Thematic report

Rural Access and Connectivity in Tanzania

Lessons learned from setting up and managing IICD supported Rural Communication Access Centres

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Summary

Since 2000 the International Institute for Communication and Development (IICD) supports partners in Tanzania with application of information and communication technology (ICT) in development processes.

IICD's Tanzania Country Programme consists of 25 projects operating at district and national level in the sectors agriculture, governance, education and health.

Access to the Internet in rural communities is provided through what is referred to in this paper as Rural Communication Access Centres (RCAs). Internet access is also provided via access points in schools, hospitals and offices of local government. Presently, via these RCAs over one million end-users are reached, directly or indirectly, amongst whom are students, teachers, women, youth, farmers, government officials, health workers and small entrepreneurs.

ICT has a major role to play in knowledge development in many areas, but also offers the possibility e.g. to improve governance. Basic infrastructure is therefore indispensable. In Tanzania access to the Internet has increased considerably in recent years, however, much has to be done to reduce costs and improve the quality of the services since affordable access is key to development.

This paper aims to raise awareness and contribute to sharing knowledge about the experiences and lessons learned with setting up and managing rural communication access centres, or telecentres, in Tanzania. It builds upon the outputs of the workshop on rural access and connectivity, organised in Dar es Salaam in May 2006. This workshop was organised jointly by SWOPnet and IICD. SWOPnet is the Tanzanian national ICT for Development (ICT4D) network, supported by IICD, which aims to provide information services, raise awareness and participate in dialogues on national- and sector ICT policies.

Some of the findings that will be described in this paper are the factors for successfully running a RCA, like the necessity to have the RCA strongly anchored in the local community, sturdy management, availability of relevant local content and technical knowledge to provide support and maintenance.

Introduction

The International Institute for Communication and Development (IICD) supports partners in Tanzania with incorporating ICT in the development process. Projects to introduce information and communication technology (ICT) in various sectors have been implemented and currently IICD's Tanzania country programme consists of 25 projects in the sectors agriculture, governance, education and health. Since 2002 the national ICT for Development (ICT4D) network SWOPnet (www.swopnet.or.tz) is engaged in policy dialogues and knowledge sharing around the theme of ICT4D. Access to information and communication by using the Internet is enhanced by involving institutional partners such as schools, hospitals and local government offices. Access to Internet for rural communities is provided in - what is referred to in IICD's Country Programme and in this paper as - Rural Communication Access Centres (RCAs).

As it is an important element in the process and several pilot projects were underway, the need was felt to take stock of the progress with the set-up and operation of the RCAs. In May 2006 IICD and SWOPnet hosted a workshop on Rural Connectivity in Tanzania, of which the outcomes served as a basis for this paper. The Honorary Basil Mramba, Member of Parliament and Minister for Infrastructure Development, opened the workshop underscoring the importance and priority the Tanzanian Government gives to rural access.

The objective of the workshop was to exchange information and experiences on key aspects of access and connectivity, including technical, organisational, managerial and financial dimensions, with a focus on rural areas.

Various ways exist to connect to the Internet. Cost and performance of the connectivity options determine use and economics, thereby influencing sustainability.
Parallel to this workshop, commissioned by SWOPnet and IICD, Mr Suhail Sheriff did a research[1] into options and costs of Internet connectivity in Tanzania.

This paper focuses on the practical experiences and lessons learned of IICD partners in Tanzania with setting up and managing Rural Communication Access Centres (RCAs). In other papers or projects these are referred to as telecentres, rural information centres, community media centres etc..

The five IICD supported RCA projects and their experiences are presented next, followed by the lessons learned, conclusions with regard to sustainability – also in comparison with the experiences from IICD projects in Bolivia – and the recommendations for follow up activities.

[1] *The report is available on-line at the IICD website (www.iicd.org/articles/RuralConnectivityTanzania) and will be updated for the 2007 situation.*

Experiences with establishing RCAs in Tanzania

IICD has supported various partners with developing Rural Communication Access Centres (RCAs) in Tanzania. The following projects presented their experiences as cases in the workshop:

1. FADECO Resource Telecentre, Karagwe - Kagera
2. Kibengwe Rural Communication Access and Development Centre (RCADC)
3. Sengerema Rural Access point
4. Project ICTanzania 2006
5. Cromabu, Crop Marketing Bureau Ltd. ICT Project, Magu, Mwanza

1. FADECO Resource Telecentre, Karagwe - Kagera

The Family Alliance for Development and Cooperation (FADECO) telecentre was started in 2001 without Internet connection, using only offline resources. In 2002 a local area network (LAN) was set up with 4 computers. In 2004 the centre was connected to the Internet via a VSAT - small satellite dish installed at end-user locations - and the number of computers expanded to 12. IICD mostly supported training of staff. FADECO has recently set-up the first FM radio station in the region. They have started to supply Internet services to two schools using a wireless connection. FADECO organised a seminar for decision makers as well as a thin-client[2] workshop.

