leads the world in annual growth rates for mobile subscriptions. Most countries have now achieved at least 60% mobile coverage. According to the International Telecommunications Union (ITU), about 32% of Africans had a mobile phone in 2008 compared to less than 2% having a mobile phone in 1998. While this is still significantly below the world average, the fact is growth has been explosive. [Source: <https://www.budde.com.au/Research/Africa-Internet-Broadband-and-Digital-Media-Statistics-tables-only.html?r=51>]

Infrastructure and Regulations

One of the biggest developments in the delivery of Triple Play in Africa involves communications infrastructure. Limited penetration of telecommunication networks into rural areas (often over 75% of the country's telephone lines are concentrated in the capital city) and irregular or non-existent electricity supplies are a common feature and a major barrier to the delivery of Triple Play especially outside the major towns. Africa however has immense potential to improve its infrastructure deployment and telecommunications usage. African leaders and industry heads as well as CEOs of leading ICT companies from around the world are discussing ways to mobilize human, financial and technical resources and bring new investment commitments aimed at bridging ICT infrastructure gaps.

Improving physical access however is just one step in the delivery of Triple Play services. Further challenges involve adopting and harmonizing appropriate public policies and regulatory frameworks; both are seen as imperative in creating an enabling environment for the effective delivery of Triple Play services. The national regulatory environment in Africa varies greatly, from relatively open competition in Internet service provision or even in mobile services and the local loop, to long term monopolies in all of these areas.

Until very recently, Sub-Saharan African regulators and governments have sought to

contain the disruptive impact of new technologies on their historic operators rather than encourage technological innovation. VoIP calling has only recently been defined as a legal activity in a small number of countries. Despite these barriers, in certain African countries these new technologies have gone around regulatory rules and international voice traffic using VoIP has varied between 10–30 percent in most African countries, often acting as hidden competition for the historic operator on international voice calling. A recent study for ECOWAS and the World Bank found that VoIP had been legalized in six out of fifteen ECOWAS countries but this overstates what is actually happening as there are disputes or extremely limiting conditions in four of these countries. Wireless technologies have often remained outlawed or been rendered difficult to use through regulatory inexperience or unwillingness to extend access to low-cost spectrum.

Fortunately, many African governments have begun to prioritize ICTs in their national agendas, appreciating the great contribution that communications play in the development process. Advancements in regulatory and policy frameworks are being addressed with innovative public-private partnerships that seek accessible end-user equipment and service for all. Many regulatory structures are beginning to encompass convergence, critical to the delivery of Triple Play. [Source: Source: http://www.itu.int/newsroom/features/ict_africa.html]

Spectrum Use and Allocation

Traditionally, Africa's regulators have made clear distinctions between mobile, fixed and broadcasting services. This distinction is no longer clear due to the convergence of technologies, or Triple Play, which makes it possible for these services to be delivered from one platform. Access to spectrum currently represents one of the biggest obstacles to competitive participation in the ICT marketplace and the widespread deployment of mobile broadband services.

It is widely acknowledged within the regulatory community that global and regional harmonization of spectrum allocations and arrangements are imperative in that harmonization will lower costs in equipment manufacturing and service provisioning, therefore leading to increase benefits for all consumers and operators. Many African countries however currently do not have adequate resources to efficiently manage radio spectrum allocation and this has resulted in congestion, lack of a transparent licensing process, and difficulties in obtaining spectrum from regulators.

According to a 2009 Yankee Group Report, regulatory factors in Africa present significant risks for operators seeking new or augmented spectrum holdings including delays in licensing procedures, the imposition of service restrictions and spectrum scarcity. In addition to spectrum incumbency issues, scarcity also is the result of artificial constraints that regulators may impose in terms of block sizes (MHz), caps on the amount of spectrum that an individual operator may acquire and limits on unpaired spectrum allocations. To achieve widespread access to Triple Play services, efficient spectrum allocation and management throughout Africa is imperative. [Source: <http://www.analysismason.com/About-Us/News/Newsletter/Could-Africa->

Market Demand

According to recent report on Africa's broadband, - “African Broadband, Triple Play and Converged Markets” - demand for Internet access is growing at exponential rates on the continent as well as the amount of Internet traffic due to multimedia. Internet service providers are now faced with the challenge of keeping up with demand for network bandwidth. Triple Play and broadband services are projected to power the next stage of growth for Africa's Internet as the number of broadband subscribers is set to triple over the next few years.

The leader of information and communication technology (ICT) development market in Africa is South Africa, the 20th largest consumer of IT products and services in the world. South Africa's ICT products and services industry is penetrating the fast-growing African Triple Play market as South African companies have supplied many of the new fixed and wireless telecoms networks that have been established across the continent in recent years. Kenya and the East African Community have worked on backhaul projects, which laid fiber-optic networks throughout each country and connected the networks in each so that broadband could be delivered to Kenya, Rwanda, Burundi, Uganda and Tanzania. The potential market is not only Kenya but the entire East African Community (EAC) – some 130 million people.

Pilot Country Case Studies

Current State of Triple Play

Rwanda

The government of Rwanda, under the leadership of President Paul Kagame, has made several strides to develop Rwanda into the ICT leader of Africa. The government is looking to follow very ambitious plans to accelerate Rwanda into this role, but with the dedication of the President and other government leaders this is a realistic goal. The Economist magazine recently reported that Rwanda is well on its way to achieving several of the Millennium Development Goals due to the impact ICT has had on this emerging economy. With substantial business process redesign, government support and focused leadership, Rwanda has demonstrated to East Africa that much can be accomplished when ICT is used as an engine for development.

According to a recent IT News Africa article, Rwanda's telecom industry is getting a boost with the country's latest fiber optic network transmitting large bandwidth from capital Kigali to Gatuna border, through Uganda, Kenya and the East African coast. Patrick Nyirishema, Deputy CEO-IT, Rwanda Development Board, indicated that the cable had reached the border at Gatuna and is ready to be leased to telecom companies. Operators in the country will be also able

to link their existing fiber optic infrastructure with the pipe, to provide more affordable and reliable telecom services in Rwanda. [Source: <http://www.itnewsafrika.com/?p=7081>]

Kenya

According to the Communications Commission of Kenya (CCK), the communications sector in Kenya has maintained an upward trend since liberalization. Enhancement of competition has spawned deployment of innovative products in the market to meet consumer demands. The growth of and expansion in telecommunications networks has completely transformed both commercial and individual communication and opened up untapped areas within the economy. The country has also experienced increased use of communication services not only in the direct use of voice and data services, but also in other enabled and enhanced services. Many players have joined the industry ranging from network providers, service providers, equipment providers, to vendors. The advancement in the sector has been driven mainly by technological convergence that has made it possible for provision of more competitive and quality services such as Triple Play.

