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The Commonwealth African Rural Connectivity Report

Executive Summary

June 2008

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Acknowledgements

In the spirit of public-private people partnerships, this report is the product of a nine-month collaboration between a number of Commonwealth ministries responsible for telecommunications and ICTs, regulatory authorities, universal service and access agencies, telecommunications service providers, the international donor community and academic community. The Commonwealth African Rural Connectivity Initiative (COMARCI) and this report would not have been possible without the enthusiastic and tireless work of a large number of editors, in-country researchers, financial supporters and partner organisations.

The Commonwealth Telecommunications Organisation takes this opportunity to acknowledge and thank all those who contributed to this ongoing research effort. They include:

The COMARCI Editorial Board

Mr. Vishnu Calindi, Telecommunications Development Bureau, International Telecommunications Union
Dr. Rahul Tongia, Carnegie Mellon University, USA
Dr. Peter Ross, Griffith University, Australia
Dr. Jyrki Pulkkinen, Information Society for Development, Ministry for Foreign Affairs of Finland
Dr. Lawrence Akwetey, British Institute of Technology and E-Commerce, UK
Ms. Dot Field, Vodacom Group Pty Ltd.

Thanks also are extended to the **Commonwealth Connects Steering Committee, then Chaired by the (former) Foreign Minister of Malta, Mr Michael Frendo, and hosted by the Commonwealth Secretariat** for adopting this initiative. Appreciation goes to the following entities that have provided financial support to make this research and initiative possible:

The Government of Malta
BT Global Services
Telkom SA
Vodacom (Pty) Ltd

The wide breadth of research could not have been possible without the contributions and support from our member African Commonwealth countries. Particular acknowledgement is due to the following:

Mr. Jericho Keletso, Public Relations Officer, BTA, Botswana
Mr. Gabriel Ndow, Director, Policy, Strategy and Consumer Affairs, PURA, Gambia
Ms. Johanna E. Awotwi. Director of Research. Centre for e-Governance, Ghana
Mr. Pierre Kwaku, FIMIS, Ghana
Mr. Charles Amega-Selorm, Internet Research Analyst, Centre for e-Governance, Ghana
Mr. Ainsoh, Manager International Affairs, Ghana Telecom
Mr. Abraham Kofi Asante, Administrator, Ghana Investment Fund for Telecommunications
Mr. Phillip Prempeh, Business Development Manager, Ghana Investment Fund for Telecommunications
Mr. David Maldima. CEO, Netafrique.com, Ghana
Mr. Steve Gale, MBCS
Mr. Christopher Bennet
Ms. Patience Accolor, MSc, Dip M(UK)
Ms. Hazel Mafatle, Manager, Communications Development, Lesotho
Mr. Pearson Kachepatsonga, ICT Development Manager, Malawi
Mr. Vik Bhoyroo, Assistant Manager and Head of the ICT Culture Promotion Division, Mauritius
Dr. Magda Vercickt, UNDP Senior Programme Manager, Mauritius
Ms. Nariman Nabee, UNDP, Mauritius
Sr. Luis Jose Rego, Director General, Instituto Nacional das Comunicações de Moçambique

Mrs. Ibukun Odusote, Ag Director, Information Technology Department, Ministry of Information and Communication, Nigeria
Mr. Bashir Ayodeji Idris, Assistant Director, Economic Analysis and Corporate Planning, NCC, Nigeria
Mr. V. E. Idehen, Assistant Director, Policy and Strategy, Universal Service Provision Fund, Nigeria
Dr. George Ah-Thew, Director General of Communications, Seychelles
Mr. Aubrey Mathinjwa, Manager, USAASA, South Africa
Mr. Dlamini Amon, General Manager, SwaziTelecom, Swaziland
Mr. Samson Mwela, Executive Engineer, Tanzania
Mr. Bob Lyazi, Fund Manager, Rural Communications Development Fund, Uganda
Mr. Moses Okello, Project Coordinator, Rural Communications Development Fund, Uganda
Mr. Katwamba Mwanza, Deputy CEO, Communications Authority, Zambia
Mr. Lotty Kabuko, Director, International and Public Relations, Communications Authority, Zambia

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The Commonwealth Secretariat
The Commonwealth Business Council
The Commonwealth Broadcasting Association
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Telecommunications Regulatory Commission of Sri Lanka	Pakistan Telecommunications Company Ltd
Fiji International Telecommunications Ltd (FINTEL)	Office of Utilities Regulation, Jamaica
Telecom Commission, Department of Telecommunications, India	Zambia Telecommunications Company Ltd
Telecom Vanuatu Ltd	Malawi Communications Regulatory Authority (MACRA)
Ministry of Communications and Competitiveness of Malta	Gambia Telecommunications Company Ltd
Mozambique Cellular	Nigerian Communications Commission
Swaziland Posts & Telecommunications Corporation	Dept of Communications, South Africa
Government of Barbados	Ministry of Communications, Ghana
Cable and Wireless (Seychelles) Ltd	Ghana Telecoms
Tanzania Communications Regulatory Authority	Ministry of Information Technology and Telecommunications, Mauritius
UK Office of Communications	Lesotho Telecommunications Authority
Ministry of Public Works and Communications, Guyana	Uganda Communications Commission
Tanzania Telecommunications Co Ltd	Telekom Malaysia Berhad

Department of Electronic Communications of the Ministry of Communications & Works, Cyprus	Solomon Telekom Company Ltd
Communications Commission of Kenya	Sierra Leone Telecommunications Co Ltd
Botswana Telecommunications Authority	SENTECH, South Africa
Post & Telecommunications Corp., Papua New Guinea	Telkom South Africa
The Government of Canada	The Telecom Regulatory Board of Cameroon
The Government of Trinidad and Tobago	

Within the CTO, the staff who have worked in the research and production of this report include Bashir Patel, Lasantha de Alwis, Kojo Boakye, Rosemary Forest and Salim Binbrek.