Services offered are the following:

- Library services, access to books, other printed materials and CDs
- Internet café
- IT support services: An IT department with an IT technician for hardware and software maintenance is operational
- Information services: The office secretary received training in resource management and now fulfils the position of information manager.
- An access point for the Open Knowledge Network (OKN) by using WorldSpace technology

FADECO is a private initiative. Recently it connected the base station with the Karagwe secondary school at eight kilometres distance. Interesting was that the link which went through rugged area, did not require an amplifier[3]. This enhances the possibilities to create 'chains of telecentres', which could improve local communication and reduce bandwidth costs through sharing Internet access.

FADECO: lessons learned

- It is difficult to sustain a resource centre entirely from income generated from its services
- Diversification of services towards value for money services could help to increase income
- People are willing to pay for essential and affordable services of good quality
- There is a great temptation to convert the resource centre into a public Internet café to increase income. Concerns however are that this may lead to uncontrolled use e.g. pornography

2 A Thin client is a computer (client) in client-server architecture networks which has little or no application logic, so it has to depend primarily on the central server for processing activities. The word "thin" refers to the small boot image which such clients typically require - perhaps no more than required to connect to a network and start up a dedicated web browser.

3 See http://kjohnah.blogspot.com

2. Kibengwe RCADC, Bukoba Rural District - Kagera

Kibengwe Rural Communication Access and Development Centre (RCADC[4]) is a rural access project which was initiated by the non-governmental organisation KAEMP (Kagera Agricultural Environmental Management Project) and the Computing Centre of the University of Dar es Salaam (UCC) in collaboration with IICD and World Vision. IICD provided support in training, technical advice and investment.

Kibengwe youth surfing the Internet

The project has been set-up with the following objectives:

- To provide rural areas with access to communication tools, information and knowledge through a low-cost, sustainable, and shareable infrastructure
- To provide means for local content development and use
- To empower local community through ICT so as to improve their socio-economic situation
- To test a business model which can be easily replicated elsewhere in Tanzania

From the start users were involved and a strong Kibengwe user committee emerged. The set-up of the centre is as follows:

- Connected to the Internet through a VSAT
- Internet access via bandwidth services of 32 Kbps uplink and 96Kbps downlink. The monthly costs of US $ 600 have been re-negotiated with the Internet provider to US $ 200. The connection is shared with a school.
- 16 computers in the training room (with 6 computers connected to the Internet). Most use Linux and 3 are Windows-based
- 2 printers, 1 photocopier machine, 1 scanner, 1 LCD projector
- 1 telephone handset
- 1 World Space radio
- 1 mobile device – PDA - for locations without network and electricity
- providing Internet services to the neighbouring Hekima Secondary School and Nyaigando Convent via wireless links and to Bugabo Area Development Programme (at 50m) – part of World Vision International via UTP cable
- it is planned to stabilise energy supply by purchasing a converter

It is planned to connect local communities at 7- 18 kilometre distance via an intranet and offer locally hosted content and local VOIP services thereby avoiding high international bandwidth costs.

Kibengwe: lessons learned

- Involvement of the user community from planning to execution of the project is a key factor for success; potential beneficiaries were consulted and involved in establishing the centre.
- Awareness about the project, the benefits of the centre, with prospective users is still limited; there is a need to educate the community. Extra awareness efforts e.g. seminars and meetings are planned for.
- Stakeholders who pledged to contribute in monetary terms have not done so; depending on contributions to sustain operations has proven to be insecure.
- The business model and mode of operation of the Kibengwe project needs to be changed. With the present subsidy of 50% of the bandwidth costs the telecentre just breaks even.
- The number of users is critical. It can be enhanced by offering locally relevant content and structural use by institutions. Experiences underline the potential for sharing cost of access.

3. Sengerema, Rural Access Point

Sengerema telecentre was initiated by the Tanzania Commission for Science and Technology (COSTECH) with support of the International Development Research Centre (IDRC) and other international donors.