Uganda

The Ugandan government realizes the recent trends in ICT convergence such as Triple Play and the bundling of TV, Internet and phone services allows for radical cost efficiencies, can be used to introduce new services in previously underserved communities. The government has made a firm commitment to work closely with private sector and other stakeholders to have a well coordinated approach in resolving the broadband infrastructure challenges.

Today, Uganda's communications sector is one of the fastest growing in Africa. As in the rest of the continent, this is largely due to the rapid expansion of mobile telephony. According to statistics from UCC, the number of telephone subscribers had reached 10 million in March 2009 — up from more than 8.7 million in December 2008 — which is about one-third of the country's population. Of the 10 million subscriptions, 9.8 million are mobile phone subscribers while around 200 000 are fixed-line owners [Source: ITU News, Communications in Uganda]

Ghana

The evolution of the telecommunications industry in Ghana over the past several years has produced dramatic changes in the technology behind human communication and the role that advances electronic telecommunication play in all aspects of society and the economy. According to Ghana's Ministry of Communications, among the most important developments has been the transformation of the global and domestic industry from a largely monopolized state-owned model to a broadly competitive private and open market model. Ghana has been a pioneer in the telecommunications industry.

The country opened its basic telecommunications industry to private competition more

than 10 years ago and today Ghana continues to be a leader among African nations in the expansion of market entry, the development of new services and business arrangements, and the growth of the telecommunications sector. Ghana's recently established National Telecommunications Policy seeks to "open telecommunications market segments to private, competitive market forces to establish conditions favorable to encouraging sector growth and reorienting the overall market structure"¹.

Services available in Ghana include voice fixed telephony, mobile cellular, data, paging, private networks, and other value-added services. There currently exists a new submarine fibre-optic cable tapped from Voltacom in addition to Vodafone's SAT3 and, most recently, the landing of Glo's submarine cable. Two more fibre-optic facilities will be added to the existing ones very soon and these will help create competition and do away with the current monopoly provider of international bandwidth by Vodafone Ghana as well as support the ongoing convergence of technologies.

Driven by technology and demand, convergence is resulting in major changes in market structures and business models. According to a 2010 report published by F.K. Boachie, ICT Deputy Director at the University of Ghana, the demand for Triple Play networks and services in particular Ghana is currently being driven by the financial, corporate and business communities. [Source: <http://www.modernghana.com/news/246220/50/liberalization-of-ghanas-telecom-sector.html>]

¹ <http://www.ict.gov.gh/Telecom%20policy/Ghana%20Telecom%20Policy%20Final.pdf>

Voice, Mobile, TV and Radio

Rwanda

The aftermath of the 1994 genocide and a monopolistic market structure until 2006 have weighed on the Rwandan telecommunications sector, but the country is now rapidly catching up with other markets in Africa. Mobile market penetration is still significantly below the regional average. The country has been slow to liberalize the sector, allowing South Africa's MTN a monopoly until 2006 and licensing a third network (Millicom) only at the end of 2008. The fixed-line incumbent and second mobile operator, Rwandatel has launched third generation mobile services, with MTN expected to follow shortly. Both Rwandatel and MTN are rolling out national fiber backbone networks which also allow them to connect to international submarine fiber optic cables on the African east coast. Seacom, the first such cable landed in July 2009, giving the entire region fiber-based international bandwidth for the first time and bringing to an end its dependency on satellites. (Source: BuddeComm based on various sources)

The Telecommunications Law No. 44/2001 of 30 November 2001 provides the regulatory framework for Rwanda's telecom sector. It established an independent multi-sector regulatory body, the Rwanda Utilities Regulatory Agency (RURA). Among other things, the law requires networks to be interconnected. In 2007, 25 new licenses and renewals for VSAT, ISP, radio and television assignments, satellite telephony and pay television were issued by RURA. Regulatory challenges involve adopting and harmonizing appropriate public policies and regulatory frameworks; both are seen as imperative in creating an enabling environment for the effective delivery of Triple Play services.

Kenya

Currently, there are four licensed mobile operators, namely Safaricom, Celtel, Econet Wireless, and Telkom Kenya (which is also the sole national fixed network operator). The opening up and development of the sector is set to be enhanced by technological convergence and implementation of a unified licensing framework. Competition in the sector also spurred product and service innovations, especially in the mobile sector, with the operators coming up with tariffs that address user demands and lifestyle.

Uganda

Currently, Uganda's major mobile telephony providers are MTN Uganda, Orange Uganda Limited, Zain (formerly Celtel) Uganda Telecom Mobile and Warid Telecom. The boom in Uganda's mobile market is the result of continuous positive growth of the country's gross

domestic product (GDP) and a clear policy of liberalization and competition. Analysts at Pyramid Research anticipate that over the next few years, Uganda will experience Africa's second highest percentage rise in mobile subscriptions (after Cameroon), and that by 2014, more than 70 per cent of Ugandans will have mobile phones. Pyramid Research also foresees rapid growth in fixed and wireless broadband access to the Internet.

[Source: <http://www.itu.int/net/itunews/issues/2009/06/31.aspx>]

Ghana

To date, Ghana has had an impressive performance in the telecommunications market with mobile phone lines exceeding fixed lines by 40:1 and recording one of the highest numbers of mobile phone usage in Africa. At the end of 2009, Ghana had 15.360mn mobile subscribers; this gave the country a penetration rate of almost 63%. Although growth was slower than in 2007 and 2008, when annual growth of at least 50% was recorded, the Ghanaian mobile customer base expanded by almost 33% in 2009 [Telecommunications Report on Ghana].

