OFFICIAL EVENT REPORT

The Commonwealth African Rural Connectivity Initiative (COMARCI)

Connecting Africa's Rural Communities
Through Effective & Sustainable Partnerships

19 June 2008
The Commonwealth Secretariat,
Marlborough House,
Pall Mall, London

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Report Abstract

This report details the presentations, discussions and conclusions held at the COMARCI Day event during the African European Roundtable, attended by Heads of Commonwealth African Regulatory Authorities and selected ICT stakeholders from ICT operators, manufacturers and financial institutions.

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Executive Summary

This report summarises discussions and recommendations from **COMARCI Day**, held as part of the African-European Roundtable in Marlborough House, Pall Mall, London on 19 June 2008.

The forum was organized by the CTO, attended by the Ugandan Minister of ICT, Dr. Ham Mukasa Mulira and Heads of Regulatory Authorities from across Commonwealth Africa and selected ICT stakeholders from the private sector, ICT service providers, technology manufacturers and financial institutions.

The CTO firmly believes that increasing rural connectivity and harnessing the potential of ICTs are key enablers to stimulate social and economic benefits for the millions of unconnected in Africa. However, the public and private sectors must develop solid mutual understanding and operational partnerships so that real benefits can be felt by both administrations and the citizens they serve. The CTO's COMARCI is designed to provide a platform for this dialogue, increase collaboration between stakeholders and improve rural connectivity on the African continent.

This report provides details of the presentations and discussions that took place at the roundtable in London. These covered several **crucial topics**, including:

- the *roles of government, private sector and local entrepreneurs* in supporting rural connectivity;
- the use of *universal service funds* to finance rural connectivity projects;
- the business model for the provision of *broadband* rural connectivity;
- the importance of *local ownership* for sustainable solutions;
- the provision of *long-term finance* for rural connectivity; and,
- the *advances in satellite* technology for affordable rural services.

After the presentations and roundtable discussion, the following **recommendations** can be distilled from the forum:

- **Public Private Peoples Partnership (PPPP)** models should be adopted to develop sustainable business models for rural connectivity

- While **private sector investment and innovation** is largely responsible for the explosive growth in ICTs in the last decade, there is still a **critical leading role to be played by the public sector**

- **Local ownership**, either through personal or financial commitment, is necessary for project sustainability

- The success of any rural connectivity initiative is dependent on the specific **regulatory environment** in that country

- More **pilot projects** and innovative technology solutions need to be **tried and tested** to determine their effectiveness and sustainability

- Technologies leveraging **alternative energy sources** must be developed and integrated into rural connectivity projects

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The report is divided in four main parts. The background of COMARCI and results from Phase One of the initiative are presented in the following section. The second section summarises the presentations on Strategy, Projects and Partnerships tackling the challenge of rural connectivity. Financing and Project Modelling for Rural Connectivity is summarised in the third section and this report concludes with steps to Launch Phase Two of COMARCI and the conclusions and recommendations of the day.

1. COMARCI Background and Phase I Results

1.1 Welcome Remarks

The opening session of the day featured the following distinguished speakers, all of whom helped to develop the Commonwealth African Rural Connectivity Initiative (COMARCI) from vision into reality:

- Mr. Bashir Patel, Director, Programmes and Business Development, Commonwealth Telecommunications Organisation (CTO)
- Dr. Michael Frendo, former Chairman of Commonwealth Connects Steering Committee
- Dr. Ekwow Spio-Garbrah, Chief Executive Officer, CTO
- Mr. Gavin Tench, Representative of the UK Foreign Office
- Hon. Dr. Ham-Mukasa Mulira, Honourable Minister of Information and Communication Technology (ICT), The Republic of Uganda

This section provides a brief background to the inspiration behind COMARCI and the key welcoming remarks made by each of the above speakers.

Today the prosperity of nations depends to a large extent on populations having access to ICTs, through a broadband connection, fixed-line telephone, public payphone or mobile phone. However, access is not available in large parts of the world, particularly in rural and under-privileged areas. Emerging countries like Malaysia and India have accelerated rural connectivity, which partly explains their economic successes, leaving behind countries like Sierra Leone and Zambia, where inadequate investment, among other factors, has restrained potential growth.

As a result, some 3 billion people—nearly half the world's population—have yet to be connected to any type of telephone, whether fixed or mobile. Although recent years have seen dramatic growth in penetration rates in some African countries, especially mobile networks, the continent's aggregate penetration rate is still less than 20 percent. For Internet access and use, the figures are well below 5 percent for most of Africa. Over 60 percent of Africa's population lives in unconnected rural areas and represent an, as of yet, untapped market, holding enormous potential for growth for service providers, equipment manufacturers and the entire telecommunications industry.

The Commonwealth African Rural Connectivity Initiative (COMARCI) is the Commonwealth's initiative to help connect the unconnected in its 18 African member countries to the national communications networks, and by extension to the outside world. It is believed that the resulting access to market information and opportunities will catalyse a social, economic and commercial revolution.

COMARCI is now:

- Assembling the existing body of knowledge on how telecommunications regulation, policy, legislation, and operational, technological and financial models affect the potential for cost-effective rural connectivity in the 18 African Commonwealth countries
- Mapping the status of connectivity and rural connectivity initiatives

- Compiling similar information on initiatives and best practices of five selected non-African countries, US, Canada, Australia, Malaysia, and India, who have demonstrated innovative and successful solutions to rural connectivity
- Writing and disseminating "The Commonwealth African Rural Connectivity Report"
- Identifying "winning" rural connectivity pilot projects, which have already been successfully implemented, for adaptation and replication across the continent
- Mainstreaming COMARCI with national development agendas

Mr. Bashir Patel, Director of Programmes and Business Development at the CTO, stressed in his opening remarks that COMARCI has not only involved the CTO, but hundreds of people from all of the 18 African Commonwealth Countries, the Commonwealth Secretariat, other member organisations, industry and various other stakeholders. **Dr. Michael Frendo**, former Chairman of the Commonwealth Connects Steering Committee, explained that when COMARCI was first proposed it immediately caught the imagination of the Commonwealth Secretariat because it is not simply an academic exercise, but a project that can make a difference on the ground and lead to a better life for people in Africa through greater connectivity.

Dr. Ekwow Spio-Garbrah, Chief Executive Officer of the CTO, emphasised that rural communications is central to development and poverty alleviation, since the majority of poor people around the world live in rural areas. Much of the research by various bodies, such as the GSMA, has confirmed that access to telephony and the Internet is related to development. Access to information helps to include the poor in the development process and helps to achieve many of the Millennium Development Goals (MDGs) relating to literacy, infant mortality, gender equality, education, etc.

Despite tremendous growth in access to ICTs in the developing world over the last 10 to 15 years, about 80 percent of the African population is still not connected. Moreover, penetration is often overestimated because it is based on SIM card purchases, which are not entirely accurate, as one person may have many SIM cards. Therefore, the CTO works to provide the international community with the means to bridge the digital divide and deliver unique knowledge-sharing programmes on the use of ICTs to drive socio-economic development.

Dr. Spio-Garbrah commended the Government of Malta, who has committed £50,000 to COMARCI, along with funding from Vodacom, BT Global, and Telkom South Africa. The CTO has also partnered with the Commonwealth Secretariat, Commonwealth Business Council, Commonwealth Broadcasting Association, Commonwealth of Learning, Commonwealth Network for Information Technology and the International Telecommunications Union (ITU). Most of the CTO member organisations have also contributed to the initiative by appointing liaison officers and research associates.

Mr. Gavin Tench, standing in for Lord Malloch-Brown, the Foreign Office Minister, took the stage and commended the CTO for tackling a challenging objective in line with the MDGs, which are a critical focus of the Foreign Office. He reflected on his own past experiences growing up in Kenya and the difficulties faced when trying to communicate with people abroad, the tediousness of switch boards and frustration with lost connections. While times have changed and texts, voice and video are now accessible through mobile phone in some parts of Kenya, there is clearly so much more to be done those people who do not share the same privilege.

The Honourable Minister of ICT for Uganda, **Dr. Ham-Mukasa Mulira**, remarked how proud he was that COMARCI was approved by Heads of Commonwealth Governments last November in Kampala, Uganda. After a sneak preview of the report, he was thoroughly impressed by the quantum and quality of information, the balance of interests between the various stakeholders, and the particular relevance of the winning ICT pilot projects.

Dr. Mulira noted that policymakers and regulators understand and appreciate the role of the private sector in the ICT world and it is only natural that the private sector should play an equally important role in an initiative that aims to bring rural connectivity to Africa. What is novel about the COMARCI Report is the call to add "Peoples" in the partnership structure. It is not only wise, but requisite to have the ultimate beneficiaries, which will not only add ownership, but also sustainability involved in the project.

Nearing the end of the first phase of COMARCI, it is now time to implement the pilot projects in the various Commonwealth African countries. It is hoped that this knowledge will be mainstreamed and become part of the policy and regulatory framework of the individual countries.

Dr. Mulira went on to stress that it is important to open our minds to possibilities we may not have seen or taken notice of.

> *"You see things; and you say, Why? But I dream things*
> *that never were; and I say, Why not?"*
>
> *- Bernard Shaw*

He asserted that unless we follow Mr. Shaw's advice, another generation will see the world pass them by. It is even more imperative today, since the world has seen what ICTs are capable of achieving in countries such as India and Malaysia. The delegates in attendance will see many options, in terms of technology, business models, partners and relationships that will address the rural connectivity gap in the various African Commonwealth countries. As policymakers and regulators in ICTs, it is up to them to provide leadership and implement possible solutions to a lasting resolution.

Mr. Anthony Ming, Informatics Advisor from the Governance and Institutional Development Division of the Commonwealth Secretariat, and former Head of Commonwealth Connects, reflected on the origins of COMARCI. In 2001 the Commonwealth Secretariat convened a panel of ICT experts to examine the growing importance of ICTs and its implications for developmental goals; COMARCI was adopted in response to the panel's following two major conclusions:

1. ICTs have transformational power to change societies and bring governments and citizens closer together

2. There is a growing digital divide between and within the Commonwealth countries, especially those with large geographical areas

1.2 Keynote Address: COMARCI PHASE I

The keynote address of the morning was delivered by the CEO of the CTO, **Dr. Ekwow Spio-Garbrah**. Below is a summary of his speech.