Special thanks go to Ms. Deborah Miller, Research Associate at the CTO, for most of the work in coordinating the research effort, and for writing and editing vast sections of the report.

COMARCI is the brainchild of the nocturnal reflections of the CEO of the CTO, Dr. Ekwow Spio-Garbrah, whose initial ideas on the subject of rural communication was the basis of a paper on Rural Tele-Coop presented to and approved by the CTO Council, in Colombo, Sri Lanka, in September 2004. Under his guidance, the CTO has also organised a series of rural communications conferences in Africa and Asia, to continue to focus sustained attention to this important remaining divide in ICT access in the developing world.

Executive Summary

The exigency of ensuring faster access to Information and Communication Technology (ICT) connectivity for most Africans is dictated by the need to ensure that Africa becomes fully part of the dynamic global knowledge society. Affordable use of ICTs in Africa is critical, not for the mere ability to conduct social intercourse by electronic means, or to improve the delivery of governmental and business services to isolated communities; rather, it is central to the core objective of empowering people through literacy, education, knowledge, employable skills, poverty reduction and wealth creation. It is these developmental objectives that have driven this report on the Commonwealth African Rural Connectivity Initiative (COMARCI).

This study highlights numerous examples of how ICTs are already making a positive difference in the general development of rural communities in Commonwealth African countries. Notwithstanding these examples of visible success and progress, nowhere is access to and effective use of ICTs less pervasive and more needed than in the rural and isolated areas of sub-Saharan Africa. Fixed-line penetration in Commonwealth Africa has stagnated, and the existing infrastructure is concentrated in highly populated areas with perceived high return on investment, leaving the majority of rural areas totally unconnected. In fact, the ITU estimates that some 55 percent of the total population in rural sub-Saharan Africa is still without basic and effective telecommunications.

However, the recent explosion in mobile telephony across the continent is evidence of the potential of mobile and innovative technologies to connect the millions of unconnected Africans. Mobile telephones already outnumber fixed lines by nine to one in sub-Saharan Africa, where mobile subscribership has grown an average of 52 percent per year from 2000 to 2006. As urban markets saturate, telecommunications operators have begun to look at rural communities as the source of new subscribers to maintain their impressive growth rates. At the same time, in countries where democracy and electoral politics are taking root, governments are keen to maintain their electability by encouraging the provision of basic services to the majority of the populace.

For these reasons, African governments are making varying degrees of effort to ensure that ICT policy, legislation and regulation keep apace with the rapidly evolving telecommunications and ICT sector. Advancements in technology are blurring the line between broadcast and telecommunications services, while innovative technologies, financing schemes and business models are changing the way ICT stakeholders view the once-unprofitable rural communities. This research sheds light on how policies, trends and initiatives are either impeding or facilitating the process of improving rural connectivity in the 18 African Commonwealth countries. Moreover, best practices and lessons learnt are drawn from five selected, non-African, comparator countries, namely Australia, Canada, India, Malaysia and the United States, each selected because of the significant relevant progress it has made in rural connectivity.

A. National ICT Strategies for Rural Connectivity

The findings from this research support many of the actions lines, regarding the creation and implementation of national ICT policies, or e-strategies, raised in the aftermath of the World Summit on the Information Society (WSIS). The comparator country experience suggests that national ICT strategies, which should be well integrated into the wider national development policy agenda, have been best implemented in partnership with the private sector and local communities. Moreover, national ICT policies should spell out specific provisions focusing on universal or rural access in order to solidify national commitment to the provision of basic telecommunications in areas where the market alone would not encourage investment.

Now that Commonwealth African countries have made considerable progress in developing comprehensive ICT policies, these countries must ensure that their legislation and regulations are in harmony with their stated policy objectives.

B. Liberalisation, Competition, Independent Regulation and their Impact on Rural Connectivity

The research also supports the continued incremental and methodical process of liberalisation and privatisation of the telecommunications sector and the implementation of regulatory safeguards to foster competition thereafter. It is likewise imperative that countries establish an independent regulator, capable of establishing and enforcing impartial rules. Several of the regulatory authorities in Commonwealth Africa are still subject to direct oversight by the ICT Ministry, which can be particularly detrimental to competition and to an environment conducive to rural connectivity. This is a special challenge in those countries where the state still owns or has a significant financial stake in the incumbent operator.

This report recognises that African regulators have available to them a range of tools to promote competition and an enabling environment for universal access, ranging from mandating interconnection requirements, tariff structures and guidelines for spectrum management. It is up to the regulators—like referees in a sporting event—to have the courage to take necessary action, especially when any actor in the industry, including the government, is guilty of foul play.