In 2002, the government began an ICT policy, known as the Information and Communication Technology for Accelerated Development (ICT4AD), to further enhance the liberalization process. As a result of this policy Ghana has witnessed improvement in the penetration of telecoms services. A number of FM Radio stations have come into existence as a result of this liberalization policy of the government; each regional capital has at least one FM radio station. In addition to GTV, Mnet and TV3, which are micro wave based TV stations in Ghana and, the only two other TV stations are Cable Gold and Multi Choice. [Source: <http://www.en24heures.com/niger/ghana's-mobile-phone-penetration-reaches-63-in-2009-ghana-news/2010/04/02/276>]

Triple Play Networks and Infrastructure

Rwanda

According to Rwanda's The New Times publication, Rwanda has officially launched its new high-speed Internet connections, Kigali Wireless Broadband (WiBro) and Kigali Metropolitan Network (KMN), after two years of infrastructure development by Korea Telecom (KT), cites. The Rwanda's Development Board (RDB) states that, 46 government institutions are already using the connectivity. "This technology will cater for data, voice and video transmission plus other value added services that the market may require," explained John Gara, CEO of RDB. The two projects developed by Korea Telecom (KT) bring Kigali's Internet users data connectivity and VoIP services through wireless broadband technology (WiBro) and a metropolitan network (KMN) on fiber optic cable.

The new connections are expected to lead to more access to affordable and reliable networking services, as close to 4 million Rwandans will gain access to high speed Internet in the next couple of years. Similarly, the KMN will facilitate connection for more than 700 institution, schools, healthcare centers and local administrative facilities across Rwanda. Korean Telecom will be also responsible in a related project that will see the nation's fiber-optic cable linked to the undersea cable in the next year. The network will connect 36 main points in Rwanda's 30 districts, with a 2.300-kilometre cable running across the country. This project will include training and cable installation to achieve high-speed Internet for Rwanda's population.

Kenya

Telkom Kenya's monopoly in Internet backbone and international bandwidth services ended in 2004 and several new data carriers have been licensed. Currently there are 72 licensed ISPs of which about half are operational. ADSL and wireless broadband technologies have been introduced, and VoIP Internet telephony has been liberalized, promising to bring the long-awaited reduction of international and long-distance calling rates. A WiMAX network is being rolled out with the aim of providing converged voice, data and video/broadband TV (triple-play) services.

Some of the recent infrastructure developments that will impact the roll-out of Triple Play service include a WiMAX network being rolled out to provide converged voice, data and video/broadband TV (triple-play) services and the launch of third generation (3G) mobile broadband services with speeds of up to 7.2Mb/s. Companies that started out as ISPs - such as AccessKenya, Africa Online, Kenya Data Networks (KDN) and Wananchi - are transforming themselves into second-tier telecom companies by rolling out national fiber backbones and wireless broadband access networks, offering Triple Play services (converged voice, data and video/entertainment). Analysts also say that the arrival of fiber optic cables has enabled triple play services, with satellite-based internet said to offer weak infrastructure.

Uganda

Uganda is faced with high costs for Internet bandwidth due to the fact that the primary means of access is by Satellite. Satellite Technology remains very expensive and the lack of alternatives in the region has made it difficult for Uganda to fully exploit the vast benefits of the Information Age. In 2007 the Ugandan government started an initiative to roll out the National Backbone Infrastructure and E-Government Infrastructure (NBI-EGI) Project across the entire country. The first phase of this project has been completed in Kampala, and extending to Entebbe, Jinja and Bombo, thereby connecting all government Ministries with a more commercial phase to follow.

Wireless Internet connectivity has slowly emerged as popular alternative means of access in the country. A number of WIMAX networks are currently being rolled out and a solution for last mile access. However, there is no concrete strategy and policy in place to address last mile connectivity [Source: Uganda Broadband Infrastructure Strategy, 2009].

Networks and Infrastructure

With an accelerated growth pace in market penetration, opportunity continues to exist in the provision of basic voice services as well as Internet access through the mobile networks, given the country's poorly developed fixed-line infrastructure. In an attempt to connect Ghana's ICT infrastructure to its neighboring countries, the country's government plans to make a major investment into its National Communication Backbone. This investment into the project, estimated to total around US\$70 million, is designed to facilitate the reduction of bandwidth cost to the ordinary citizens and corporate organizations.

The Ministry of Communications will also provide an open-access broadband infrastructure and extend the fiber optic backbone infrastructure to the northern parts of the country. Upon completion, all 10 regional capitals and more than 30 other towns will be linked to the fiber network. In February 2010, Main One Cable Company announced that it had begun final deployment stage of its Main One cable, a cross-continental submarine fibre-optic network, which will run from Portugal to Nigeria and Ghana. The 1.92Tbps capacity cable network, expected to be launched in June 2010, aims to provide capacity for higher use of broadband internet services in Ghana.

Spectrum Use and Allocation

Rwanda

The government of Rwanda has created a multi-sector regulatory agency, the Rwanda Utilities Regulatory Agency (RURA) that covers the major sectors of the economy, including energy, telecommunications and transport. The Agency will direct frequency spectrum allocation and management as the fundamental elements to enable fair access and affordability to ICT and Triple Play services.

Kenya

One of the core mandates of the CCK is management of scarce resources such as spectrum, which facilitates the deployment of ICT services. The CCK continually regulates the radio frequency spectrum to ensure economic and efficient utilization of the scarce frequency

resource for development of radio communications services in the country. Most recently, the CCK identified and assigned 10 MHz of paired bandwidth in the 2 GHz band to Safaricom for commercial rollout of 3G services after a successful one-year trial period. The service provides high speed mobile data to subscribers and is initially available in Nairobi and Mombasa. The 3G packet-based data offers a number of advantages over the existing circuit-switched methods used for transporting mobile voice and is set to increase call volumes and support multi-media data applications, video and Triple Play service offerings. The Commission continues to experience high demand for broadcasting frequencies as reflected by increasingly large number of applications received for FM and TV broadcasting.

Uganda

The Uganda Communications Commission office of Spectrum Management is responsible for the frequency planning; coordinating allocations assignments, regulating and administering of the use of radio frequencies; and the monitoring and enforcement procedures. In Uganda, the management of the spectrum is based on the Uganda Communications Act that provides the framework for radio spectrum management. The use and demand for the radio frequency spectrum has been increasing since the liberalization of the sector in 1996. With an increased competitive environment, which anticipates high usage of the radio spectrum an delivery of services like Tripe Play, Uganda realizes that only a comprehensive spectrum policy guidelines to address issues of convergence will help meet these growing demands.