COMARCI was approved in July last year as one of the grand projects of the Commonwealth Connects Programme. The project is knowledge-driven and will be shared and developed online in order to provide a platform for various players to interact in partnership. Although the research focuses on the experiences of the 18 African Commonwealth countries, the findings of the initiative are relevant to other developing countries as well.

The draft COMARCI Report, disseminated for review that day, maps out the status of rural connectivity initiatives and draws best practices from the 18 African countries, as well as the five non-African comparator countries, the US, Canada, Australia, Malaysia, and India. The comparator countries have made considerable progress in achieving their own rural connectivity objectives. Malaysia, in particular, has positively transformed itself in a short space of time due to visionary leadership that understood the potential of ICTs. One achievement was the creation of a cyber city known as "Cyberjaya", which forms the nucleus of the Multimedia Super Corridor (MSC), where over a thousand research and development companies are based. Australia, a country with a sparse population and large land mass, has connected many of its remote and rural parts; and India, the second most populous country in the world, has connected millions of its rural inhabitants. The COMARCI report reflects the wealth of knowledge that can be acquired from the experiences of countries all over the world.

It is also imperative that Universal Service and Access Agencies are strengthened and improved. It is estimated that about US$6.5 billion has been levied from operating companies, but has not always been utilised effectively in many African countries. Many operators argue that the regulator should let them roll out rural services themselves, rather than simply taking money from them. That said, if the money was not levied, it is unlikely it would be invested in rural telecom activities.

The private sector drives ICT innovation in today's world. From 1960 to about 2000, most of the telecommunications sector was publicly funded through state-owned telecom companies, but since then, many countries have liberalised the communications sector. Investment in fixed-line technologies has faltered in recent years, but private companies have become aggressive players in the African mobile and Internet markets. This report studies the Nokias, Ericssons, Hewlett-Packards, Huaweis and other companies that have embarked on many rural connectivity projects.

It is hoped that policymakers and regulators can benefit from the resultant knowledge expressed in the draft report and apply it to their own countries. The report identifies 10 winning projects from various countries that have certain ingredients, or criteria, that are essential for achieving successful rural connectivity. Delegates should review the report, the winning ICT initiatives and the criteria for selection; and provide the CTO with feedback and additional contributions, as well as identify similarly successful ICT pilot projects in their own countries.

The methodology of the report is comprised of the following elements:

- Extensive country profiling of the 18 African Commonwealth Countries – perspectives of stakeholders on policy, regulatory, operational, infrastructure, connectivity, rural access, Universal Service and Access Funds, etc.
- Research of the best practices in 5 non-African comparator countries, selected on the basis of their successes in improving rural access

- Engagement of donor agencies (World Bank, ADB, DfID, EU, etc) and other development partners on rural connectivity initiatives, such as universal service and access agencies
- Engagement with the private sector for initiatives, services and technologies targeting rural connectivity
- Identification of successful and replicable rural connectivity initiatives
- Development of Public Private Peoples Partnerships (PPPPs) for implementation of pilot projects

Many of the conclusions of the report can be understood and implemented using the **PROFIT** acronym, coined by Dr. Spio-Garbrah himself.

Policy Environment
Regulatory Environment
Operating Environment
Funding Institutions
Infrastructure
Technology

Applications
Best Practices
Legislation
Enabling Environment

Moreover, if **PROFITABLE** conditions exist, there will be a greater chance for success.

Following are the COMARCI recommendations for ICT stakeholders to drive rural connectivity, using the above PROFIT framework.

Lessons for **Policymakers** include:

- Establish an independent and impartial regulator
- Address telecommunications and broadcasting convergence by creating a single converged regulator and a regulatory framework
- Implement a technology- and service- neutral licensing regime to promote competition and to facilitate the most cost-effective means of connectivity
- Develop local human resources and build human capacity through local participation in ICT programme implementation
- Improve national ICT skills by equipping ICT training centres with modern ICT hardware and high-speed Internet connections
- Focus on ICT literacy and related training programmes for primary and secondary schools and the local people

Lessons for **Regulators** include:

- Put safety-net regulations in place to ensure affordability of services in rural areas
- Encourage favourable interconnection terms that reflect the substantially higher operation and maintenance costs of rural networks
- Provide incentives to operators for infrastructure sharing to reduce duplication of efforts and increase cost-efficiency of service provision

- Consider the allocation of unlicensed spectrum to encourage the development and use of innovative technologies
- Ensure that licence obligations are feasible, flexible and technology-neutral
- Establish an independent dispute resolution body to resolve disputes in a fair and timely manner
- Ensure optimal distribution of Universal Service Funds through competitive bidding
- Prioritise use of Universal Service Funds for common use such as public kiosks and telecentres

Lessons for **Operators** include:

- Ensure the affordability and availability of services to rural communities
- Strive to meet rural connectivity targets set as licence conditions
- Provide reliable, high-quality services with the most cost-effective technology available
- Assess the cost of rural connectivity as accurately as possible when bidding for Universal Service and Access Funds
- Cooperate amongst each other to share passive, active and backhaul infrastructure
- Establish employee training programmes to build local, practical, on-the-job skills
- Prioritise the provision of service to public access points such as local government headquarters, educational institutions, kiosks, telecentres and payphones.
- Negotiate interconnection terms that reflect the substantially higher operation and maintenance costs of rural networks

Lessons for **Financial institutions** include:

- View the "bottom of the pyramid" as a market in need of telecommunications infrastructure and services to help drive economic growth
- Consider the potential entrepreneurs at the "bottom of the pyramid" to bring telecommunications services to their rural communities
- Follow the sustainable banking principles as set out in the "Equator Principles," when financing telecommunications infrastructure rollout in order to preserve social and environmental integrity

Lessons for **Infrastructure providers** include:

- Lease infrastructure to telecommunications service providers in a fair, competitive manner
- Employ the local workforce when maintaining and installing telecommunications infrastructure, to help build the local technical and ICT human capacity

Lessons for **Technology providers** include:

- Step up research and development efforts in technologies that are relevant to rural connectivity, including innovative technology that is suitable for varied terrain
- Develop technologies that use renewable energy, such as biomass, solar, wind or hydroelectric power, to bring ICTs to rural communities removed from the national electricity grid

The next step to drive rural connectivity is to develop the necessary Public Private Peoples Partnerships (PPPPs). The draft report determines that for PPPPs to be successful they must work towards:

- Implementing national ICT strategies, within the wider national development policy agenda, and with a specific provision for rural connectivity
- Identifying workable business models that leverage the various roles of different ICT stakeholders and consumers for rural connectivity
- Testing innovative technologies, financial schemes and the business models as ICT pilot projects in rural areas
- Implementing and scaling up the successful rural ICT pilot projects
- Nurturing local ownership throughout the implementation of ICT initiatives in order to maintain local buy-in

In addition, the success of ICT pilot projects is dependent on a number of specific characteristics. Below are **essential** criteria for winning pilot projects:

- Improves rural ICT connectivity;
- Satisfies local needs for ICT services;
- Is easily accessible to the rural community;
- Offers services that are affordable to the rural poor;
- Contributes to the achievement of national policy goals;
- Is financially sustainable;
- Is built on strong PPPP partnerships;
- Uses the most appropriate, cost-effective infrastructure;
- Is able to operate on any reliable power source;
- Provides a reliable and sufficient connection appropriate for the services to be delivered; and,
- Makes local technical support available.

And criteria found to be **desirable** in pilot projects are the following:

- Builds on national, regional, and local partnerships;
- Generates profits above self-sustainability for re-investment and expansion;
- Strengthens rural ICT human capacity;
- Sustains public awareness of ICT services;
- Makes instructions on use available in local language(s);
- Facilitates gender equality;
- Benefits traditionally excluded groups;
- Uses equipment interoperable across networks;
- Takes advantage of renewable energy sources;
- Has the potential to play a peering role and share best practices; and,
- Ensures that IPRs are not an impediment to knowledge and experience sharing.

The CTO has identified a number of **winning pilot projects** that meet most, if not all, of the above criteria. There are listed below:

- Motorola / Seaside Communications Rural Broadband, Nova Scotia, Canada
- Nynet Rural Broadband, North Yorkshire, UK
- Nokia Siemens Networks Village Connection, India
- Village Phone, Uganda
- Vodacom Community Services Phone Shops, South Africa
- Ghana eCare, Ghana
- Ericsson Gramjyoti Rural Broadband Project, India
- Cyber Coaches and Caravans, Malaysia and Mauritius
- Vodacom and the Tanzania Agricultural Marketing Systems Development Programme, Tanzania
- Mobile Banking / M-PESA Model, Kenya

Each stakeholder is expected to play a role in facilitating successful PPPPs. It is expected that the public sector partners (policymakers and regulators) will:

- Help select a suitable site for the project
- Provide implementation expertise including subject matter expertise
- Contribute funds, possibly from Universal Service and Access Funds
- Guide on compliances with policy, legislative and regulatory requirements
- Facilitate public consultations and engagement with relevant communities
- Take the lead in building PPPPs

Private sector partners are expected to:

- Contribute or make technological expertise available
- Provide implementation expertise, including business models and project management
- Facilitate consultations with users of similar technologies and/or business models

The Peoples partner will:

- Commit and take ownership of the project
- Engage effectively with the project
- Leverage its strengths including local expertise for the project

On our part the CTO will:

- Advise on other requisite partners for the project
- Advise on project designing, technology selection, business models and Institutional structures
- Provide implementation support including project management expertise and stakeholder consultation
- Support raising finances for the project including from donors and the private sector
- Assist in building PPPPs

In addition, specific COMARCI deliverables include:

- Implementation of replicable pilot projects, based on tested examples that work and leverage PPPPs
- A Knowledge Resource Platform, based on research and studies
- Capacity-building and training workshops, especially for regulators and USF Agencies, to share knowledge and best practices
- A series of conferences, aimed at mobilizing investment, funding and technology partnerships to support projects

This should end with an undertaking by member states to fully implement rural connectivity in their respective countries in accordance with their own individual road maps. There must be willingness among all stakeholders to share the costs and risks through PPPPs and the various stakeholders must forge strategic alliances to implement specific country projects. It is also essential that there is engagement by government, regulators and USF Agencies together with operators, vendors and suppliers to target specific communities for connectivity and capacity building, with the assistance of the CTO if necessary.

The first step that needs to be taken is to sign an MOU involving various stakeholders for specific country projects. The signatories must then select a suitable pilot project and establish project teams and funding schemes. The pilot programme should be executed within budgeted time frames and results should be audited, fine-tuned and replicated where appropriate.