Incumbent fixed-line operators often have little incentive to allow new market entrants to access their networks at affordable interconnection rates. For rural areas, in particular, the economic viability of telecommunications depends on negotiating favourable interconnection terms, which reflect the substantially higher operation and maintenance costs of rural networks. Operators could also be encouraged to share infrastructure in order to reduce overall capital expenditure in rural connectivity rollout, through any number of policy and regulatory interventions, including preferential access to universal service funds or even tax credits. The research also finds that frequent interconnection disputes can delay the development of competition in the telecommunications sector and legislation should therefore establish an independent dispute resolution body, either as a special-functions arm of the regulatory authority or as a separate entity.

Traditionally, telecommunications operators have cross-subsidised rural service, but economists now champion the virtues of tariff rebalancing so that prices of services reflect the underlying cost of providing the service. However, when operators rebalance their tariffs, regulators must have other tools in place to ensure the affordability of services in rural areas. For example, the regulator can give telecommunications operators some flexibility in setting prices by mandating an average price or range of prices for a basket of services. The operator can then choose to cross-subsidise services to rural areas on a slight scale but without distorting market prices too much. Alternatively, regulators can set price floors on services in the basket or place services in separate competitive and less competitive baskets.

This report also encourages regulatory authorities to consider the allocation of spectrum for licence-free uses. The deployment of wireless local area networks (W-LANs) in the 2.4GHz unlicensed band, for instance, has proven commercially successful and proves that unlicensed spectrum can open up opportunities for innovative technologies to provide more cost-effective services. The broadband deployment to rural communities in Nova Scotia, Canada, undertaken by Seaside Communications, used unlicensed spectrum ranging from 2.4 to 5.9 GHz and 90 MHz, and the service provider claims that the flexibility and cost-savings of using unlicensed spectrum is critical to the sustainability of its business model.

C. Technological Convergence and the Opportunities for Rural Connectivity

Technological convergence is increasingly playing a key role in competition and regulation of the telecommunications sector. The research illustrates how telecommunications and ICT service providers that operate in a converged regulatory environment can seamlessly deliver the services demanded by rural users with the most cost-effective technologies for rural deployment.

When transitioning to a technology-neutral or unified licensing regime, each country must adapt its existing legal framework.

Therefore, preferably, legislation should establish a single regulator with jurisdiction over both the telecommunications and broadcasting sectors, a single regulatory framework that applies to both sectors and a licensing regime that issues licenses on a technology-neutral and service-neutral basis. The best timing and method of migration to a converged regulatory regime will be different for each country. For example, Kenya adopted a unified licensing framework in 2004, permitting any communications technology to be used to provide any communications service. The former service-specific licensing regime issued 46 different types of licences and the new regime is gradually being phased in during a transition period. Three licenses are now being issued, i.e. individual network operator licence, non-facility based service provider licence, and frequency licence, before completely migrating to the single unified license. India is migrating its technology-neutral regime to a fully unified one, which is expected to accelerate connectivity of rural communities.

This research finds that national ICT strategies should aim to strike a balance between the provision of basic services and the provision of more advanced services, such as broadband, less rural communities be left further behind. The establishment of a converged licensing regime will also help drive this innovation and the provision of advanced services. CTO's consultation with Indian stakeholders indicates that the lack of a fully unified licensing regime, which could facilitate the installation of a 3G network, for instance, is a key obstacle to the further development of the sector. Moreover, ICT stakeholders in India indicated that the requirement to apply for a special license to roll out a Wi-Max network was an impediment to further network rollout.

In addition, with the phenomenal growth of mobile operators and the cost-efficiency of mobile technology for rural connectivity, the research finds that many of the incumbent fixed-line operators, who are excluded from operating wireless technologies, are at an inherent disadvantage. Therefore, technology-neutral regulatory regimes can also help create a level playing field among operators competing for universal service subsidies and/or universal service licences.

D. Implementing Universal Access Regimes to Accelerate Rural Connectivity

The report acknowledges that the 18 African Commonwealth countries are at different stages in the implementation of universal access policies. Ghana, Nigeria, South Africa and Uganda all have operational rural or universal access funds established in their respective telecommunications legislation. More countries, Kenya, Lesotho and Zambia, for example, have enacted legislation empowering their regulatory authorities to establish such a fund, but the authorities have yet to do so (or are still in the process of doing so).

The research identifies a number of methods by which regulatory authorities can implement universal access regimes. Regulators often include universal service obligations in each operator's licence and enforce penalties if the required targets are not met. However, in the view of the report, such licence obligations must be accurate and flexible to be effective. This research also highlights the virtue of technology-neutral licence obligations.

Alternatively, universal access regimes can perhaps best be implemented through the competitive tender of universal service funds. This method has the added advantage of allocating subsidies to operators based on return on investment. Some operators may even determine that they require no subsidy at all in turn for the exclusive license for the underserved region. Gamos finds that telecom operators in Botswana, Ghana and Uganda tend to underestimate the demand and return on investment for network expansion.[1] Some potentially profitable expansion opportunities are considered commercially unviable, causing regulators to pay unnecessarily high subsidies for rollout in these areas and diverting USF funds from areas where they are really required.