Ghana

Recent key spectrum regulatory developments include plans to auction five spectrum licenses for broadband wireless access (BWA) services. These licenses that will allow those who win them to offer both voice and data, and it is currently believed that these licenses will ultimately be used to offer WiMAX services.

The Market

Rwanda

Rwanda has a relatively high level of mobile penetration. According to RURA,19 mobile penetration increased from 7% in 2007 to 13.8% in December 2008; that is, a total national subscriber base of 1,322,637, with MTN Rwanda securing 1,158,674 of these. Competition within the mobile market is anticipated to remain intense due to a number of factors, including

Rwandatel's expansion plans and the newly licensed third national operator (Millicom/Tigo), which will launch at the end of 2009.

As for fixed telephony, Rwandatel's subscriber base decreased from 22,643 in 2007 to 16,770 in 2008, representing a 26% decrease. The subscriber base for all ISPs is estimated at 7,857, representing a 67% increase from 4,715 in 2007 [*RURA Annual Report 2008*]. As of 2008, 20 broadband VSATs are operational in Rwanda. The major owners are international organizations, ISPs and higher educational institutions. VoIP is not legal. The current licenses allow MTN Rwandacell and Rwandatel to use and offer VoIP services as their licenses are all encompassing. However, the potential legalization of VoIP by the regulator is still at the preliminary stage [*RURA Annual Report 2008*].

Kenya

According to infoDev and the International Telecommunication Union Service *convergence* is blurring the boundaries between Kenya's ICT sectors. For example, the boundary between broadcasting and telecommunications is no longer clear. Many content providers broadcast material over the Internet as well as (or instead of) over conventional broadcasting networks. Broadcasting over mobile television networks is emerging as well. As networks migrate to digital technologies, broadcasting networks are able to carry a range of services including, potentially, voice telephony. This has important consequences for sector regulators and competition policy. Co-ordination across regulatory areas (between broadcasting, data services, and telecommunications) will be important to avoid regulatory arbitrage. Mergers between entities in previously separate sectors may now raise competition concerns.

Similarly, mobile and other wireless services are becoming effective substitutes for wireline telecommunications services for some users. Indeed, in some developing countries, wireless minutes of use exceed wireline minutes of use. This trend brings into question the long held assumption that an incumbent telecommunications operator will necessarily be the dominant operator in the market. As the quality of VoIP services improves, it is becoming a more effective substitute for conventional voice service. VoIP is already placing competitive pressure on prices for long distance calls. As more users switch to VoIP, this will have significant implications for regulators and operators.

[Source: <http://www.ictregulationtoolkit.org/en/Section.2196.html>]

Uganda

Although the growth in Uganda's ICT sector has been exponential over the past ten years and reflective of increasing demand, the quality and cost of internet services remains an issue of major concern. Slow growth in Internet is attributed to two issues (1); from the supply end/

infrastructure end riddled with low capacity and high access costs and (2) on the other end demand constraints such low content, awareness and IT skills.

Ghana

As mentioned previously, the demand for Triple Play networks and services in particular Ghana is currently being driven by the financial, corporate and business communities. Emerging market communities are also demanding Triple Play services for the ease of doing business. Statistics obtained from the Ghanaian National Communications Authority (NCA) indicate that there are 11,962,224 active mobile phone subscriptions, representing 98% market penetration of the telecom industry. The recent figures indicate that mobile phone subscriptions increased by some 16.8%, but that fixed subscriptions have been dropping since 2002.

Constraints of Triple Play

Rwanda

The growth of broadband faces several challenges. These include the high cost of access, and the low level of ICT usage for business transactions. But, arguably, one of the main challenges remains the lack of a clear broadband policy in Rwanda that can guide its development and provide regulatory guidelines for RURA to take appropriate measures to support its take up. Other challenges preventing the deployment of Triple Play in Rwanda include in some cases the lack of human resources, both on the technical and policy sides. Lastly, access to broadband at an affordable price will ultimately increase access and usage of ICTs within the country, and will provide greater opportunities for the deployment of Triple Play services.

Kenya

Although next generation networks are said to maximize use of infrastructure, resulting in more efficiency, reduced costs, and value added services to consumers, current statistics show that Kenya is still far from realizing these benefits [ITC Connectivity Scorecard 2010, Nokia-Siemens]. Overall, fixed broadband connectivity stands at less than two per cent, with home connections at 0.5 per cent. In addition, recent trends point to slow growth in the spread of fixed line infrastructure due to the rapid expansion of mobile networks.

Though fibre-optic cables, which are the ideal backbone for triple play services, have arrived, the high cost of extending lines to homes is major barrier to Triple Play networks with

wireless technologies like Wimax, Wifi, and dial-up modems being deployed more. Though more commercial buildings may soon have dedicated broadband connections, it is likely that private homes may take longer to be wired. For the short term, analysts say that these technologies have and will continue to bridge the huge gap left by the poor penetration of fixed line platform. However, as diverse communication models get digitized and converged through the internet, inadequate fixed line infrastructure to carry them will deny consumers benefits of the service.

Uganda

Uganda suffers from a combination of institutional and structural factors that have led to high bandwidth costs. These include low income levels that limit investment in ICT infrastructure, small markets that preclude economies of scale and lower unit costs and geographical isolation that entails the use of expensive satellite connectivity. Apart from radio, investments in other media have not been growing because such investments require a lot of capital.

There is also need for further removal of more regulatory barriers that might hamper quick connectivity of Uganda to the international, regional and national broadband networks, including the provisioning of incentives for the roll out of last mile solution based on latest broadband technologies such as WiMAX and LTE. [Source: Uganda Broadband Infrastructure Strategy, 2009].

Ghana

Triple Play service deployment problems encountered so far in Ghana are blamed on the lack of a strong regulatory agency, especially regarding interconnection negotiations. Another issue has been how to address interconnection issues with special reference to fix to mobile operations, development and delivery of fundamental economic issues for regulators, which includes competition policy, costs and pricing and finance for regulators. One of the key impediments to affordable broadband services is the high cost of bandwidth.