2. Rural Connectivity – Strategy, Projects and Partnerships

The second section of the day featured four presentations on various aspects of strategy, projects and partnerships to drive rural connectivity. The following distinguished speakers presented during the session:

- Mr. Nkatko Nyoka, Chief Officer of Regulatory and Stakeholder Relations, Vodacom
- Mr. Patrick Masambu, Executive Director of the Uganda Communications Commission
- Ms. Nancy Flam, Project Director at the Nova Scotia Provincial Government
- Mr. Nicholas Williams, Director of Regulatory Affairs for sub-Saharan Africa, Ericsson

The presentations and the following panel discussion are summarised below.

2.1 From Government Subsidies to a Profit Generating Sustainable Model: *The Vodacom Entrepreneur-owned and managed Community Services Phone Shops*

Below is a summary of Vodacom Chief Officer of Regulatory and Stakeholder Relations, Mr. Nkatko Nyoka's presentation on the company's Community Services Phone Shops.

The CEO of Vodacom, Mr. Alan Knott-Craig, dreamt fourteen years ago that every person in the country would own a telephone; not one that used discarded technology, but one that used the latest technology; not just for the rich or those who had a house, or a job, but for everyone. Essentially, the dream was to democratise the telephone in order to democratise communication, as it is a basic right for all people to have access to communications.

Prior to 1994 infrastructure development in South Africa was confined to privileged communities. South Africa was a country of white people and a country of black South Africans. Telecommunication penetration was only 10 percent, with only 1 percent of South Africa's disadvantaged communities having access to telephony. Access to telecommunications was prioritised as part of the process of building a single South African nationhood, and shortly thereafter, Vodacom was issued a licence to provide 22,000 subsidised public telephones in under-serviced areas. As a result, South Africa has about 120,000 public phones today.

The Vodacom phone shops were launched in 1994 and provide instant affordable access to telephony services and promote social and economic empowerment for communities. Some centres have sparked business entrepreneurship by providing fax, email, and Internet, along with traditional voice, services.

The phone shop, which is traditionally housed in a shipping container, follows a franchise business model with Vodacom as the franchisor and the Community Service Telephone Operator (CSTO) as the franchisee. Essentially the CSTO pays 60 cents per minute to Vodacom for calls, but charges customers 90 cents per

minute. Each container generally has multiple phones run by one attendant and are located on street corners, bus terminals, and other public areas.

In South Africa, the mobile phone is the sole source of communication for 85 percent of black-run small businesses. The Community Services Phone Shops allow distance-learning university students in rural areas to access study materials. This is doubly important as many people in rural areas cannot afford tuition for full-time education, and there is an established long-distance learning university that has been using the mobile as a learning tool. As well, the service shops assist with job applications, training opportunities and provide access to business information.

The project has been a success with approximately 4,000 phone shop containers in operation throughout South Africa with 103,000 active phones and 87 million call minutes per month. At the outset of the project in 1994, telecom penetration was only 10 percent, but currently SIM card penetration is almost 94 percent. Over 2,923 new small businesses have been created with over 20,000 new jobs and annual revenues close to R1 billion. The Community Phone Shops have also benefited a number of supporting businesses in the informal economy, as selling airtime has becoming a thriving industry. Many bars, shops and hair salons double as mobile phone shops.

One case study about Mr. Antonio Manhica was presented to show how the cellular industry can be used to create entrepreneurs and consequently increase access to communication services. Manhica was originally a fruit hawker but bought a cell phone and charged customers to use it. He then became a Vodacom public phone operator and now owns 50 public phone shops. At the beginning, the community phones were an obligation, but today Vodacom has found a business model that makes the provision of telecom services in rural areas profitable. It is hoped that this model will be replicated in different regions throughout Africa.

2.2 The Village Phone Project: *Utilising universal service funds to connect rural Uganda*

Following is a summary of the presentation made by **Mr. Patrick Masambu**, Executive Director of the Uganda Communications Commission.

There are three main elements of Universal Access.

- Availability: possibility to obtain service in all inhabited parts of a country
- Affordability: everyone can pay what is charged for the service they need to use
- Accessibility: everyone can use the service on equitable terms regardless of location, gender, educational background etc.

These are conceptual issues which are often tackled when researching Universal Service Funds. Steps taken will typically be premised on four or more layers. In Uganda, the first layer was infrastructure coverage, because at that time the networks were quite small. The next layer, public access, defines the level at which one wants to concentrate the provision of service. As investment increases, the focus shifts to private use, the third layer. Finally, at the top level, the focus centres on routine usage. In effect, these steps illustrate a movement from connectivity to utility.

Targets for Universal Access in most countries are focused on four areas:

- A public payphone for each community of a designated size
- A minimum walking distance to a public payphone (more relevant 10 years ago due to predominance of fixed-line)
- An Internet Point of Presence in every "district"
- A public Internet café in every "district"

If a country has a Universal Service and Access Fund, it is essential that the country decide on specific targets, generally directed at disadvantaged groups, such as:
- Anyone with income too low to afford uninhibited private use
- Elderly
- People with disabilities
- Categories like: individuals, households, communities, institutions, youth, etc.

The evolution of the Ugandan communications sector over the last decade and a half is outlined in the timeline below.

The Communications Sector Key Historical Dates

1993: Introduction of mobile telephony service - Celtel Uganda
1997: The Uganda Communications Act enacted
1998: Split of UPT&C: Creation of Uganda Telecom (UTL), Uganda Post Limited (UPL) & Post Bank Uganda
Establishment of Uganda Communications Commission (UCC)
Licensing of MTN Uganda as SNO and start of duopoly
2000: Liberalisation of UTL
2002: RCDF established to subsidise services in rural and under-served areas
2005: End of duopoly
2006: Establishment of the Ministry of ICT and full liberalisation of the market

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The dates illustrate strategic steps in the history of a country. Initiatives in Uganda can be classified as having been government-led, specifically the National Backbone Infrastructure, which has been put in place for almost a year now. Uganda has had financial assistance from the World Bank and other donors and the Universal Service and Access Fund, called the Rural Communications Development Fund (RCDF), has been the main intervention initiative, along with licence obligations.

In 1998 when licenses were issued to MTN and Uganda Telecom, it was recognized that there was a need to include obligations for the provision of service to rural areas, as operators would likely focus on more lucrative urban areas. Companies were asked to define which areas of the country they were not going to focus on, as it would allow government to define which areas were in need of intervention in terms of rural communications. In response, the RCDF was established and is administered at arms length by the regulatory authority, the Uganda Communications Commission (UCC). Three key objectives in the Universal Service and Access policy are the following:

1. To provide access to basic communications services within a reasonable distance to all the people in Uganda
2. To leverage investment in rural communications development

3. To promote ICT usage in Uganda

Since there is a new Ministry of ICT, the responsibility to promote rural communications, and the extent to which the regulator is involved, will have to be reassessed in the coming years. Many people believe that when a Universal Service and Access Fund is set up, the actions must ensure that the regulator is not seen as an operator. Therefore, the management of the RCDF must be administered at arms-length and managed by a dedicated Board (the RCDF Board), as defined by Statutory Instrument 2002 No 52.

The source of RCDF funding comes from:

- Money appropriated by Parliament (the national budget)
- Donations and grants from development partners
- Money from the Uganda Communications Commission (UCC)
- Donations, gifts, grants and loans acceptable to the Minister of ICT and the Minister responsible for Finance

In terms of implementation, it is important to determine the kind of subsidy amounts made available. The project implementer should be selected through a competitive system of bidding, and the reverse auction or least-cost subsidy is now used in Uganda. Typically, the implementer must give a business plan that is sustainable over a five-year period and performance criteria should be established between the implementer and the UCC, with agreement on how reports are to be submitted to the UCC. Mechanisms to hold the implementer accountable over the five-year period must be put in place and at the end of the five-year period, the project is closed and any money made goes to the implementer. The UCC simply plays the role of facilitator, giving out money on a grant basis, while ensuring that the funds are being utilised for the specified work.

This year marks the five-year mark for many of Uganda's various projects. The table below illustrates the results of the RCDF subsidies since its establishment:

#	PROGRAMME AREA	COMPLETED	UNDER DEV'T
1	Internet Points of Presence	52	24
2	Internet Cafes	55	45
3	ICT Training centers	70	2
4	Web Portals	78	0
5	Public Pay Phones	1,704	895
6	Research Projects	4	0
7	Postal support Projects	15	20
8	MCTs	4	20
9	Schools ICT projects	8	87
10	Health ICT projects	0	43
11	Call centers	0	1

Other specific impacts of the RCDF-subsidised projects include:

- The creation of 35 ICT-business entrepreneurs
- The establishment of an additional three to five other facilities, on average, following the establishment of RCDF-supported projects, due to the creation of confidence in the sector
- The creation of additional job opportunities, e.g. an Internet café directly employs about 4 persons
- An increase in the ratio of women to men users to about six to four
- The generation of research results that guide further ICT investment
- An increase in the ratio of private sector to RCDF investment in a project to about two to one.

Uganda is still faced with a number of challenges, such as the following:

- Unsustainable connectivity initiatives
- Unreliability or lack of grid power supply
- Low ICT usage due to low awareness levels
- High OPEX/CAPEX

Some planned activities include the development of a new ICT policy. The UCC is now working on the following tasks:

- Last-mile broadband infrastructure linking districts to sub-counties
- Call centres in various regions of the country
- Public pay phones covering all parishes, and covering all villages by 2010
- Support for postal projects
- Computer laboratories and data connectivity to more government schools
- Data connectivity to all district health facilities
- Applied ICT research activities
- Appropriate content development

2.3 Achieving Community Connectivity: *Cracking the "business model" code for rural communities and connecting at high-speed to the global economy*

Following is a summary of the presentation made by **Ms. Nancy Flam**, Project Director at the Nova Scotia Provincial Government.

Nova Scotia is a Canadian province with a population of approximately 1 million people. The majority of inhabitants live in urban areas, but a significant minority remain in rural or remote areas. According to most Nova Scotians, broadband connectivity is a vital piece of infrastructure, as important as electricity and paved roads. Roughly 200,000 people, 93,500 homes, 213 schools and 5,600 businesses were located in broadband "black spots", which were unfeasible and unprofitable areas for service providers to enter due to their remoteness.

These black spots were a serious problem since broadband is essential for the education, hospitality and tourism sectors. Ms. Flam provided an example of an Inn keeper who did not have broadband at his Inn in the North Shore of Nova Scotia and consequently often lost customers to other Inns who could offer broadband connectivity to their customers.