[1] Gamos, 2003. "Innovative Demand Models for Telecommunications Services"

For example, Ghana's universal service fund, the Ghana Investment Fund for Telecommunications (GIFTEL), provides basic communications and Internet services in rural areas by awarding grants on a non-commercial but competitive basis, with direct disbursements of up to US$50,000. These grants are awarded to applications relating to unserved rural areas or providing 'rural packages' that aim to enhance access through public telephony kiosks or telecentres. Similarly, Australia and South Africa defined under-serviced areas and licensed fixed-line operators to provide service in each area. However, the under-serviced areas licensees (USALs) are under increasing competitive pressure from mobile operators and the sustainability of the current USAL regime is uncertain unless modified to accommodate technology neutrality.

E. Harnessing Innovative and Cost-Effective Technology

Many of the new technologies connecting rural communities around the world, especially those leveraging wireless and fixed wireless infrastructure are easier, quicker and cheaper to deploy than wired alternatives, meaning many rural communities now represent vast untapped markets for telecommunications and ICT operating companies.

For example, wireless local loops (WLLs) local loops can extend up to 30km from the main network, and therefore reduce the investment required to provide wire based infrastructure in rural areas. The potential of Wi-Max has already been recognised by stakeholders across the continent. Many countries, such as South Africa, Kenya, Nigeria and the Democratic Republic of the Congo have tested, and in many cases, rolled out Wi-Max on a commercial basis.

The increasing use of wireless mesh technology across Africa is indicative of its applicability to rural connectivity and many communities are adapting the technology to create ad hoc chains of normal Wi-fi routers in order to multiply the reach of the signal. The main requirement for mesh networks is that each router in the chain can see the next, but in some instances rural communities are using mirrors to deflect signals when line of sight is not possible.
At the May 2008 ITU Telecom Africa Conference in Cairo, the ITU stressed that infrastructure-sharing is particularly relevant in Africa, because of the critical need for increased investment in ICT facilities and lower access prices. This report encourages the sharing of telecommunications infrastructure among service providers in order to minimise duplication and share the initial capital costs of increasingly costly investments. For example, India's regulatory body, TRAI, has emphasised the need for cooperative efforts among telecom service providers to share infrastructure for faster rollout and higher quality of service. It recommended sharing of passive infrastructure, such as physical sites, towers and power supply, to the Department of Telecommunications and has also called for sharing of active and backhaul infrastructure.
Despite the limited levels of electrification in the 18 African countries, advancements in technology and the success of recent pilot projects mean that power line communications (PLC) may help to increase connectivity in rural areas close to the power grid. The use of PLC in some of the comparator countries and the increasing number of electrification projects in countries such as Lesotho, Mozambique, Malawi, Namibia, Tanzania, Uganda and Zambia requires policymakers and regulators to encourage the technology's potential for rural communications.

F. The Need for Human Capacity Building for Rural Connectivity

Operators cannot readily expand ICT infrastructure into Africa's rural areas if there are inadequate numbers of ICT literates in the population to take advantage of services or shortages of skilled ICT technicians to perform basic installation, maintenance and repair of equipment. The gaps in general education and skills sets within most of Africa between urban and rural populations are to be felt in the ICT sector as well. There is a sizeable gap between the existing ICT skills and human capacity and those necessary to accelerate rural connectivity across Commonwealth Africa. The majority of urban-based universities in Commonwealth Africa lack adequate ICT hardware and endure poor access to affordable high-speed Internet connectivity. Many African secondary school leavers graduate without having used a computer. By extension, rural schools are often even more ill-equipped and plagued with intermittent power supply, making ICT education and skills training next to impossible.

Therefore, African ICT policy and implementation plans must address more urgently the need to build ICT human capacity. Although this impediment to rural rollout is well understood amongst African ICT policymakers, the current focus on ICT programme implementation still tends to often focus on the installation of infrastructure often under contracts by foreigners, while local human resource development and capacity building is given short shrift. More needs to be done by governments and other stakeholders in lCT literacy and related training programmes for local people.

For example, Australia's Telecommunications Action Plan for Remote Indigenous Communities (TAPRIC) encourages Telstra to expand its training programmes in partnership with the government (building supply-side human capacity) and also launches an investigation of the most effective way to deliver ICT skills and training to community access centres (building demand-side human capacity). The past decade has also witnessed the rise of regional initiatives within many Commonwealth African countries, which should continue to nurture and replicate such partnerships across the continent. Examples include the New Partnership for Africa's Development (NEPAD) e-Schools Programme, SchoolNet Africa (SNA), African Virtual University (AVU), and the International Education Resources Network (iEarn). There is a growing recognition that greater cooperation and participation will yield stronger, more sustainable results.

G. Enhanced Role of ICT Consumers and Stakeholders

Various ICT consumers and stakeholders play a critical role in driving rural connectivity, be it local governments that seek better telecommunications infrastructure, or a private sector company providing information on weather, market prices and scientific farm practices to agricultural communities. This report recognises that the various tiers of decentralised government, the national postal service, educational institutions, medical establishments, money transfer schemes, agricultural businesses, law enforcement and revenue-generating agencies, as well as civil society can have a demand-pull factor in driving rural connectivity. In addition, the research also finds that these local ICT stakeholders can help to create and supply online and mobile content that is relevant to the needs of rural communities.