Customer Utilization

Rwanda

Rwanda started digital broadcasting by March 2009, five years earlier than the International Telecommunication Union (ITU) deadline for all countries to adopt the terrestrial digital broadcasting. The cost of telecommunications is a factor that constrains growth and customer utilization.

The private sector cluster joint sector review report 2008 shows that Rwanda still has low access levels for both internet and mobile services. Less than 2% of the population has access to the internet, while 5% has access to mobile phones. This compares badly to other countries in the region, particularly regarding mobile phone penetration in Kenya and Tanzania and internet penetration in Kenya and Uganda. [Source: Republic of Rwanda, March 2009]

Kenya

According to the CCK, the 2012 transition to digital broadcasting is expected provide a number of benefits to Kenya resulting from greater spectrum usage efficiency. Such benefits are expected to enhance customer utilization and continue to pave the entry for Triple Play service. The shift from analog to digital is driving convergence of communication services. Many different types of communication (such as data, text, audio, video, and voice) can now be transported over the same networks and, in some cases, sent and received over the same user equipment. Benefits include:

- Additional services: Consumers will have a wider choice of enhanced broadcasting applications, multimedia data and entertainment services.
- Higher video and audio quality
- Greater spectrum efficiency due to associated digital coding techniques and the additional number of frequencies;
- More broadcasters due to more programming channels that can be accommodated in one frequency.
- Freed spectrum: The switch off of analogue terrestrial broadcasting will release some frequency spectrum which will be reassigned for new services.

Uganda

Uganda's switch-over date for analogue to digital broadcasting is June 2015. However, the availability of digital receiving apparatus at affordable prices is crucial to early uptake of digital broadcasting technology by the mass market. Pricing of such receiving equipment could be the biggest single obstacle (or enabler) to introduction of digital broadcasting and subsequent Triple Play services. The switch from analog to digital broadcasting offers many advantages to customers and is critical to the deployment of Triple Play service offerings. Internet Protocol Television (IPTV) for example will be a digital multimedia service (television, video, audio, text, graphics, and data) that will be able to provide new services such as triple play, video-on-demand, and other IPTV based converged services.

Additional digital conversion advantages that will help the roll-out of Triple Play include:

- Availability of Choice- Consumers are best served when they have choice, high quality programs, access to different service providers and different transmission platforms and a wide selection of digital equipment having various levels of functionality.
- Interoperability of Systems- Equipment used should be able to receive content from any service provider in order to ensure that consumers have the ability to switch between service providers operating on the same platform.
- Ensuring the Presence of a Competitive Market:-Competition benefits the consumer through the provision of more affordable prices, better quality, more services and innovative products.
- Efficient Use of Spectrum- Spectrum is a finite scarce resource and should, therefore, be used to its maximum potential so as to benefit from the “digital dividend”.

Ghana

Digital broadcasting in Ghana has the potential to revolutionize TV viewing, giving consumers more choice and better quality. Broadcasters can serve multiple interests over the same infrastructure. The National Communications Authority (NCA) has established a Regulatory & Industry Task Force for Digital Broadcasting Migration. The Task force comprises representatives from:

- National Communications Authority (NCA)
- Ghana Broadcasting Corporation (GBC) and the
- Ghana Independent Broadcasters Association (GIBA)

The terms of reference of the Task Force includes:

- Determine the spectrum to be made available for digital broadcasting in Ghana
- Determine strategies on the use of spectrum for digital broadcasting services
- Make recommendations on spectrum pricing for digital broadcasting services
- Recommend appropriate standards for digital broadcasting services
- Identify technical issues to be addressed with neighboring countries to ensure harmonious spectrum usage
- Consider free-to-air vs free-access vs subscription digital broadcasting systems
- Consider the role that satellite-broadcasting should play in the Ghanaian digital broadcasting landscape

A meeting was held in Ghana as recently as March 2010 by the National Communications Authority to discuss digital broadcasting migration and with key stakeholders in Ghana’s telecommunications regulatory community (see Appendix of a list of meeting participants).

The Future of Triple Play

Rwanda

Rwanda's vision to place ICT at the centre of the country's development strategy has been made operational through a national policy document widely known as the National Information Communication Infrastructure (NICI) Plan. The first of these plans, NICI I (2001-2005), has since expired, and Rwanda is currently implementing NICI II (2006-2010). Another key policy instrument is the National Policy on Science, which strives to support the adoption of science, technology, innovation and ICT.

As part of the NICI II Plan, a national fiber backbone representing 2,300 kilometers of distance is being implemented around the country and will definitely impact the development and affordability of broadband to the general population. [Source: A review of telecommunications policy development and challenges in Rwanda, Albert Nsengiyumva and Emmanuel Habumuremyi-Association for Progressive Communications (APC) September 2009]. This plan encompasses The Rapid National Broadband Backbone Development Facilitation Initiative which aims to promote the rapid development of an advanced broadband communication backbone infrastructure for Rwanda through private investment [Source: Republic of Rwanda NICI II Plan (Kigali: RITA, 2006)]. The fiber optic project, expected to be completed towards the first quarter of 2010, will be very key to the deployment of Triple Play networks and services.

Kenya

A recent ICT report by the United Nations Conference on Trade and Development (UNCTAD) says that in developed countries like Kenya, existing fixed telecommunications infrastructure is increasingly leveraged for the introduction of triple play services over Internet Protocol (IP) platform. The introduction of triple play service in Kenya has been highly anticipated. Analysts expect triple play to gain root in the coming years to match those of more developed regions where it is quickly becoming the norm.

But according to some industry experts recently, Kenya risks losing out on the benefits of converged communications unless players in the ICT sector increase their investments in fixed line broadband. These experts blame the growing preference for mobile communications and wireless internet connectivity in developing countries, which they say has resulted in a decrease in fixed line communications infrastructure. Should this trend continue it would result in Kenya not having sufficient fixed line broadband, especially in homes, to roll out triple play services -- telephone, Internet and television --in what is referred to as next generation networks.

Nevertheless, Kenya's ICT sector is set to "redefine how consumers access, use and pay for telecommunication and entertainment services, including voice calls, Internet, and television or video viewing" according to a recent 2010 article posted by Kenya's Business Daily news. Kenya Data Networks (KDN) is inching closer to a mass market roll-out of triple play services – a bundle of Internet, voice, and television or video content services to home users who will have KDN as the point of contact for all the three services.