Broadband is also needed for farmers who are required to provide detailed test results of their produce online, healthcare workers who provide telehealth services, and doctors who can analyse x-rays online. As well, students in rural areas can take advantage of online distance learning materials that are only available in urban schools. In short, broadband access is critical to the sustainability and growth of Nova Scotia's economy and quality of life.

A major problem, however, is that there are not enough people in rural areas to justify the "normal" business model for broadband. Dial-up is profitable in some cases, as users are often forced to buy a second phone line; one for the telephone and the other for the Internet. Satellite services are not feasible, as they have high start-up costs and are relatively slow and expensive.

Ms. Flan and her team decided to divide the province into seven zones to ensure the sustainability of services. They also implemented an infrastructure-sharing scheme where service providers use government-owned towers to drastically cut down on the service provider's capex. Two providers were successful in their bids and were given various zones of responsibility.

The provincial government earmarked CA$19.6 million for infrastructure and project management. The federal government added another CA$14.5 million. The municipal government, although lacking funds, provided great assistance and direction. The goal for the Province of Nova Scotia is to achieve 100 percent broadband Internet coverage with long-term sustainability and at the lowest cost to taxpayers by the year 2009.

The government was faced with three technology options:

> 1. DSL or xDSL - a family of technologies that provide digital data transmission over the wires of a local telephone network.
>
> 2. Cable Modem - a type of modem that provides access to a data signal sent over the cable television infrastructure.
>
> 3. Fixed-wireless - a class of technologies used to connect two fixed locations (e.g., homes, buildings) with a wireless link.

The evaluation team was composed of federal/provincial representatives, financial, technical, and project management representatives from each zone. This was complimented with financial, technical and project management subcommittees.

The government then conducted a survey with the help of the community throughout Nova Scotia, asking people if they had access to broadband services. In some cases citizens went door to door asking neighbours if they had broadband connectivity. Once data was collected, it was processed using geographical information system (GIS) software, which mapped out the areas with broadband black spots.

The government of Nova Scotia then decided to issue a public tender that would require the service providers to achieve as close to 100 percent coverage as possible at the lowest cost. The requirements also stipulated that the installation cost should not exceed US$100, with no deposit and monthly charges that do not exceed those available within urban areas for similar broadband connectivity services. They also included the availability of 24/7 customer support and site maintenance when required. Information on black spots was made public so service providers who were bidding could incorporate the information into their proposals.

Winning bids were selected according to the following criteria:

- 10% General corporate references
- 15% Relevant demonstrated experience
- 10% Technical approach and approach to project
- 20% Sustainability of operations within the zone(s)
- 10% Business model approach
- 15% Ability to meet desired completion date
- 20% Cost of proposal

The contribution for each zone was based on the number of full-time and seasonal residents, business schools, demographics, and existing infrastructure within the zone area.

The result is that there is now healthy competition between two to three service providers in all of Nova Scotia's zones, providing sustainable broadband services due to strong multilateral partnerships, community involvement, fixed-wireless Motorola canopy technology, unlicensed spectrum and use of shared existing government towers.

2.4 An Analysis of a Rural Connectivity Initiative in India: *The Gramjyoti Rural Broadband Project – the mechanics of the project and the partnerships behind it*

This section summarises the presentation made by **Mr. Nicholas Williams**, Director of Regulatory Affairs for sub-Saharan Africa at Ericsson, who first discussed the applications for Gramjyoti and then focused on the corresponding policy messages.

Despite success in the African mobile industry over the last decade, the problem is the exclusive focus on the top end of the pyramid. While it is important to move beyond connectivity into utility for many current users, the bottom half of the pyramid, which accounts for more than half of the continent's population, is still crying out for connectivity. The challenge will be to
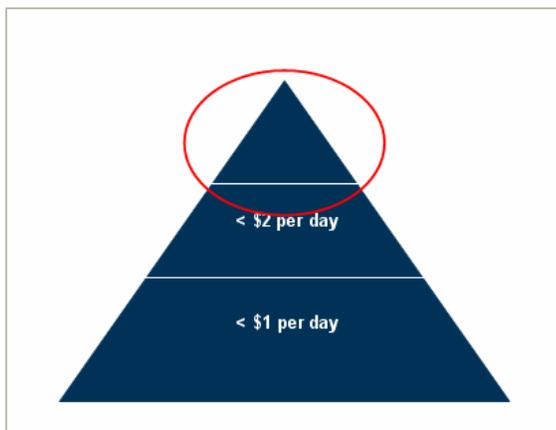
bring network costs down so it is possible to also pursue connectivity and basic services for rural areas. The private sector has been fighting hard to try to serve the bottom half of the pyramid, and therefore, incentives to vendors are likely to be in line with regulators. To reach the bottom end of the pyramid, Ericsson has relied on cost-effective technological solutions. Its philosophy is that the solution should be something that is widely available and has economies of scale attached to it.

With both utility and connectivity in mind, Ericsson has adopted High-Speed Packet Access (HSPA) as the best solution for broadband data connectivity, since it has already been rolled out in over 200 networks, broadly available around the world, with network economies of scale. Moreover, Ericsson already has a number of devices operable with HSPA.

The Gramjyoti project began as a demo project to test HSPA solutions and illustrate the capability of technology to the people, while also determining its supply-side economic feasibility. Ericsson chose to implement the pilot in India because the government provided Ericsson with spectrum (2.5 GHz) to trial the HSPA. A location was chosen in the South East (Tamil Nadu) and a number of projects were undertaken, which are listed below:

- e-Education - live interactive educational classes
- Telemedicine - live interactive checkups and reporting
- e-Governance - online government applications
- Online local information - local rates for agricultural products
- Entertainment - live television
- Other - Video conferencing, surveillance

The Gramjyoti e-Education programme connected 3,000 high school students with high-speed Internet access. The students could take e-learning courses and gain access to bandwidth-intensive learning materials, as well as learn through distance education with teachers based in Delhi.

The project was financially sustainable within the medium- to long-term, and based on strong partnerships with bodies such as Apollo Hospitals, Hand In Hand (a socially oriented NGO that advocates for poverty reduction and education), Edurite, One97, CNN and the Cartoon Network. Apollo Hospitals provides free health checkups in the Hand in Hand citizen centres three times a week. Edurite Technologies supports the e-learning services, One97 Communications provides the technology infrastructure for the project, and CNN and the Cartoon Network collaborated with Ericsson to provide infotainment services. These partnerships have also ensured that the content provided is relevant to the population, which contributes to the overall sustainability of the project.

2.5 Panel Discussion – Best Practices for Pilot Projects

Research and pilot testing, multi-tiered government cooperation, local ownership, project transparency, and training and human capacity building were all identified as best practices during the panel discussion. This section summarises the discussion on each best practice, indicating the key points made by various delegates.

Research and testing

Mr. Williams from Ericsson stressed the value of doing one's "homework." It is important to spend time and resources to research applications and test equipment to ensure it fits the community. It is not a one-size-fits-all concept on the supply side. Also, one should be prepared to be told they are wrong. Not all applications will be economically sustainable, but with an open mind one can determine which ones are and which ones are not.

Of particular note is Ericsson's take on the importance of testing new technologies and running pilot projects. When questioned why Ericsson conducted the high-speed, bandwidth-intensive Gramjyoti project in a country that did not have a 3G license, Mr. Williams responded by saying that "It is the best place to encourage it."

Likewise, Ericsson implemented a similar six-month prototype project with The Earth Institute at Colombia's Millennium Villages Project, where it partnered with Celtel to illustrate "the art of the possible" both to government and users.

Multi-tiered government cooperation

Ms. Flam from Nova Scotia underlined the importance of working with various tiers of government and development partners. The formal two-person project team in Nova Scotia consisted of herself and a technology expert, but they were supported by a number of other groups. In particular, a number of regional development authorities helped with the collection of data and provided critiques. Federal partners shared past experiences and provincial partners assisted with tower-sharing and access to crown lands.

Local ownership

Mr. Nyoka of Vodacom explained that most of the Community Phone Services entrepreneurs do not bring anything to the table other than the agreement that they will pay Vodacom 60 cents for every minute of use of the phones. In general, an entrepreneur or shopkeeper identifies a market opportunity and suitable location and approaches Vodacom with the proposal. Vodacom assesses the application taking the entrepreneur's potential to run the business into consideration.

The success of the model rests on Vodacom's willingness to take a risk with each entrepreneur. Mr. Nyoka further explains that Vodacom is able to take these financial risks by introducing an element of cross-subsidisation. Therefore, the Vodacom model requires a benign interconnection regime where the regulator does not challenge the interconnection fees across operators.

The Vodacom model started in the form of containers but has since evolved, and now individual entrepreneurs provide Vodacom services in shops that are not necessarily owned by Vodacom. Even though the entrepreneur does not own the container, the reality is that it becomes a source of their livelihood; hence they take good care of them. If there are serious technical problems, regional technical teams provide required support.

Dr. Spio-Garbrah acceded that the Vodacom model, where the franchisees merely make themselves available, but incur no risk themselves is interesting, but the CTO encourages a model where the local community partners take some portion of the risk. For example, if the entrepreneur has to borrow money from the supplier to finance the start-up costs, then he or she exhibits a certain amount of commitment,

which bodes well for the longer-term sustainability of the model. In response, a representative from The Gambia voiced a note of caution, acknowledging that in many communities the people with the most vision and passion for running the business are often unable to bring any money to the table.

Project Transparency

Mr. Masambu, from the UCC, argued that transparency is an important element of a successful partnership.

Training and human-capacity building

Mr. Masambu concluded that the regulator should provide more assistance, such as training on business development, to mitigate the risk associated with rural connectivity projects, such as those dependent on start-up entrepreneurs.

3. Financing and Project Modelling

3.1 Broadband to the most rural part of England: *Partnering with local government to create a successful business model*

This section summarises the presentation made by **Mr. Andy Lister**, Sales and Marketing Director for Nynet UK.

North Yorkshire is a large rural county in the north of England, where the development of the knowledge economy and provision of broadband services are serious challenges. Despite being the biggest county (geographically) with the lowest population density (600,000 citizens), North Yorkshire is economically prosperous with over 25,000 businesses. However, the provision of broadband lags behind the rest of the country by three or four years. Businesses and organisations pay between two and eight times more than comparable businesses in urban areas such as Leeds and London. The emergence of next generation broadband services across the UK, such as ADSL 2+ and Fibre to the Premises (FTTP), skipped over North Yorkshire.