H. Partnerships for Rural Connectivity

Achieving universal service and access is not an easy task and cannot be implemented either by governments alone or private sector alone. Governments, regulators, operators and rural communities in the comparator countries have proven that rural connectivity is best implemented in partnership. The types of partnerships and strategies in action now are diverse, and range from public-private partnerships in Malaysia to the engagement of strategic NGO partners in India. The incumbent operators in both Malaysia and Australia have recognised that partnering with the communities they serve is essential to the success of their rural sustainability and have both adopted community ownership strategies. Moreover, this report finds that the key to successful partnerships is to nurture local ownership that keeps the community enthusiastic and the project relevant to the diversity of local needs.

One such example highlighted in the report is the Mobile Internet Unit (MIU), or Cyber Coach, in Malaysia, which is bringing ICT literacy training programmes to students, teachers and parents in rural schools, while simultaneously collecting data to help develop national ICT policies. The initiative is only possible due to collaboration and adoption of the "smart-partnership" between Malaysia's government organizations, private sector/NGOs and the various local communities.

Examples of public-private partnerships to increase rural connectivity in Africa are prolific as well. National mobile operator, Orange Botswana has partnered with Ericsson to implement the Ericsson Expander solution with cells that have a range four to five times greater than traditional transmitters, allowing Orange to reach rural users previously too remote for cost-efficient coverage. The successful pilot of PLC in Ghana offers an alternative innovative solution to rural power and telecommunications connectivity, but it is imperative that effective and robust collaborative mechanisms are established between energy companies, the Ministries responsible for ICT and regulatory authorities to ensure that new or improved power lines can provide enhanced connectivity.

Once pilot projects have made rural communities aware of ICTs and their associated opportunities, this report recommends that relationships between the local community and the various ICT stakeholders must be established to foster continued productive use of the technologies and generate demand for their content and services. Happily, public-private partnerships (PPPs), amongst educational institutions, one or more ministries, donor and development agencies and private ICT companies, such as Microsoft and Cisco, have begun to sprout up across Commonwealth Africa. Many of these partnerships are in the form of ICT trusts, designed to increase investment and involvement of stakeholders in ICT infrastructure for development in education and human capacity. For example, in Mozambique the NEPAD demo project was initiated in six schools with private sector participation. HP and Microsoft formed a consortium to support the project which supplied each of the six schools with computer labs and trained the teachers in the use of PCs.

This report has confirmed that rural connectivity remains a central defying challenge to the efforts of ICT policymakers, legislators, regulators, operators, technology suppliers and other stakeholders in Africa. Each of these stakeholders has an independent reason to want rural communities to become connected. However, these stakeholders and others are yet, in most cases in Africa, to work more collaboratively, harmoniously, methodically and constructively together to achieve their mutually inter-dependent objectives. The CTO hopes that the information, evidence, data and arguments adduced, and the recommendations made in the report will contribute to the process by which millions of Africa's rural poor can be further liberated and their livelihoods improved through better connectivity with the rest of the world through ICTs.

1 Conclusions

A number of recommendations on the development of an appropriate policy framework, sound legislation, and effective regulation to drive rural connectivity are made throughout this report. But other challenges exist; for example, the lack of access to electricity, the low income of rural areas, high operational and maintenance costs of infrastructure and low levels of ICT human capacity. The findings of this study recommend a number of strategies to overcome such challenges. These include the implementation of parallel rural electrification and connectivity programmes, to infrastructure sharing, to public- private people partnerships that incorporate local ownership and facilities management, along with human capacity building to support the more technical aspects of various connectivity initiatives.

Moreover, the report findings encourage governments, regulators, telecom operators, investors, financial institutions, community and village leaders, and civil society actors to work more closely together to identify workable business models, test more pilot projects, and implement and scale up successful models in order to sustain greater access by rural people to ICTs. This chapter itemises those recommendations to policymakers, regulators, operators, financial institutions, infrastructure owners and technology manufacturers supported by the research. In making these recommendations, the CTO recognises that there is no single best path for all countries to follow and that each national ICT strategy and rural connectivity plan needs to be specifically tailored to that country's particular circumstances. That said, these recommendations are based on recurring elements of national ICT strategies that have already proven successful in the comparator countries and in many of the African Commonwealth countries. For example, it is quite clear that contrary to impressions given to African policy makers that the private sector alone could ensure rural connectivity, the evidence from the experiences of more advanced economies, such as the United States, Canada and Australia, is that a heavy dose of governmental initiative and intervention has been necessary to ensure ICT connectivity to rural people and isolated communities.

This chapter will also present the set of specific criteria, indicating those characteristics of ICT initiatives that have proven themselves critical to the success and sustainability of rural connectivity initiatives in the countries studied. The 10 "winning" ICT pilots, already in operation, that meet the essential criteria, and a number of desirable criteria, are presented here in order to jumpstart the formation of public private peoples partnerships (PPPPs) to replicate these groundbreaking and promising initiatives across the African continent.

1.1 Recommendations to Stakeholders

Based on this research, the CTO makes a number of recommendations to the various telecommunications and ICT stakeholders. In particular, the stakeholders targeted in this section are policymakers / government, regulators, USF agencies, financial institutions, infrastructure owners and technology manufacturers.

