

Broadband and the development of Rwanda

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Rwanda is staking its hopes for economic growth and the country's future upon an ambitious 20-year project, now entering its second five-year phase, to make the country a regional ICT powerhouse. The plan calls for a nationwide fibre backbone to turn the country into a knowledge-based society. It intends to become a regional communications hub and a centre of excellence in ICT to support the growth of a robust financial sector, outsourced computer services, and regional air traffic control.



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Rwanda's recent history, which culminated in the genocide of 1994 and the loss of up to one million people, left the Rwandan economy devastated and much of the infrastructure destroyed. There is, therefore, an urgent need to develop the country both economically and socially against the background of a very low, virtually non-existent, natural resource base. Rwanda has tremendous ambition, in line with its Vision 2020 targets to become a knowledge-based, technology-led economy by 2020, underpinned by Rwanda's transformation into a regional ICT hub. Two key strategies support the adoption of science, technology, innovation and ICT in Rwanda: the recently approved National Policy on Science, Technology and Innovation and the NICI Plan (National Information and Communications Infrastructure), a 20-year strategy, now in its second five-year phase (2006–2010).

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The NICI Plan aims to incorporate ICT at every level and in every sector of society, bringing collective benefits to everyone in Rwanda based on the following ten pillars:

- Education;
- Human capacity development;
- Infrastructure, equipment and content;
- Economic development;
- Social development;
- E-government and e-governance;
- Private sector development;
- Rural and community access;
- Legal, regulatory and institutional provisions and standards; and
- National security, law and order.

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education, healthcare, financial sector, government, defence, etc. It is what economists would call ‘general purpose technology’ - it has an impact on technical change across a large number of industries, drives continuous improvement leading to sustained productivity growth, and spawns innovation (V.W. Ruttan 2007). Four types of services evidence the impact of convergence: voice, data, image and video. Numbers with a series of zeros and ones can represent all four types of communication. However, the requirements for corresponding processing, storage and bandwidth are significantly different. Voice needs a narrow bandwidth and less space storage. The images (two-dimensional data) need more storage capacity, more bandwidth for transmission, and more processing power for various analyses. The video (three-dimensional data) needs even more storage space, more bandwidth for transmission, and more processing power for analysis.

Modern international experience has demonstrated the profound impact that ICT, and in particular the growth of the network through broadband, has had in transforming people’s lives. In his book, *“The Big Switch - Rewiring the World from Edison to Google”*, Nicholas Carr stresses that the future of computing will lie in high bandwidth networks hooked up to “massive information processing plants”. The revolution in computer broadband networks is seeing information services delivered to every home, changing society as dramatically as the cheap electricity that was delivered to people’s homes from the early part of the 20th century. (Carr, 2008).

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The Government of Rwanda recognises that processing power, storage and bandwidth are key elements in a growing ICT sector. Rwanda also needs to develop the human resource base, particularly in the areas of science and technology, through the medium of ICT, to capitalise on the benefits of the

global computer revolution that is ‘reshaping business, society, and culture’ (Carr, 2008).

Top level commitment to this goal is demonstrated in an address to the 8th African Union (AU) summit on ‘Science, Technology and Research for Africa’s Development’ in 2007. His Excellency, President of Rwanda, Paul Kagame states that:

“Historically, whether one considers the role played by indigenous technologies in Africa, or the 19th century industrial revolution that transformed Europe and North America, or contemporary Asian experiences - it has been all about using scientific and technological applications to achieve fundamental socio-economic transformation.”

He further develops this in his keynote address at the Sub Saharan Africa ICT Conference held in San Francisco in March 2007 where he asks:

“... how are we in Africa to emulate California and other successful economies in creating a strong ICT base and market?”

He discussed how ICT, with particular reference to the mobile phone, is transforming people’s lives, stressing the importance Rwanda is placing on ICT through the development of infrastructure, including installation of a national fibre optic backbone and connectivity in national institutions such as cabinet and parliament.

The investment in ICT infrastructure and skills started in 2000 with the establishment of the NICI plan, an ICT led socio-economic development policy. A total of four, five-year plans, covering 20 years, are designed to increase access to voice, data and video, improving people’s lives through improved access to and functioning of facilities and institutions such as:

- Good governance and strengthening of democratic institutions;
- Improved government communications;
- Improved delivery of public services;
- Education;
- Healthcare;

- Revenue management systems; and
- Financial sector.

Starting from a very low base, progress has already been achieved in access to voice and data. In the case of voice, from a base of only around 7000 in 1998 the fixed and mobile subscribers now number over 650 thousand. There are currently an estimated 200 thousand users accessing the Internet via a mix of GPRS, WIMAX, WBB, ADSL, EVDO and direct fibre.