The government of North Yorkshire looked at its market demographics, the number of potential subscribers, the dependency on copper infrastructure and the previously prohibitive cost of network backhaul; and decided to change the market behaviour to attract service providers to the area. First, the government defined its policy objectives in order to garner the necessary political support. The policy objectives conveyed how the project was to stimulate economic growth, facilitate digital social inclusion and ensure good use of taxpayers' money.

Second, the government decided on a "future-proof" technology solution that would still be relevant in 10 years time. Moreover, the technology has to be capable of serving the needs of both the public and private sectors. For example, consultations with the public sector indicated that the technology must support services for children, telemedicine, the police, the fire service, etc.

Third, the government developed a sustainable business model by aggregating public sector expenditure. The total annual expenditure of the 280 schools and 150 other council sites was about £4 million, while the police and health service expend an additional £6 million. Together, the £10 million a year constitute a significant amount of capital when one pulls it together and takes a ten-year view.

The business model provides Internet services to the various public sector entities at prices lower than what they previously paid, while still allowing for the operator's profit margin to cover the operational costs of the network and ensure financial sustainability.

Key drivers of the enabling public-private partnership were the North Yorkshire County Council and Health Services, which gave the project a market value of £80 million over 10 years. A business plan was created, which would create margins from one anchor tenant. The anchor tenant guaranteed an expenditure of £40 million over 10 years. It was known that the network could sell at 50 percent so £20 million were used to buy a carrier class network.

In summary, taking margins from sales to the public sector allowed for investment in high-speed infrastructure around Yorkshire. The business case was approved

politically, and since the model was sustainable with one "anchor tenant", additional public and private sector customers created excess revenue, which was used to extend the network and implement social digital trust initiatives in the county.

A conducive regulatory environment was also an essential component of the success of the initiative. NYNet was able to open up their networks with a price that is distance-independent with permission from the European regulatory authority. Therefore the cost of backhaul in North Yorkshire for service providers would, in real terms prior to NYNet, cost £100-150 thousand. However, now that NYNet is functioning, costs are closer to those in urban areas, at £15,000.

A key success factor was that NYNet was a private business that was governed and managed by the public sector but with freedom of action which allowed it to progress very quickly and not be held back by government bureaucracy. The company is also staffed with experienced telecom professionals, which enabled competitive negotiation with service providers.

The task for NYNet now is to attract competing service providers to enter previously unserved areas. A 32Gb fibre ring and forty points of presence (PoPs) connect the public sector sites. More PoPs relate to cheaper transmission costs and act as a platform where the public sector can share services. The additional backhaul and excess capacity is open to any potential service providers. NYNet has already attracted a number of regional service providers for small towns and coastal areas and now aims to attract national service providers who can invest in more local exchanges. In addition, wireless technology solutions will be adopted to reach the most remote of locations which remain unserved.

3.2 The Village Connection Project: Local network ownership and operation: *Partnering with local citizens to achieve a successful business model*


Following is a summary of the presentation made by **Mr. Rauno Granath**, Head of New Growth Markets, Nokia Siemens Networks (NSN).

The Village Connection Project was launched over a year ago and has been commercially available since the beginning of 2008. During the project's development, NSN undertook a number of pilot projects, which are each a scale-down of network functionality to the village level. The base station is smaller, since the traditional tower infrastructure is replaced by the village entrepreneur's house equipped with a water-pipe-type antennae mast.

The project increases the economic activity and benefits the recipient communities by providing affordable connectivity and access to mobile phones, as well as Internet connectivity in more developed models. The signal covers each village, up to a 4 km radius, in order to serve the main area of habitation and agricultural fields. While the coverage area is relatively small, the goal of the project is to bring significant network functionality to the village so the entrepreneur can operate more aspects of the service chain.

The key technological enablers of the cost-effective model are the cost savings from the antennae masts (rather than expensive towers) and backhaul-cost savings from point-to-multi-point, IP-based radio transmission between villages. (see figure below). There is full connectivity to the outside world, with all services available as part of the

main operators' network, extended in an island-type structure in rural villages. Moreover, because the network is IP-based, the technology is already installed and available to offer Internet services, if the business model finds it economical.
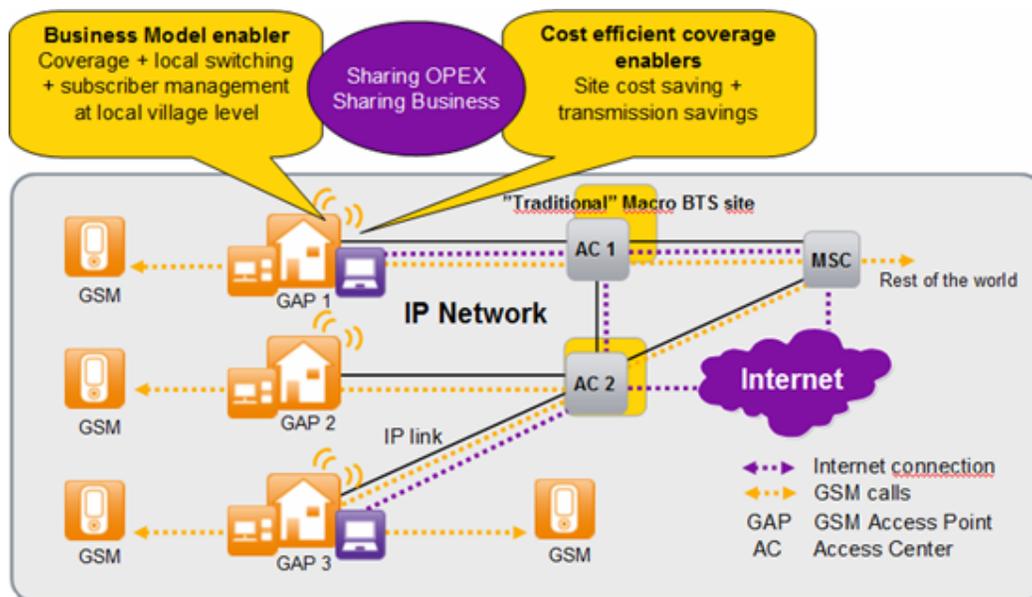
The business enablers exhibit even larger cost-savings. The investment phase for the operator has some opex, but is capex-intensive. The marginal business case for operators to acquire and keep new subscribers becomes a larger share of opex during a five-year cycle (acquiring, serving and keeping customers satisfied). Operators can share or franchise part of this cost to the entrepreneurs. Moreover, village customers are more likely to trust a credible entrepreneur from their own village, than an unfamiliar corporate face.

NSN follows the model illustrated and discussed below.
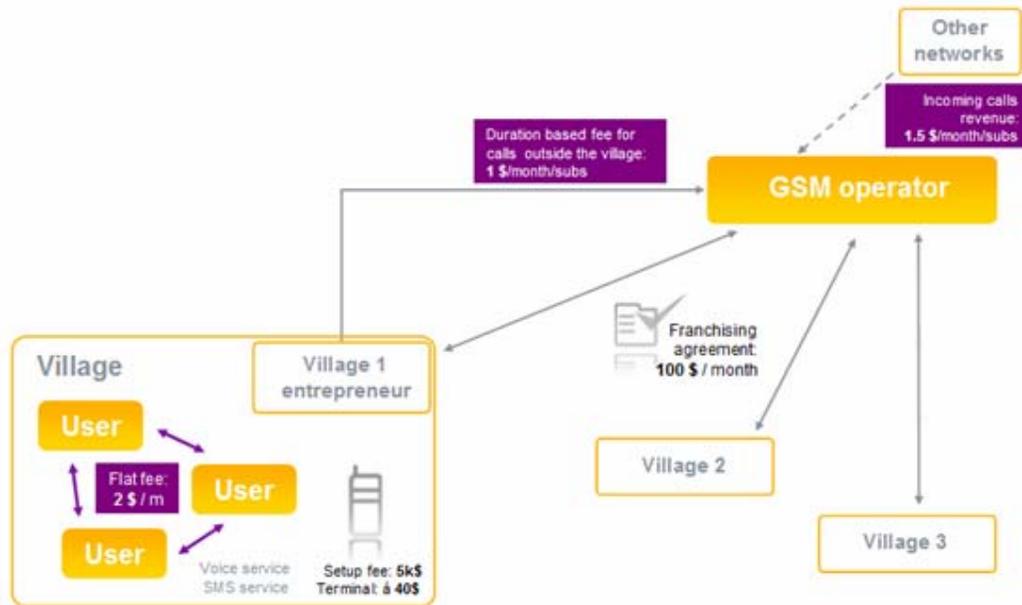
The basic structure is a franchise business model. The price of calling can be based on a flat-rate arrangement and has been modelled to be sustainable at very low spending levels, for both the operator and the entrepreneur. In the illustrated example, the village entrepreneur pays a flat rate of just two dollars per month for within-village calls, and external calls (both outgoing and incoming) are charged per call (an average of one dollar's worth of calls per month per subscriber in this diagram). The external calls make up the bulk of the operator revenue, and more coverage in rural areas results in more incoming urban-to-rural calls, thus exhibiting favourable economies of scale of extending rural connectivity.

The distribution of responsibilities among all parties in the franchise model will likely vary depending on the market and regulatory framework. A new product solution or innovation tends to take about 6-12 months for adaptation into big volumes, and the development and implementation of new business models will need adaptation as well. There are currently 10 different projects in different stages of implementation or trialling around the world, the first of which is an initiative to extend rural connectivity in Tanzania with Vodacom Tanzania.

The model has passed the rigorous testing phases and will shortly be implemented in very remote areas of Tanzania. NSN finds that minimal technological skills are required to learn the technologies, and that the entrepreneurial skills and spirit evident in the villages are of greater importance. NSN also has developed a business model tool for operators.

Important concerns from operators centre on shared ownership. Operators are concerned that if they relinquish some the control to third parties, are the entrepreneurs held responsible for service obligations and can operators rely on their fortitude in the face of competition? Should entrepreneurs invest money in the equipment? When do franchisees need individual licences? Would they be categorised as communications service providers? Is it possible to franchise a licence to a person?

In response, a delegate from the Ghana National Communications Authority (NCA), explained that In most regulatory licenses the licensee is the responsible person, and

not the franchisee, raising doubts in his mind of the viability of the NSN model. Secondly, the quota service responsibility would likely lie with the operator and he is not sure how it would reside with the franchisee.