A. Policymakers, i.e. governments, should strive to:

- Establish an independent regulator, capable of establishing and enforcing impartial rules
- Prioritise the establishment of a single converged regulator and regulatory framework, with jurisdiction over both the telecommunications and broadcasting sectors, to take into account issues of technological convergence
- Implement a technology- and service-neutral licensing regime to promote competition and ensure the provision of services through the most cost-effective means
- Encourage the participation of the local workforce when implementing ICT programmes and installing ICT infrastructure, in order to improve local human resource development and capacity building

- Equip universities, science and technology institutes, technical colleges, and other tertiary educational institutions with modern ICT hardware and high-speed Internet connections in order to source an advanced level of skilled ICT technical graduates
- Focus on ICT literacy and related training programmes for primary and secondary schools and local people

B. Regulators should strive to:

- 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 between operators in a fair and timely manner and thereby promote a competitive and conducive environment for rural connectivity

The body responsible for universal service funds (Regulator or USF Agency) should strive to:

- Disburse universal service funds by competitive tender, ensuring the optimal distribution of funds where they are needed most
- Prioritise the disbursement of universal service funds for bidders offering "rural packages" such as public access kiosks and telecentres

C. Operators should strive to:

- Ensure the affordability and availability of services to rural communities
- Strive to meet rural connectivity targets as mandated in their licence conditions
- Provide reliable, high-quality services with the most cost-effective technology available
- Assess the cost of rolling out infrastructure and services to rural communities as accurately as possible when bidding for universal service 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 rural local government headquarters, educational institutions, hospitals and other medical facilities and postal offices and other public access points, including rural kiosks, telecentres and payphones.
- Negotiate interconnection terms that reflect the substantially higher operation and maintenance costs of rural networks

D. Financial Institutions should strive to:

- View the "bottom of the pyramid" as a market in need of telecommunications infrastructure and services to help drive economic growth
- See the potential entrepreneurs at the "bottom of the pyramid" who have the business savvy 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

E. Infrastructure Owners should strive to:

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

F. Technology Manufacturers should strive to:

- Step up Research and Development in technologies that are relevant to rural connectivity, including innovative technology that is suitable for varied terrain—mountainous regions, tropical jungles, outlying islands
- Develop technologies that use renewable energy, such as biomass, solar, wind or hydroelectric power, to assist the provision of ICT services, especially where rural communities are located out of reach of the national electricity grid

PPPPs should strive to:

- Implement national ICT strategies, within the wider national development policy agenda, and with a specific provision for rural connectivity
- Identify workable business models that leverage the various roles of different ICT stakeholders and consumers for rural connectivity
- Test innovative technologies, financial schemes and the above identified business models as ICT pilot projects in rural areas
- Implement and scale up the successful rural ICT pilot projects (which we are giving you the opportunity to do now)
- Strive to nurture local ownership throughout the implementation of ICT initiatives in order to keep the local communities enthusiastic about using ICTs

1.2 Criteria for the selection of "winning" ICT pilot projects

Based on these conclusions, COMARCI has begun the construction of a set of specific criteria, presented below, indicating what characteristics of ICT initiatives are necessary for their success and sustainability.

The essential criteria for the selection of COMARCI "winning" ICT pilot projects are the following:

- 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.

It is also desirable that the "winning" ICT pilot project meet the following criteria:

- Generates profits above self-sustainability for re-investment and expansion;
- Builds on national, regional, and local partnerships;
- 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.

1.3 The 10 "Winning" ICT Pilot Projects

The above criteria have been used to identify 10 promising ICT pilots, already in operation, which the CTO proposes for large-scale adaptation and replication across Commonwealth Africa through PPPPs. Brief synopses of the 10 winning ICT pilot projects, in no particular order, follow.

1.3.1 Motorola / Seaside Communications Rural Broadband, Nova Scotia, Canada

Motorola and Seaside Communications in Nova Scotia, Canada, have engaged in a public-private partnership with the local government to connect every Nova Scotian with broadband Internet connectivity by the end of 2009. Under the contract terms, the service providers can not charge rates higher than the market rates in urban areas, ensuring affordability for the service. The initiative uses Motorola's fixed-wireless technology, Canopy, which has proven cost-efficient, and is easily scalable when demand for more bandwidth arises.

The innovative technology and business model uses the unlicensed spectrum ranging from 2.4 to 5.9 GHz and 90 MHz. The technology enables data speeds of up to 1.5Mbps, which is approximately 15 times faster than dial-up Internet speeds, to ensure that service meets the needs of the rural subscribers.

The Canopy technology transmits a radio signal between fixed access points on radio antennae (towers and poles) strategically located across the province. Each subscriber receives the signal through a receiver box fixed to their home or office. If the subscriber does not have access to the national grid, then the receiver can be powered with a charge controller, batteries and a solar panel.

1.3.2 NYnet Rural Broadband, North Yorkshire, UK

NYnet is a public and private sector commercial venture, providing a communications network for the delivery of high-speed broadband services to the rural region's citizens. North Yorkshire County Council partnered with Yorkshire Forward, the Government Office of Yorkshire and Humber and BT to deliver, monitor and maintain the network. Once seen as unprofitable, NYnet has created a backhaul infrastructure to 12 points of presence in North Yorkshire using aggregated public sector demand, but small businesses and residents are also reaping the benefits of the ADSL services. In fact, the broadband take-up rate of the region is higher than the national average. NYnet will price this DWDM backhaul capacity to minimise the impact of distance, in hopes of stimulating the provision of advanced 'next generation' services to the public and private sector. NYnet represents one of Europe's largest public sector led, open access, broadband infrastructure initiatives to overcome the issue of rural/coastal disadvantage in terms of broadband and connectivity.