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Growth in voice and data is set to continue. In the case of voice, the penetration rate is now about 7 per cent of the population, with 12 per cent penetration expected by the end of 2008. In the case of data, as shown in Table 2, current Internet users are estimated at 200,000, with this projected to increase by 30 per cent per annum over the years 2009-2012. The adoption of video is dependent on the rollout of high bandwidth broadband networks.

The benefits of this policy are already starting to transform both the economy and the life of people in Rwanda. These can be summarised under the following headings:

- Good governance, including online publication of high level cabinet decisions;
- Improved delivery of public services, including a public national tendering system;
- Education - all national institutions of higher learning have connectivity through broadband fibre access. A One Laptop Per Child (OLPC) programme pilot has already taken place at a semi-rural school;
- Healthcare - TRACNET, a dynamic information technology solution established throughout Rwanda related to the care and treatment of HIV and AIDS;
- Revenue management systems: All customs border points are linked into the centralised management system; and
- Financial sector: as an example, all banks

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are now linked into the National Bank, which has the responsibility for sector regulation.

The Government of Rwanda recognises it is necessary to ensure that telecommunications services, and the resulting benefits of economic, social and cultural development are extended effectively and efficiently throughout the rural areas of Rwanda. Disseminating information throughout rural areas with the current infrastructure is more costly and difficult than for urban areas. Therefore, these rural areas will benefit significantly from improved access to information and services. In the short term, this will include the efficient delivery of key public services, as outlined above, that will greatly enhance the decentralised government process and ensure that all the people of Rwanda are included.

Plans for the future include the building of a national broadband backbone infrastructure. Central to this infrastructure is a physical fibre network linking all 30 district offices in Rwanda to provide nationwide coverage. The general access network will be overlaid onto this, using a combination of wireless and fibre to provide high-speed access to communities, schools, health centres.

Another crucial strategy is to ensure that Rwanda has access to efficient and high capacity telecommunications services and information globally. This is essential to ensure that Rwandan companies are able to compete in the global marketplace. As Rwanda is a landlocked country, this will mean regional fibre optic connections through neighbouring countries: Uganda and Kenya in the North, Burundi and Tanzania in the South and East, connected to submarine landing points expected to be in Mombasa, Kenya and Dar es Salaam, Tanzania. Rwanda is already negotiating with the cable operators to ensure the best possible services based on competitive pricing.

Ongoing initiatives in ICT linked to the above include:

- Governance support systems continuing to enhance efficient delivery of key public services and foster the process of decentralising the government, including via a local government communication system;
- Community healthcare support systems to

expand the availability of rural telemedicine in district hospitals and health centres;

- Education initiatives such as support for distance education and the One Laptop per Child project for Rwanda; and
- Rural private sector development support by establishing tele-centres to enable the gathering and distribution of information of all sorts and the widespread dissemination of detailed best-practice and market information.

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- There is also the intention to continue with key projects such as:

- o Karisimbi project: an Infrastructure project, based around a 50m mast installed on top of a 4,500m mountain in the North of Rwanda. A number of national and regional projects are planned including an air traffic control system;

- o One Laptop per Child: Rwanda is working with the One Laptop Per Child project with the intention to provide a laptop to every primary school student within five years;

- o One Mobile phone per Household: The target is both to introduce low cost phones throughout the country including rural villages, with a manufacturing plant in Rwanda, together with schemes to assist in the purchase of the phones;

- o ICT Park: an ICT park is being

established which, from its original building in Telecom House in Kigali, will ultimately become one of the main drivers of Rwanda’s evolution into an ICT society and mature into a regional hub for ICT innovation.

Following the One Mobile phone per household initiative we expect that access to mobile phones will increase at a yearly rate of 30 per cent and reach a significant percentage of the rural population, of which around five million are over 16 years of age, within the next five years. As I mentioned in a previous article: “Bringing cell phones to a rural village is like introducing a positive charge into a quantum vacuum... The use of mobile phones will support literacy through the use of SMS, mobility and empowerment of the people through communication and enhanced services such as mobile banking” (World Bank Development Outreach, January 2007).

Rwanda looks forward to the future, converting its large population and its small landlocked status, two areas of potential weakness, into strengths. With a knowledgeable, computer literate, population, a concentrated nationally distributed ICT network and a burgeoning computing industry, Rwanda intends to position itself as a centre of excellence in ICT. Rwanda’s development depends upon the growth of key commercial and strategic areas such as the finance and banking sector including its recently established stock exchange, regional air traffic control, outsourced computer service industry including software development, among others. The planned nationwide, high bandwidth, broadband network will make it possible to develop other potential growth areas that depend upon access to the virtual global market place.

By 2012, we expect that ICT will contribute a sizeable percentage of Gross Domestic Product (GDP) and compete strongly with agriculture. One of the main telecoms operators in Rwanda is already the highest individual tax contributor in Rwanda, surpassing even soft drinks and alcoholic beverages.

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