Mr. Granath then explained that at least one operator concern can be resolved by the network architecture itself, which allows operators to sell services to medium-level sub-operators, who in turn deal with individual entrepreneurs. Such a structure could ease main operators' worries, as they would work directly with a professional, specially licensed operator, which controls and runs a cluster of villages.

As an important member of the PPPP, entrepreneurs should also have realistic access to financing, such as micro-financing or USF funding. The entrepreneur, as the GSM service and Internet provider, could also host public services to the village, increasing the likelihood village phones being a viable business.

3.3 Providing long-term debt finance to commercially viable private sector infrastructure ventures in sub-Saharan Africa: *The Perspective of the Financer: Views, experiences, and best practices*

Following is the summary of the presentation made by **Mr. Roland Janssens**, Senior Investment Adviser at Frontier Markets Fund Managers (FMFM), Standard Bank, who asserted that there is still a lot of potential growth in the growing ICT sector in Africa.

FMFM's telecommunications department manage two ICT-related funds; one is a long-term debt fund for sub-Saharan Africa and the other is a guarantee fund, which provides long-term guarantees with a significant concentration in Africa. The fund grants loans of up to 15 years and are willing to venture up and down the spectrum from senior debt to innovative mezzanine, subordinate or higher risk instruments.

The FMFM shareholders are the UK, Sweden, The Netherlands, and Switzerland via the Private Infrastructure Development Group and are therefore a public-private partnership with the directive to take higher risks in infrastructure projects. It is important to note that GuarantCo (G'tCo) provides long-term guarantees for local currency debt, thus reducing the risk profile to the loanee.

Of particular note is the emergence of broadband Internet service, despite the slow instalment of national backbone infrastructure. The Bank has now moved into fibre-optic options such as the undersea cable SeaCom, being constructed along the eastern coast of the continent to address Africa's "Missing Link". The boxes below display some of the current and past projects financed by the Bank.

EAIF

Past/current projects financed:
- Celtel Snr 31/01/03 – prepaid 20/06/06
- MTN Nigeria 16/11/04 – prepaid 20/2/06
- Celtel Subord. 30/12/04 – prepaid 20/06/06
- Celtel Nigeria, DRC, Malawi, Madagascar, Sierra Leone, Uganda – active in Portfolio (signed 03-06/07)
- Seacom – active (signed 11/12/07)

Pending African Telco Projects:
- Tanzania – rural telecoms
- A cable on the African west coast

Guarantco

Past and current projects financed:
- Celtel Kenya (12/05) – prepaid 02/07
- Celtel Chad –active (signed 2007)

Pending African Telco Projects:
- Seaquest Niger (mandated)
- Seaquest Mali (considering)

Seacom (11/2007)
- Sector: Undersea fibre-optics
- Country: Pan African
  - Initially RSA, Madagascar, Mozambique, Tanzania, Kenya, Ethiopia
- Description/Finance Parameters:
  - The USD 600m project is the first undersea fibre optic cable along the east coast of Africa, connec-ting it to Marseille and Mumbai
  - EAIF provided USD 35m in debt to a special purpose vehicle controlled by Industrial Promotion Services (Kenya) Ltd, one of the equity investors in Seacom and a subsidiary of IPS Kenya controlled by the Aga Khan Fund for Economic Development.
  - Competing cables include EASSY and TEAMS

Celtel I (01/2003)
- Sector: Mobile
- Country: Pan-African
  - Follow on financings in Nigeria, Malawi, DRC Sierra Leone, Uganda; re-paid pan-African
- Description/Finance Parameters:
  - USD 22m senior and USD 8m subordinated of a USD 117m 7 year financing for Celtel arranged with Standard Bank, ING.
  - Founded in 1998, Celtel was then still one of the first significant investors in Sub-Saharan African mobile tel. Subsequent refinancings, incl. by EAIF and separate EAIF financings for several Celtel African mobile Telcos. Celtel was acquired by MTC (Zain) in 2005
  - Today many competing operators

It is critical that any project proposal presented to the Bank for financing must clearly explain the business and how it will pay for itself over the long-term. In turn, the government must have a clear understanding of the financiers' expectations from the regulatory environment (certainty, clarity, ability to enforce/preserve rights).

Generally, the philosophy of the bank is to get a fair and balanced deal for every stakeholder. Financiers will look beyond the project to the backers (developer, government, management) to assess capability and willingness to sort out problems as they occur after the project is up and running – their perspective is more on repayment and sustainability.

Banking is as much about the people as the projects. Financiers will spend a great deal of time with their counter-parties particularly on the business case, the market and the "numbers". "Numbers" (or the financial model) discussions are not only about understanding the project, they are also about assessing how well the project is thought through and how management reasons and would react in the face of adversity. Few projections prove accurate after they are made, especially projections over 5 years out, but the process gives insight into management preparedness and flexibility.

Views, experiences and best practices of FMFM include the following:

- Structure the financing to withstand difficult times but also to accommodate success
- Conservative financial leverage may be wisest in the long term
- Match financing currency exposure, especially debt, to cash flow currency as much as possible
- Win-win negotiating is preferable to gaining at the advantage of the other parties (win – lose)
- Respect commitments
- Communicate regularly, well and professionally

Drivers of growth and success in the mobile communications market, in the experience of FMFM, include the following:

- Large unsatisfied demand resulting from weakness of fixed-line business development
- Technology evolution and effective substitution of mobile for fixed-line in many applications
- Strong profits & cash flow (including from a pre-pay business model)
- Relative ease of cutting off non-payers (compared to other infrastructure such as water)
- Relatively low investment requirements
- Relatively low government intervention (after license granted) and not politically sensitive
- Typically light regulatory regime, providing freedom to innovate (as compared to e.g. water, power)
- Generally fewer vested interest compared to other utility sectors
- Sufficient number of reputable potential investors

3.4 The Business Case for Satellite for Rural Connectivity: *An analysis of cost-effective projects and models*

Following is a summary of the presentation made by **Mr. Jean-Pierre C. Kabanda**, Vice President of Market Development in Africa for SES New Skies.

Satellites have been used in Africa over the last 40 years, providing international voice trunks, broadcasting services, private data networks and Internet access. Today, there are more than 55 satellites providing coverage of Africa and more than 20 satellites with new advanced capabilities are expected to be launched over Africa within the next 5 years, some of which will replace ageing satellites.

In addition to telecommunications services, broadcasting companies utilise satellites in 37 out of the 53 African countries to broadcast 120 African television channels to re-broadcasting stations or subscribers and many countries depend on satellites for the only access to the Internet backbone.

The growth of mobile phones across Africa has provided connectivity in a way that was unimaginable 10 years ago. The role of satellites in the growth of mobile networks has been crucial in Africa, especially in rural areas where satellites are used for backhaul services, linking remote GSM base stations to the rest of the network.

Satellites require a huge capital investment (between US$200 million – US$400 million depending on the size), most of which is paid before the satellite is commissioned. The procurement process can last about 3 years from design to satellite launch and in-orbit testing and then the satellite life expectancy is 15 years. Once the satellite is successfully launched, there are no additional satellite infrastructure costs, but expenses related to depreciation, financing charges, flight management, operating expenses and marketing expenses.

Nilesat, Nigcomsat and Rascom have shown that African operators can achieve success, giving Africans "owner economics" of satellite networks and cheaper communications.

More satellites are expected to be launched over Africa in the next 5 years, mostly for new operators, which will mean more competitors and lower prices. There will also be bigger satellites, with 20 to 100+ transponders, which can:

- Use different frequency bands;
- Reuse frequency in the same band;
- Provide multiple coverage; and,
- Implement a switching matrix for flexible connectivity.

The new satellites will have more powerful and cost-effective beams, such as:

- 40 - 44 dBW in C band
- 50 - 54 dBW in Ku band
- Wider Ku band beams covering more countries
- Automatic gain control

Currently there are more efficient modulation schemes (BPSK, QPSK, 8PSK, 16QAM), more favourable forward error correction (1/3 to 8/9 FEC), better coding schemes (Reed Solomon, Turbo coding, LDPC), compression (CRTP, A-Bis, DCME) and carrier-in-carrier. Further cost savings are achieved by using smaller antennas and new compression techniques that can go down to 1:16 (with proportionate cost-savings). An example is provided below:

- 55% saving in occupied BW can be achieved when using a large antenna and 34% when using a smaller antenna
- Compression can increase the throughput by 8
- An E1 consisting of 2 x 2048 kbps carries 30 voice channels. With 1:8 compression, just 2 x 256 kbps would be required. Assuming a 3.8M antenna, 400 kHz of BW would be required. With a cost per MHz of US$5,000 per month, the cost of an E1 would be reduced to US$2,000 per month from US$20,000 a few years ago.
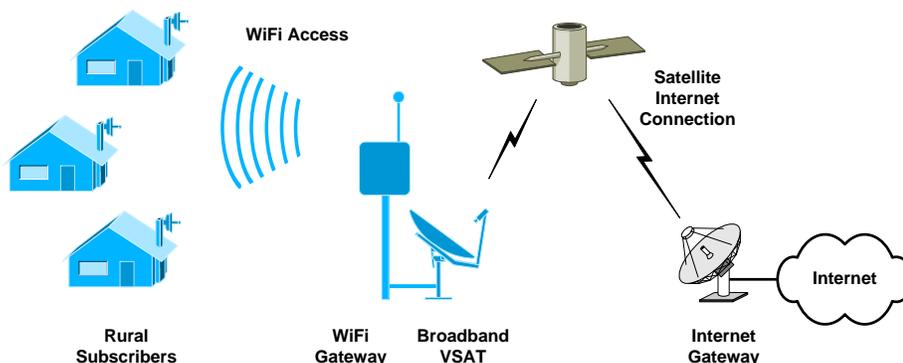
With regards to broadcasting, compression techniques reduce the bandwidth required to transmit television channels. Whereas one 36 MHz transponder was used to transmit a single analogue TV channel, now the same transponder can carry up to 10 to 22 statistically multiplexed standard definition MPEG-2 channels (Zee TV India) and potentially 2 to 3 times more MPEG-4 channels.