1.3.3 Nokia Siemens Networks Village Connection, India

Nokia Siemens Networks Village Connection avails voice and Internet connectivity to rural communities where traditional GSM network roll-out and operation has been seen as too costly. Using an IP-based network structure and innovative business model, the solution essentially reduces operators' expenditure, making previously unattractive markets potentially profitable. Coverage is established through compact local GSM Access Points, located in both villages and regional access centres. These access points are based on cost-effective infrastructure, aggregating radio frequency, power and standard PC with Access Point software. Furthermore, the access points typically house an antenna on the roof of the building, eliminating the need for costly towers. The project presents an innovative business model which ultimately reduces operators' costs, increasing incentive for expansion and interconnection. One option has a local entrepreneur who runs and manages the Access Points and interconnects with the operator for external connectivity. Alternatively, the operator can own the Access Point, which the local entrepreneur operates and manages for a salary. These village connections, while increasing the availability of communication options for rural populations, also decrease the costs of such tools for the end-user.

1.3.4 Village Phone Uganda

MTN Uganda and the Grameen Foundation joined forces in 2003 to establish the Village Phone programme in Uganda. The programme is modelled after the successful and pioneering Grameen Phone initiative in Bangladesh. Essentially, the project facilitates the purchase of specialized mobile phones by rural entrepreneurs who then act as village phone operators (VPOs), providing affordable telecommunication access to rural dwellers in areas where little or no telecommunication infrastructure exists. The Grameen Foundation acts as a facilitator between the telecom sector and microfinance sector, as all VPOs purchase the handsets with microfinance loans. The VPOs charge on a per-call basis and make enough money to repay their loans and earn profit.

The Village Phone is now recognized as a strong business model for connecting rural communities as the majority of VPOs successfully repay their loans and make profits. It is also acknowledged as a sustainable development tool by numerous governments and development agencies such as the World Bank, the United Nations, the International Finance Corporation and USAID. In Uganda, the initial goal was set at 5,000 new mobile businesses in five years; however, MTN has surpassed this goal in just three years by setting up over 6,700 new businesses, representing a growth rate of over 150 businesses per month.

1.3.5 Vodacom Community Services Phone Shops, South Africa

Vodacom Community Services Phone Shops provide telecommunications services to disadvantaged communities at regulated prices well below market rates. The services were initially subsidised by the service provider, but now the phone shops are self-sustaining. The business model emphasises the role of local entrepreneurs from disadvantaged communities in establishing the phone shop franchises at a start-up cost of about R 26,000 to operate five cellular lines within converted shipping containers. Vodacom also invests about R 30,000 per franchise to transform the shipping container into a phone shop. The phone shop products and services are simple, consistent and affordable. Phone calls are priced at a set rate of R.85 (US$.11) per minute, representing a two-thirds discount. Fax and Internet services are also increasingly being offered. Vodacom trains the entrepreneurs in management skills and offers business insight at the start of operations.

1.3.6 Ghana eCare

eCare provides telecommunications services in peri-urban and rural areas through local entrepreneur owned and operated ICT centres, offering telecommunications and solar power services. The entrepreneurs are recruited, interviewed and required to complete eCare training in Accra. Successful candidates are then offered the chance to apply for a loan that covers 90 percent of the cost of purchasing the pre-packaged centre, which will be delivered to the village by truck in the shape of a modified cargo container complete with doors, windows, phone booths, and desk. The centre is equipped with three fixed cellular terminal phones, a solar panel system, a computer and printer. The site must have Ghana Telecom GSM coverage or Ghana Telecom Wireless Local Loop coverage, but do not require access to the power grid as the centres run on solar power. The strict selection of entrepreneurs, favourable loan scheme, and resultant local ownership all support the financial sustainability of the project. As well, the ability to draw on cost-effective and appropriate technologies, such as solar power, has connected underserved rural communities.

Currently, 69 centres are successfully in operation in all 10 regions of Ghana and benefiting over 500,000 people in various communities. By the end of 2008, eCare expects to have at least 200 centres offering renewable energy and telecom services to over a million Ghanaians. The project is implemented by a partnership between the United Nations Foundation, Ghana Telecom, United Nations Environment Programme, and Kumasi Institute of Technology and Environment.

1.3.7 Ericsson Gramjyoti Rural Broadband Project, India

In September 2007, Ericsson launched the Gramjyoti Rural Broadband Project. This initiative leverages the benefits of WCDMA/HSPA technology in rural India, connecting ICT-poor communities to high-speed services. It is the first HSPA-powered rural broadband demo network in India and delivers the benefits of 3G to 18 villages and 15 towns in Tamil Nadu.
Over 3,000 high school students within the communities are benefiting from high-speed internet, take e-learning courses and gain access to bandwidth intensive learning materials. The high-speed connection allows students to learn through distance education, with teachers based in Delhi. Villagers can also visit citizen centres where they can log into high-speed internet connections and benefit from relevant information such as the latest selling rates of agricultural produce.

Live interactive medical check-ups via telemedicine, e-governance services, online and local information, voice and video call services as well as live TV and entertainment have also been introduced to the villages for the first time.