From a CCK policy and regulatory standpoint future policy that will help enable the deployment of Triple Play will cover items such as:

- Convergence
- Competition Policy
- Creating confidence in ICT by ensuring security, resilience and robustness
- Broadband networks
- Affordable Next Generation (and ALL IP) Networks (NGN)
- Privacy and protection of personal data
- ICT and the Environment

Uganda

The Ugandan government realizes the recent trend in convergence such as Triple Play and the bundling of TV, Internet and phone services allows for radical cost efficiencies, can be used to introduce new services in previously underserved communities. The government has made a firm commitment to work closely with private sector and other stakeholders to have a well coordinated approach in resolving the broadband infrastructure challenges. The future of Triple Play in Uganda is tied to the country's ability to quickly solve these problems. The roll out the National Backbone Infrastructure and E-Government Infrastructure (NBI-EGI) Project across the entire country has been a critical step in providing adequate infrastructure for Triple Play services.

Ghana

The future Triple Play in Ghana according to most expert looks very promising. 2008 was marked by changes in the regulation of communications in Ghana, through the coming into effect of the new National Communications Act, 2008, Act 769, Electronic Communications Act, 2008, Act 775, the Electronic Transactions Act, 2008, Act 772, and the National Information Technology Agency Act, 2008, Act 771. All these new Acts are geared to support the increasing convergence taking place in the communications space. The new National Communications Act provided for a new licensing regime and a review of regulations that sought to govern previously distinct, but now, converging "Triple Play" technologies consisting

of telecommunication, broadcasting and computing.

Triple Play and Open ARIS

Introduction

The complexities associated with monitoring disease occurrences and other emerging infectious diseases (EIDs) has been steadily increasing. Agencies such as USAID, FAO, OIE, WHO and UNICEF and others realize that a broad multidisciplinary and multisectoral cooperation across the entire animal-human-ecosystems interface must be put in place. For example, under the banner of *One World, One Health*, FAO, OIE, WHO and UNICEF (together with the World Bank and the UN System Influenza Coordinator (UNSIC)), have agreed that a better understanding of the global emergence, spread and impact of EIDs is both urgent and important.

The thrust of the One World, One Health concept is to diminish the risk and minimize the global impact of epidemics and pandemics due to EIDs by enhancing livestock and wildlife disease intelligence, surveillance and emergency response systems at national, regional and international levels, and by supporting them through strong and stable public and animal health services and effective national communication strategies. Priorities will be identified on the basis of known areas of risk ('hotspots') for disease emergence and on research findings that point to new risks.

Emerging ICT trends, particularly within developing nations are changing the dynamics of how credible, timely data on food animal-human-ecosystems and disease emergence can be gathered and how new risks can be identified. As networks and new applications spread, the impact of ICTs is catalyzed through the expanding penetration of Internet services, mobile services, and convergence, also known as "Triple Play" or the bundling of voice, Internet, and television/video. Improving the telecommunications policy and regulatory environments in developing countries is critical to the development and deployment Triple Play.

In accordance to the USAID/SRA Statement of Work, VIA Consulting Group met with various African stakeholders in the telecommunication and animal health sector to determine how Triple Play in developing nations can be used to improve and foster the creation innovative rapid methods for data collection, analysis and dissemination of information; and to test the Open ARIS system under different technical and regulatory circumstances and environments. USAID's Open Source Animal Resource Information System (Open ARIS) application was used as a test case for helping to determine the infrastructure and gaps for successful launching and operation of the system utilizing voice, text, and broadcast mediums. Through this piloting

process various types of legislation and requirements necessary to transmit Open ARIS data in a Triple Play context were identified as well as barriers, possible solutions for the barriers, and other pertinent and relevant information.

Enabling Regulations for Triple Play and Open ARIS

In order for the Open ARIS application to function utilizing the internet, voice, and broadcast mediums enabling legislation must be in place. According to Justin Rudasingwa of Rwandatel and Francis Ngabo of the Rwanda Utility Regulatory Authority, the main challenges to Triple Play remain the lack of a clear broadband policy that can guide its development and provide regulatory guidelines take appropriate measures to support ICT convergence. VoIP for example is currently for government use only in many African countries and is illegal for consumers. According to Mr. Ngabo, the current Telecommunications Law in Rwanda is being changed to a “very comprehensive ICT Law” within the Ministry of ICT. This law will address policy issues at the infrastructure layer, application layer and content layers. RURA must also direct frequency spectrum allocation and management as the fundamental elements to enable fair access and affordability to ICT and Triple Play services.

Rwanda’s Regulatory NICI II Plan, a national fiber backbone project, is being implemented around the country and will facilitate the impact the development and affordability of broadband. With an expected completion date of the first quarter of 2010, the utilization of this backbone will be critical to the deployment of Triple Play networks and services for Open ARIS as all 30 districts will be connected, thereby expanding the systems capability to capture and disseminate data rapidly. Even with the roll-out of this backbone, it was noted that satellite is still very important in the provision of Internet access; therefore convergence legislation would have to also consider the use of satellite. Rwanda’s solutions to regulatory challenges involve adopting and harmonizing appropriate public policies and regulatory frameworks; both are seen as imperative in creating an enabling environment for the effective delivery Open ARIS over Triple Play services.

After meeting with telecommunication representatives in Ghana, it is clearly evident that Ghana has been making great strides in the telecommunications regulatory arena. Ghana has recently established a National Telecommunications Policy that seeks to open the telecommunications market segments to private, competitive market forces to establish conditions favorable to encouraging sector growth and reorienting the overall market structure. In an attempt to connect Ghana’s ICT infrastructure to its neighboring countries, the country’s government plans to make a major investment into its National Communication Backbone. The Ministry of Communications will also provide an open-access broadband infrastructure and extend the fiber optic backbone infrastructure to the northern parts of the country. Upon completion, all 10 regional capitals and more than 30 other towns will be linked to the fiber network. In Uganda, regulatory policy enabling the roll out the National Backbone Infrastructure

and E-Government Infrastructure (NBI-EGI) Project across the entire country has will be step in providing adequate infrastructure for Triple Play services. All of these factors point to the development of favorable regulatory conditions for the utilization of Triple Play services and Open ARIS.