Satellites are also enjoying the following rapid advances in IP technology for the improved provision of broadband Internet services:

- Improved transmission techniques:
    - For the forward link:
        - Saturated transponder using DVB or Frame Relay
        - Increased throughput achieved with DVB S2 and DOCSIS
        - Adaptive Coding
    - For the return links:
        - Shared returns using DAMA, TDMA, F-TDMA, MF-TDMA
- IP compression techniques
- TCP acceleration
- Caching techniques
- Multicasting

Case Study 1: Connecting 5000 villages

- The key to providing cost-effective satellite access for rural areas is
    - Maximise efficiency by taking advantage of the latest technologies
    - Implement large projects to take advantage of economies of scale
    - Complement technology with proper policy, planning and financing

- Basic village requirements include Internet access and voice (VoIP)
    - Hub equipment to connect 5000 users would cost US$1.5 million.
    - A VSAT terminal able to support Internet access and VoIP would cost around US$700 using Astra2Connect, Hughes Directway or other similar products.
    - With a fully loaded satellite transponder, 70 Mbps of IP throughput can be achieved on a 36 MHz transponder and 17.5 Mbps worth of returns on 12 MHz. It is estimated that the monthly service cost for a village would fall down to US$100-120 per month, less than US$3 per day per village.

WiFi Access

Satellite Internet Connection

Internet

Rural Subscribers

WiFi Gateway **Broadband VSAT**

**Internet Gateway**

- A VSAT can be shared by many users in a village using low cost WiFi equipment:
    - Off the shelf WiFi equipment using external antennas to extend range can cover a village and costs less than US$100 per user.

- With 10 WiFi users in a village sharing a VSAT:
    - The equipment cost drops by 75% to US$170 per user.
   - Monthly service cost drops 20% to US$80-100 per user

Case Study 2: Education with ICT

Content is key
- Satellite has key advantages in distributing educational content, such as
  - Websites and podcasts
  - National educational curricula and materials
  - Websites related to curricula: museums, history sites
  - General reference: Wikipedia, Allafrica.com
  - News and Current events: National newspapers, SABC news, K24
  - Snapshot of current popular sites (Africa Cup, World Cup, Olympics)
  - Content selected by educational stakeholders, such as Education Ministries, Learn Things, Eduvision

- Content pulled by a user from a website consumes satellite bandwidth – and incurs a cost.
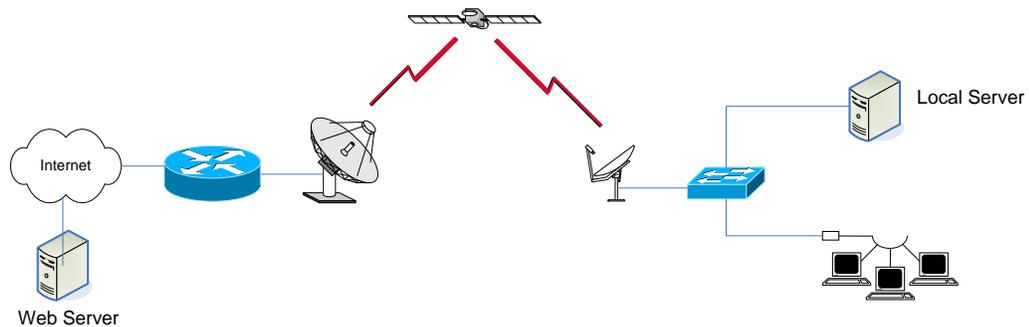
- Content pulled by a user from a server on the local LAN does not consume satellite bandwidth – incurring no bandwidth cost.
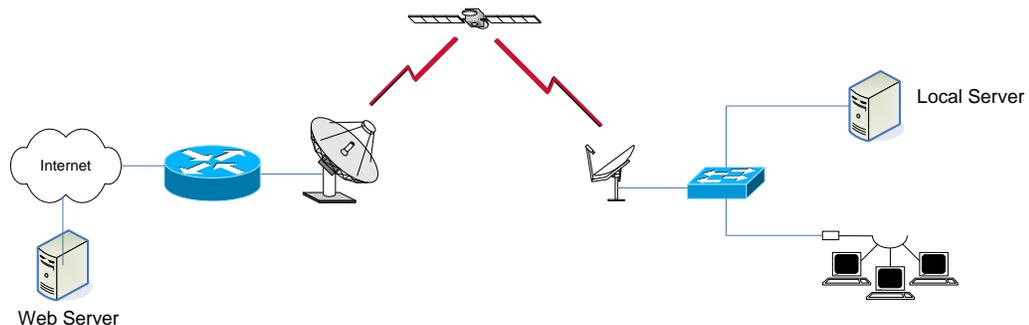
- As much content as possible should be served locally.
- Approximately 40,000 webpages can be transmitted per day
- 320 gigabyte hard drive costing US$100 can hold ~2.5 million pages
- Local content storage alone doesn't save bandwidth: a 5k webpage still has to be sent over the satellite so that it can be stored on the local server. The key is to broadcast or multicast the content to many sites at the same time.
- If the content is multicast to 1000 schools at once then the bandwidth consumption per school is 1/1000 that of the traditional solution.

If one can combine rural Internet access with educational content distribution, you can distribute the content at night when Internet access is not being used. This requires national policy coordination of all stakeholders, including the Ministries of ICT, Education and Health, as well as others.

Different satellite communication techniques can be used to successfully provide cost-effective voice telecommunication services, access to Internet, radio and TV in rural communities. Satellites complement other terrestrial technologies in delivering services to rural communities and in reducing the cost of access. Proper national policies need to be outlined and active participation and collaboration by all stakeholders are key to the successful rollout of the digital bridge in rural communities.

3.5 Panel Discussion

Public sector leading/subsidising private investment

Mr. Lister from NYNet described one example, where the aggregated demand from the public education sector would make a sustainable business case for the provision of broadband Internet to Yorkshire's 300 schools. The state aid mandate allows NYNet to intervene at the wholesale backhaul level, but not the access layer; therefore, one medium-term strategy is the establishment of a public sector network, on which a service provider can piggy-back and then "hop off" to rural "hot spots." Moreover, in the face of rural depopulation, the council is struggling to keep schools open, and setting up fixed-wireless broadband solutions to "hop off" to these schools may help to prevent their imminent closure. A similar project recently undertook costing to provide service under the same "hop off" model to a village with 40 residents. They expect a capital investment of £10,000 - £14,000 and the forty houses would pay no more than urban broadband rates.

Dr. Spio-Garbrah then posed a question to Mr. Lister. He referred to one point he made regarding increasing the market share for the public sector growing from 50%-80% and wondered why it should be the public sector and not the private sector businesses.

Although business models usually target private sector businesses to build a customer base and ensure financial sustainability, Mr. Lister explained that the reality in North Yorkshire is that profits are made from the public sector customers. This profit margin allows NYNet to offer service at an entry cost that will attract the private market to the county's rural areas. Therefore, the more public demand that NYNet can aggregate, the larger this private sector subsidy will be.

Power solutions to rural connectivity

A delegate from Rwanda questioned all delegates about their efforts in finding power solutions to rural connectivity, as a majority of connections are currently concentrated around the power grids.

Motorola has used large wind turbines, solar power, and other alternative energy solutions, together with innovative technologies that require very small amounts of energy to operate. According to the representative from Motorola, many

manufacturers often assume there will be no power and develop stand-alone broadband network infrastructure when planning and implementing rural connectivity projects.

Ms. Ida M. E. Jallow, the Acting Director General of The Gambian Public Utilities Regulatory Authority, commented on the need for information flow on how to use alternative energies, such as those solar panels and wind turbines that the delegation viewed in Stockholm earlier in the week's proceedings. The Gambia is currently implementing a project that uses solar panels to charge mobile phones in areas with little or no access to the national power grid.

4. The Launch of COMARCI Phase 2

The presentations during the day's proceedings all stressed the importance of partnerships among four players: the government, regulator, private sector, and communities. COMARCI Phase I is now culminating in a 400-page report sharing all the knowledge acquired from the 18 African countries and 5 comparator countries, but more input is needed from the delegates and their colleagues before the report can be finalised, published and distributed. Now, it is imperative to turn this knowledge base into concrete projects with the engagement of all stakeholders in strong PPPPs, with the CTO able and willing to act as a catalyst if necessary. Some delegates expressed desires to partner with the private sector representatives present and move towards possible pilot projects.

After discussion of personal experiences, best practices and the proposed criteria for winning pilot projects, delegates shared their impressions of COMARCI and agreed upon a draft communiqué to pave the way forward. Each of the delegate's comments are summarised in the table below.

Country	Comments
Cameroon	Mr. Mvondo Abossolo, Head, Studies and Prospective Department, Telecommunications Regulatory Board of Cameroon, acknowledged his organisation's close ties with the ITU and CTO and appreciation of the corresponding opportunities to meet representatives from such companies as Ericsson, Motorola, Echonet, SES New Skies, and many others. He would like to see the CTO coordinate all these energies, efforts and opportunities, so developing countries can really benefit. He agreed with the content of the communiqué and congratulated the CTO for the work being done with COMARCI.
The Gambia	Mr. Abdoukarim Sonko, the Permanent Secretary of Communications for The Gambia thanked the CTO and expressed confidence that connecting the whole of Africa is a possible feat when people can come together and share their wealth of experience and knowledge, as done during this COMARCI Day. He then turned his focus to The Gambia, noting that it is a small country with 3 GSM operators and Internet facilities only in urban centres. Broadband is something that The Gambia has to look at and they are very interested in how best to get broadband connectivity. At the Ministry level, there are various projects, such as the Smart Village concept from Egypt, and The Gambia will consider franchising with any company that is interested in such a venture. He recognises significant overlap between the ten winning pilot projects and those under trial in Gambia, indicating the potential for future collaboration with the CTO under the COMARCI. He agreed with the communiqué and congratulated CTO for a job well done. Ms. Ida M.E. Jallow, Acting Director General, PURA, followed up by adding her approval of the communiqué and saying that she looks