The project is financially sustainable within the medium- to long-term, based on strong partnerships with bodies such as the Apollo Hospitals, Hand In Hand, Edurite, One97, CNN and the Cartoon Network. The Apollo Hospitals provides support by providing free health checkups from the 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 collaborate with Ericsson to provide infotainment services. Ericsson is also making use of citizen centres which belong to Hand In Hand, a socially oriented NGO that advocates for poverty reduction and education. The partnerships also ensure that the content that is provided is relevant to the population, which will contribute to the overall sustainability of the project.

1.3.8 Cyber Coaches and Caravans, Malaysia and Mauritius

The Mobile Internet Unit (MIU), or Cyber Coach, in Malaysia, is bringing ICT literacy training programmes to students, teachers and parents in rural schools, while simultaneously collecting data to help develop national ICT policies. The MIU is a self-contained mobile vehicle equipped with multimedia cyber learning material, including books, courseware, software, ICT peripherals, audio-visual aids, evaluation packs and library service. It is designed to handle rough terrain in rural areas and has its own electrical generators. Each year the MIU travels to 20 schools and aims to instruct a total of 2,800 students and teachers in basic Internet and computing skills, including webpage development. If there is no Internet connectivity, the MIU demonstrates the usefulness of the Internet using cached Internet sites. Each day, the MIU aims to train 140 people in basic ICT literacy as well as participate in ICT awareness campaigns and special events. Its goal is to leave each school with at least one PC and a fixed connection to the Internet. The initiative is possible due to collaboration and adoption of the "smart-partnership" model by three main sectors in Malaysia: the government organizations (MOE and State Library), private sector/ NGOs (UNDP/APDIP, NITC, MIMOS BERHAD & ACM/HICOM) and the various communities.

Mauritius has employed a similar model to implement its Cyber Caravan. The project is implemented by the National Computer Board (NCB) and is increasing ICT competency, especially in common computer applications, and educating citizens on the benefits of using computers. There are two operational cyber caravans, equipped with 9 and 10 PCs respectively, a LAN network and a broadband connection, that travel to remote areas where access to ICTs is not affordable. Courses cover a range of subjects, from understanding how to use basic computer functions, to learning how to enter and manage data and formulae, perform calculations, use the Internet and e-services, and become aware of various types of viruses. Since the start of the project, in 2000, over 70,325 have completed the ICT literacy, ICT Awareness and IC3 courses. The project targets students in primary and secondary schools, women centres, and unemployed, disabled or senior citizens in social welfare centres, regardless of age, education background or profession.

1.3.9 Vodacom and the Tanzania Agricultural Marketing Systems Development Programme

The Agricultural Marketing Systems Development Programme (AMSDP), implemented by the Ministry of Industry, Trade and Marketing provides agricultural marketing support to rural farmers and traders in eight mainland regions of Tanzania, which, despite high crop yields, face serious marketing challenges. The implementation of AMSDP is done through five components: agricultural marketing policy development; producer empowerment and market linkages; financial market support services; rural marketing infrastructure; and programme organisation and coordination. One of the innovative ways in which market information is conveyed, through a subcomponent of the project, in partnership with Vodacom, is the mobile phone.

Three times a week field officers collect agricultural information for the Ministry, which is then passed on to Vodacom to be entered into the server. The system allows for farmers and traders to demand the latest prices for cash crops via text and receive the latest information on their mobile phone. The aim of this system is to enhance accessibility of market prices for farmers, enabling them to more effectively negotiate in their produce market.

1.3.10 Mobile Banking / M-PESA Model, Kenya

M-PESA is a mobile phone money transfer scheme, jointly operated by Safaricom and Vodafone, which allows subscribers to send cash to other mobile phone users by SMS without any need for a new handset or SIM card. It is, unsurprisingly, a highly demanded service among urban Kenyans supporting relatives in rural areas who often do not have access to any other bank or financial institution. The service has attracted more than 1.6 million subscribers and transferred over US$148 million via SMS in just its first year of operation.

M-PESA is also an affordable service, costing an average of US$1 to send and/or receive money, therefore proving a major source of competition for other more traditional money transfer agencies. The service is also faster and more secure than other means of money transfer.

1.4 The Way Forward

It is now an opportune time to develop the public private peoples partnerships that will adapt and replicate these and other such proven, sustainable and effective best-practice pilot projects for rural connectivity. These initiatives should be implemented in the context of national strategic programmes for rural connectivity in order to ensure that the full potential of ICTs are brought about to increase welfare and economic activities within the region and to alleviate poverty as part of the Millennium Development Goals. Policymakers and regulators must remain committed to ensure universal access through network extensions to serving poor and marginalised communities and to facilitate greater use of ICTs for development through capacity development and basic training. The International community, especially donor agencies, must support connectivity to ICTs in rural and remote communities to bring about fundamental development and transformation of these communities by improving their basic livelihood through e-education, e-health, e-governance, e-commerce, etc. Connecting those two thirds of the African population living in rural and remote communities to ICTs will enable greater and faster access to knowledge and help to accelerate Africa's development in achieving its targets towards the Millennium Development Goals in Africa. Through adoption of PPPPs and shared responsibility, Governments, private sector and development partners can bridge the digital divide and accelerate rural connectivity to Africa's unconnected.

commonwealth
telecommunications
organisation