In Kenya for example, the roll-out of Digital broadcasting in 2012 will help reduce the impact of weak regulatory agencies on Open ARIS by providing more efficient spectrum usage, lower transmission cost and better service offerings for end users. Regulation must consider low income rural areas to ensure that digital equipment is affordable and Kenya continues to maintain an upward trend in regulatory reform According to the Communications Commission of Kenya (CCK), this reform has led to the enhancement of competition has spawned deployment of innovative products in the market to meet consumer demands. The growth of and expansion in telecommunications networks has completely transformed both commercial and individual communication and opened up untapped areas within the economy. Most importantly, the coordination across regulatory areas (between broadcasting, data services, and telecommunications) will prove to be important for the use of Open ARIS.

Barriers for Triple Play and Open ARIS

Triple Play service deployment problems are primarily blamed on the lack of a strong regulatory agency, especially regarding interconnection negotiations. Another issue has been the high cost of bandwidth that impacts affordability of Triple Play services and therefore the ability of Open ARIS to use these services. The cost of telecommunications is a factor that constrains the deployment of converged services. Investments in convergence infrastructure such a fiber are very expensive and in some cases cost prohibitive. Rwanda's existing infrastructure networks for example cannot support convergence due to constraints at the core network level and require significant investments. Investments in convergence infrastructure are very expensive in Uganda, Ghana and Kenya as well. In Kenya for example, the high cost of extending lines to homes is major barrier to Triple Play networks with wireless technologies like WiMax, Wifi, and dial-up modems are being deployed more. It is believed that current and future regulatory policies that will help enable the deployment of Triple Play must cover items such as:

- Convergence
- Competition Policy
- Creating confidence in ICT by ensuring security, resilience and robustness
- Broadband networks
- Affordable Next Generation (and ALL IP) Networks (NGN)
- Privacy and protection of personal data
- ICT and the Environment

Slow growth in Internet is also a contributor to the deployment of Triple Play. The slow growth in Uganda for example is attributed to two issues (1); from the supply end and infrastructure end Uganda is plagued with low capacity and high access costs and (2) on the other end demand constraints such low content awareness and IT skills are a limiting factor. These issues must be resolved before an enabling environment for the effective delivery Open ARIS over Triple Play services can exist. Other challenges preventing the deployment of Open ARIS include the lack of human resources, both on the technical and policy sides.

Opportunities for ARIS and Triple Play

Open ARIS is currently at version 3.0 which includes critical reporting functionality. When meeting with AU-IBAR, several key factors to the further development an enhancement of Open ARIS in Kenya were discussed, some of which rely on the incorporation and use of emerging technologies such as Triple Play:

1. Rapid data capture and leveraging Triple Play technologies and network infrastructures to facilitate rapid data capture at the field level.
2. Enhances connectivity and greater bandwidth for data transfer over mobile connections
3. Robust knowledge and disease information management; tying together “One World, One Health” initiatives and the use of Triple Play services
4. In- Country sustainability that lowers the cost of data transmission through Triple Play services
5. Definition of linkages and responsibilities among key stakeholders
6. Usability and Value

When speaking with a representative at USAID Kenya, VIA Consulting learned that Open ARIS could play a key role in providing data for decision-making important trade decisions. Currently, the East Africa Community EAPIC system is used to make trade decisions but animal data is only informally captured, whereas plant data is formally captured. It was agreed that an application like Open ARIS could provide better disease surveillance at the regional level. Should Open ARIS be able to leverage Triple Play technologies appropriately it would result in the direct improvement of the quality of data that is captured to make trade decisions. According to Jeffery Austin a USAID/Kenya representative, a key focus of the USAID within the EAPIC program is Risk Assessment and Risk Analysis in order to put the trade data into context and to “defend” trade decisions. Looking forward, Open ARIS could expand the animal side of Risk Assessment and Training and well as the ability to rapidly capture accurate animal and disease data through Triple Play technologies.

In a written statement to VIA Consulting Group (see Appendix) Dr. William Mukani, the Director of Animal Resources for The Ministry of Agriculture stressed the importance gaining access to improved Internet connectivity and having the ability to “Integrate all key stakeholders (MOH, Uganda Wildlife Authority, NGOs, Teaching and Research Institutional) in the National Surveillance systems in order to capture all the relevant disease information and to promote the One World One Health Perspective.” This underscores the critical nature of Open ARIS and Triple Play services working hand in hand.

African universities participation in the Africa-Connect EU partnership (www.africa-eu-partnership.org) program could further the development, expansion and utilization of Open ARIS in other countries. Efforts within the Africa-Connect EU partnership focus on capacity building at all levels –policy and regulatory environments, infrastructures, human resources, development of local content and services. The University of Ghana for example is a part of this program that will look at connecting the world's largest multi-gigabit computer network dedicated to research and education. This will contribute to bridging both digital and scientific divides in Africa, providing the African scientific community with better access to research and education resources and peers around the globe through broadband capacity on affordable terms. Both Triple Play services and Open ARIS could very well leverage this global partnership.

In speaking with Dr. Hery of RARDA in Rwanda, VIA Consulting Group learned that there is a desire to collect data at the sector level for all 416 sectors in Rwanda. Hence, the utilization of converged services such as mobile technology and Satellite-Internet and WiMAX for rapid data collection in the field are critical. Dr Hery also pointed out that the ability to quickly provide livestock movement data as well as animal disease outbreak data directly impacts a country’s ability to manage its import/export balance. Taking into consideration also the existence of “trading blocs” within Africa that foster enhanced cooperation and collaboration among commodity traders, agricultural investors, and infrastructure developers; the global dynamics of importing, exporting and monitoring food security further emphasizing the critical nature of being able to collect and disseminate data quickly and cost effectively.

As networks and new applications spread, Triple Play in Africa has the potential to shape the delivery of government services (education and health included), redefine the way businesses operate and provide individuals with as yet unimagined information and communication services. The ability of applications such as Open ARIS to effectively utilize Triple Play services has the potential to play a critical role in the prosperity and growth of Africa’s economy. Clear broadband policy and enabling regulatory guidelines are therefore critical to Africa’s future and the expansion of Open ARIS throughout the continent.