	forward to the day when some of the projects are replicated in The Gambia.
Ghana	Mr. Bernard Forson, Director General, National Communications Authority, congratulated the CTO, its sponsors and delegates. Ghana commits to the communiqué and to adopting strategies that will improve quality of life through market oriented structures. The 10 projects will be reviewed in detail and adapted and adopted to suit Ghana's local conditions with the help of the CTO.
Kenya	Mr. Juma Kandie, Director, Human Resources and Administration, Communications Commission of Kenya, thanked the CTO for COMARCI as he believed it is something that will work. He reflected that most of the countries present share the same challenges, such as high illiteracy rates in rural areas, disease and poverty. Sharing ideas and experiences and being able to take a common approach is a major milestone. Kenya supports the initiative, the content and spirit of the communiqué and the Phase II dream to have a successful and replicable project in each of the member states.
Lesotho	Mr Monehela Posholi, CEO, Lesotho Communications Authority, thanked the CTO for an eye-opening intensive forum. He remarked that Lesotho is in a unique position with only one neighbour country and is sharing a similar payphone project to that undertaken in South Africa. He is hopeful it will be a success in Lesotho, despite its very rugged terrain. There are serious challenges in terms of coverage and there may be potential for a VSAT solution. He remarked that he was quite keen to pursue such a project. He then stated that the communiqué is the best tool to express and register commitment to this initiative. He suggested that it may be prudent to have a clause that adds a note to make future reviews to the initiative.
Namibia	Mr. David Imbili, Chairperson, Namibian Communications Commission, noted that Namibia is a large country with a small population and faces many rural connectivity challenges, despite relative success in connecting urban areas. Currently the country is embarking on a project to work with the CTO to connect most of the schools in Namibia. He too agreed with the communiqué.
Nigeria	Engr. Ernest Ndukwe started by thanking the CTO for putting up a good show. He then noted that Nigeria is a large country that has made some progress, but one of the major challenges will be to get Internet and broadband connectivity, it is a major focus not just for urban but also for rural areas. He expressed interest in exploring partnerships with the private sector to accelerate the build up of broadband infrastructure in urban and rural areas as part of the "State Accelerated Broadband Initiative". The country is currently attempting to attract the private sector to the initiative. The two examples from Nova Scotia and North Yorkshire have provided food for thought on how government can take the initiative in facilitating private sector build out of networks. He was keen to learn more from these two organisations in the future. He also announced Nigeria's "Wire Nigeria Programme" with the vision to

	construct fibre-optic highways criss-crossing the whole country in the near future. Nigeria continues to build up a significant amount of money in the Universal Service Provision Fund from operator levies and he invites good ideas on how to deploy the funds transparently and effectively. He expressed keen interest in ideas from Ericsson and New Skies. He felt the communiqué was well crafted and proposed a few small amendments.
South Africa	Mr. Paris Mashile, Chairperson, ICASA, thanked the CTO and applauded the scientific approach taken in COMARCI; the models presented have been tried and tested. He emphasised the value of the PPPP and the necessity to obtain buy-in from all stakeholders united through a common mission and objective. The ICT sector can offer many benefits, including e-health, e-education, e-commerce, etc., as well as stem the tide of urban migration, and people are growing impatient waiting for these services. All services should be provided on an equal basis in rural areas as they are in urban areas. Upon reflection of his experiences on post-apartheid South Africa, Mr. Mashile asserted that education is the key to ICT growth and that ICTs should be leveraged to democratise society. He agreed in principle to the concepts elaborated in the communiqué.
Swaziland	Mr. Elijah Dlamini, Managing Director, Swaziland Posts and Telecommunications Corporation (SPTC), thanked the CTO for the rich learning experience. Swaziland has already made progress in rural connectivity and he recommended comparing notes to avoid duplicating efforts and to keep expenses down. Swaziland fully commits to the communiqué.
Tanzania	Prof. John Nkoma congratulated the CTO staff and sponsors. Secondly, he reiterated the importance of having well-articulated policies and legislations, licensing frameworks and light regulation. Investment in infrastructure is crucial for rural connectivity and the provision of broadband services will prove to be a bigger challenge, requiring more skills, than the provision of voice services. In the spirit of COMARCI Phase II, the mobile banking scheme, MPESA, and Vodacom's Community Services Phone Shops are already being successfully replicated in Tanzania. He also confirmed his commitment to the communiqué.
Uganda	Mr. Ham Mukasa Mulira, Minister of ICT, thanked the CTO and remarked that it has been a unique experience to be one amongst the many regulators. He then requested the Ugandan regulator to make comments on behalf of Uganda. Mr. Patrick Masambu, Executive Director, UCC, expressed his thanks to the CTO and belief that the outputs provided would be put into effect. Uganda supports the communiqué and the replication of the ten pilot

	projects.
Zambia	Ms. Elizabeth Kachamba, Principal Economist/Vice Chairperson, Communications Authority of Zambia and Chairperson, Ministry of Communications and Transport, thanked the CTO for the event. She reflected on how best to make the most of the opportunities presented to meet her universal connectivity mandate. Current pilot projects are under implementation in the Eastern and Central provinces. The telecentre project in the Eastern Province is predominantly run by women and has turned out to be a successful business centre. The one in the Central Province is targeted towards farmers and is also a success. The hope is that these projects can be replicated around the country. After speaking with Motorola and receiving encouragement from Ms. Flam from Nova Scotia, she realized that what Zambia needs is something very similar; but with one major difference: Nova Scotia was already partially connected whereas most communities in Zambia are not connected at all. Ms. Kachamba announced that she would be taking a draft MOU back to her colleagues to see how best to follow up with Motorola. She indicated that there are enough funds for rural connectivity initiatives via the USF and that she would comfortably sign the communiqué.

It is understood that there a number of projects or conceptual projects in which the countries wish to engage, and some may wish to do commit themselves in a more private setting. The CTO would like to provide any necessary assistance and share information if required.

Delegates concluded the day by signing the proposed communiqué.

Dr. Ekwow Spio-Garbrah concluded the event by noting the contributions of staff to the COMARCI report, as well as the many country liaisons; he acknowledged the comments of both appreciation and thanks from all delegates throughout the event. Dr. Spio-Garbrah remarked that the CTO is a multi-stakeholder organization with all delegates present acting as shareholders, and as such the CTO is eager to work on their behalf. COMARCI has come about by virtue of the responsibility towards the member countries. Collectively, as African countries and members of the CTO, routine funding, and special funding from other partners, have all made the COMARCI report possible and thanks have been noted in the report.

It is hoped that the USAFs will be utilised more effectively and quickly to ensure more rapid rural rollout. The CTO's research has confirmed that the main issue in rural connectivity is not the absence of relevant policies or inadequate technology, rather regulators and operators need to make adjustments in their current thinking to facilitate greater ICT penetration in Africa's rural areas. The voice of the stakeholders needs to be institutionalized and engaged, and greater awareness regarding possible sources of funding that could be funnelled into ICTs is needed.

The CTO's COMARCI Launch Day
Thursday 19th June 2008
Marlborough House, Pall Mall, London

Appendix I. Agenda for COMARCI Day

08.30	Registration and Refreshments
COMARCI BACKGROUND AND PHASE 1 RESULTS	
09.00	Introductions: Mr Bashir Patel, Director, Programmes and Business Development, Commonwealth Telecommunications Organisation Dr. Michael Frendo, former Chairman of Commonwealth Connects Steering Comittee
09.05	Welcome Remarks: Dr Ekwow Spio-Garbrah, Chief Executive Officer, Commonwealth Telecommunications Organisation Lord Malloch-Brown, Foreign Office Dr. Ham-Mukasa Mulira, Honourable Minister of Information and Communications Technology (ICT), The Republic of Uganda
09.30	Chairperson's Opening Comments: COMARCI the background of the project Mr. Anthony Ming, Informatics Adviser, Governance & Institutional Development Division, Commonwealth Secretariat
09.40	Keynote Address: **COMARCI Phase 1:** ***An overview of the key aspects of the research*** • An examination of current trends in policy, legislation and regulation • Global achievements in fulfilling universal service and access obligations • Technology assessment in relation to rural connectivity • Sustainability, partnerships and success Dr. Ekwow Spio-Garbrah, Chief Executive Officer, Commonwealth Telecommunications Organisation
10.10	Question and answer session
10.40	Mid morning coffee break
RURAL CONNECTIVITY – STRATEGY, PROJECTS AND PARTNERSHIPS	
11.00	**From Government Subsidies to a Profit Generating Sustainable Business Model:** ***The Vodacom, Entrepreneur-Owned and Managed, Community Service Phone Shops*** Ms Judy van der Walt, Communications Executive, Vodacom South Africa
11.20	**The Village Phone Project:** ***Utilising universal service funds to connect rural Uganda*** Mr Patrick Masambu, Executive Director, Ugandan Communications Commission
11.40	**Achieving Community Connectivity:** ***Cracking the "business model" code for rural communities and connecting at high-speed to the global economy*** Ms Nancy Flam, Project Director, Nova Scotia Provincial Government, Canada
12.00	**An analysis of a rural connectivity initiative in India:** ***The Gramjyoti Rural Broadband Project – the mechanics of the project and the partnerships behind it*** Mr. Nicholas Williams, Director, Regulatory Affairs, sub-Saharan Africa, Ericsson
12.20	**Panel Discussion**

	• Analysis of best practice elements of highlighted projects • What are the important elements of a successful project team? • What are the important elements of a successful partnership?
13.00	Lunch

FINANCING AND PROJECT MODELLING

14.00	**Broadband to the most rural part of England:** *Partnering with local government to create a successful business model* Mr Andy Lister, Sales and Marketing Director, Nynet, UK
14.20	**The Village Connection Project: Local network ownership and operation:** *Partnering with local citizens to achieve a successful business model* Mr. Rauno Granath, Head of New Growth Markets, Nokia Siemens Networks
14.40	**Providing long-term debt finance to commercially viable private sector infrastructure ventures in sub-Saharan Africa:** *The perspective of the financier - views, experiences and best practices* Mr Roland Janssens, Senior Investment Adviser, Frontier Markets Fund Managers, Standard Bank
15.00	**The business case for satellite for rural connectivity:** *An analysis of cost effective projects and models* Mr Jean-Pierre Kabanda, Vice President, Africa Sales, SES New Skies
15.20	**Panel Discussion:** • Making funding available for rural connectivity projects • Utilising USF funds to reach USO's • Partnerships, project teams – what are the right components from a financier's perspective? • PPPP's, sustainability and commercialisation – is this the perfect mix for a successful rural project?
15.45	**Building towards the launch of COMARCI Phase 2** Mr Bashir Patel, Director, Programmes and Business Development, Commonwealth Telecommunications Organisation
16.00	**Afternoon Tea and Discussion Groups** Consultations between National Policymakers, Regulators, Operators, Manufacturers, Infrastructure Providers, Financiers and Donors with a view to collaborating on pilot projects of Phase 2

THE LAUNCH OF PHASE 2

17.00	**The route forward:** *Conclusions from the day's proceedings* Confirmed: Mr Bashir Patel, Director, Programmes and Business Development, Commonwealth Telecommunications Organisation
17.30	**Evening Reception: The launch of COMARCI Phase 2:** *Signing of the COMARCI Declaration* *An opportunity for delegates to formally commit their support to the 2nd phase of the initiative*
19.30	End of the Day's Proceedings