APPENDIX

Uganda Ministry of Agriculture Letter



**MINISTRY OF AGRICULTURE,
ANIMAL INDUSTRY AND FISHERIES**
WEBSITE: www.agriculture.go.ug

OFFICE OF THE DIRECTOR OF ANIMAL
RESOURCES,
P.O. BOX 513, ENTEBBE
EMAIL : dar@infocom.co.ug

TELEPHONE: 256-041-320825,
FAX: 256-041-320421,

In any correspondence on
this subject please quote No.

26th March 2010

Jeff C. Street
1000 Peachtree Industrial Blvd
Ste. 6, PMB 371
Suwanee, GA 30024

Dear Sir,

RE: OPEN ARIS IN UGANDA

The Government of Uganda with support from USAID, VIA Consulting Group and Makerere University, Faculty of Computing and Information Technology is implementing an Animal Resource Information System (OpenARIS). This system which is based at the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) will facilitate the collection, storage, analysis and dissemination of animal resource data within the Ministry of Agriculture Animal Industry and Fisheries.

The NADDEC has received a server to run the OpenAris programme installed with an internet connection. In addition, ten pilot districts were identified to be used to access OpenAris. GPRS/Edge 3G modems have been procured for 6 districts with no internet connection to provide quick and cheap access to the internet for ease of accessing OpenAris through internet browsers.

By the end of this project in December 2009, the ten pilot districts had not yet been connected to the system nor had the end users been trained. Although we have been very pleased with the work that VIA has done with OpenAris after the project ended, the Ministry has been constrained with continuity and sustainability of the activities of OpenAris.

Considering the need for an efficient and effective surveillance system in the country and in view of the increased outbreaks of Transboundary Animal Diseases, new and reemerging zoonotic diseases, the Ministry is requesting for additional support to fully establish the OpenAris system.

The support requested will specifically be used to undertake the following activities;

- Connect the ten pilot districts to the system and eventually roll out the technology to all districts in Uganda to ensure efficient and effective information dissemination in the whole country.

- orienting the field staff on the new system,
- Provision of backup in form of maintenance and upgrade of the software,
- Constant maintenance of the OpenAris system with the support of Makerere University, Faculty of Computing and Information Technology
- Improve internet connectivity at the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) to a higher bandwidth.
- Integrate all key stakeholders (Ministry of Health, Uganda Wildlife Authority, NGOs, Teaching and Research Institutions) in the National Surveillance systems in order to capture all the relevant disease information and to promote the One World One Health Perspective.

The Government of Uganda is committed to the OpenAris initiative and has procured computers for additional districts. We will also establish communication with the Ministry of Local Government to strategize about the institutionalization of OpenAris throughout the country.

This support will enhance early detection and reporting of animal diseases, improve information sharing of TADs and zoonotic diseases and enable Government to undertake risk analysis and assessment of new and reemerging animal diseases.

Best regards,



Dr. William Olan Mukani
DIRECTOR ANIMAL RESOURCES

Ghana National Communications Authority Meeting Notice



NATIONAL COMMUNICATIONS AUTHORITY (NCA), GHANA

AUTHORITY/NDBMTC/5

26 March, 2010

See Distribution

Dear Sir/Madam,

**INVITATION TO PLENARY MEETING OF THE NATIONAL DIGITAL
BROADCASTING MIGRATION TECHNICAL COMMITTEE AT FIESTA
ROYALE HOTEL, DZORWULU, ACCRA**

The above mentioned subject refers.

You are hereby invited to attend a meeting of the National Digital Broadcasting Migration Technical Committee scheduled for **Tuesday, 30th March, 2010** at the **Fiesta Royale Hotel, Dzorwulu, Accra**, at **9:00am**.

The meeting will consider reports from the following sub-committees:

- ❖ Consumer Affairs / Public Relations sub-committee
- ❖ Economics sub-committee
- ❖ Policy & Regulatory sub-committee
- ❖ Technical sub-committee

The report from each sub-committee shall be sent to you via email, prior to the meeting.

Please endeavour to attend.

Yours faithfully,

Edmund Yirenkyi Flanko
Secretary
For: Chairman

Distribution

1. Major (Rtd.) Emmanuel Owusu-Adansi, *National Communications Authority (NCA)*
2. Mr. Henry Kanor, *National Communications Authority (NCA)*
3. Mr. Issah Yahaya, *Ministry of Communications (MoC)*
4. Mr. Emmanuel Ofori, *Ministry of Communications (MoC)*

5. Mr. Kennedy Osei, *Ministry of Communications (MoC)*
6. Ms. Hawa Yakubu, *Ministry of Communications (MoC)*
7. Mr. G. B. L. Siilo, *Ministry of Information (MoI)*
8. Ms. Yvonne Quansah, *Ministry of Finance & Economic Planning (MoFEP)*
9. Mr. Emmanuel Adisi, *Ministry of Trade & Industry (MoTI)*
10. Mr. Augustus Ken Kweku Eshun, *Ministry of Environment, Science & Technology (MoEST)*
11. Mr. Bruce MacLean, *Ministry of Local Government & Rural Development (MoLGRD)*
12. Mr. Alex Bannerman, *National Media Commission (NMC)*
13. Mr. Oscar Nchor, *Ghana Broadcasting Corporation* * own majority of broadcast
14. Chief Crystal Djirakor, *Ghana Independent Broadcasters Association (GIBA)*
15. Mr. R. Kofi Nyantakyi, *TV3*
16. Mr. Kwaw Ansah, *TV Africa*
17. Mr. John K. Agbosege, *Customs Excise and Preventive Service (CEPS)*
18. Mr. J. K. Baiden, *Ghana Standards Board (GSB)*
19. Mr. Ebenezer Appah-Sampong, *Environmental Protection Agency (EPA)*
20. Ing. Dr. Adam I. Imoro, *Ghana Institution of Engineers (GhIE)*
21. Dr. Prosper K. Ashilievi, *Ghana Telecom University College (GTUC)*
22. Mr. Stanley Opoku, *National Film and Television Institute (NAFTI)*
23. Mr. Frank K. Boachie, *University of Ghana (UG), Legon*
24. Dr. Kwasi Diawuo, *Kwame Nkrumah University of Science & Technology*
25. Mr. Wilson Arthur, *Sky Digital TV, Abelemkpe*

Cc.: Director General, NCA
 All Directors, NCA
 Secretariat of DHRA