The centre has 3 computers with quite good telephone connectivity that connect to the Internet on set times through several service providers**:** TTCL via Fixed Landlines, Vodacom, Celtel and Tigo via Mobile Technology.

Housed at the Sengerema Community Centre, services available are the Internet Café, computer classes, typesetting, desk top publishing & printing, IT consultancy, radio broadcasting, fax and telephone, lamination, binding, photocopying, video shooting/showing, scanning and a conference room.

An interesting feature of the centre in terms of staffing is that in addition to relying on volunteers and paid staff, the centre also gets assistance from women belonging to Sengerema Women Information and Communication Group.

4 Web page with information on RCADC www.kibengwe.or.tz

4. Project ICTanzania 2006, Mara and Serengeti

This project is supported by the Swedish Agency for International Development Cooperation (SIDA) and the Tanzania Commission for Science and Technology (COSTECH). The project integrates Internet access via fibre optic cable with a rural electrification programme. As a result ample bandwidth is available but an emerging challenge is the provision of locally relevant content.

With regard to the importance of project, the following points were mentioned:

- The pilot project needs to be replicated
- It is useful to provide Voice over Internet Protocol (VoIP) services
- Success of the project will induce fibre optic cable to be included in plans for preparation of new power lines. Existing fibre connections include: Miono-Chalinze, 80 km, along a water pipe and connecting 18 villages; Bunda-Mugumu: 134 km, along a power line and serving 15 villages

The RCA also enables health centres to communicate with district hospitals and some of the professionals in the area have started using the RCA for studying online, especially schoolteachers.

5. Crop Marketing Bureau Ltd., Magu - Mwanza

This project is supported by IICD with training, technical advice and investments. The Crop Marketing Bureau Ltd. (Cromabu) collects and provides agriculture price information for farmer groups. It also stimulates women and youth groups both in the field of development activities and ICT. Cromabu established itself as an independent NGO. The centre provides Internet access, ICT training and secretarial facilities.

Cromabu has a VSAT connection with C-band. SATCOM subsidized the connectivity up to mid 2006. The RCA provides connectivity to a number of local clients. Based on WiFi technology it is planned to connect five additional clients per month. The estimation is that the market is saturated at about 120 customers. Estimates show that it is a potentially attractive business model with nett income after depreciation. However, delays in implementation and sever power cuts over the past year have undermined profitability substantially. In addition broadband access has been introduced in Magu, which has stepped up competition and led to a decrease in the number of customers.

An interesting anecdote is that the district commissioner of Magu has completed his master study at the Cromabu centre in the evenings and weekends (see below photo).

District Commissioner of Magu (2nd left) at Cromabu office

Lessons learned from IICD partners

From the presentations of the various cases of telecentres and subsequent discussions at the workshop a number of lessons learned are derived, which are listed below.

Institutional set-up; critical conditions for success

Multiple functions of Rural Access Centres

The Tanzanian cases show clearly that the role of telecentres is not limited to providing access to Internet or telephone. Telecentres offer a wide number of services and functions, including the following:

- public library services (with a book borrowing scheme to selected institutions and individuals)
- provision of reference materials to researchers/students, acting as contact point for distance learning (e.g. Cambridge Tutorial College) and enabling distance learning.
- Provision of web- and chat services to students (e.g. Tanedu.org and wanafunzi.org)
- Extended e-mail 'post office' services. It was reported that all e-mail users in Karagwe used the Karagwe telecentre email address to receive and sometimes to send their e-mails thereby creating a new concept of an e-mail post office.
- Facility for searching information on the Local Area Network (LAN) e.g. from CD-ROM libraries. In Karagwe, web pages of general interest and those requested by users were downloaded during off-peak hours and installed on servers on the LAN.
- Providing access to market information, directly by email or CD-ROM
- Promoting World Space technology to download information from the Internet
- Providing basic computer training, introduction to ICTs
- Making topical content in areas of agriculture, social welfare, education, health and environment accessible to the rural population.
- Providing a locus for local development activities with women, youth and farmer groups, e.g. Cromabu in Magu.

The mix of services offered by RCAs depends on the form, facilities and functions. It may range from a 'simple' telecentre with only one or two telephones and no link to the Internet to a centre with numerous telephones, fax machines, printers, and computers connected to the Internet.

It was also mentioned that telecentres can and should serve as Development Knowledge Information Hubs. Within a rural setting, they provide an opportunity to organise people and raise awareness in order "to break the poverty vicious circle by removing isolation and providing information and knowledge necessary for development and wealth creation". In this way, they also contribute to the reduction of the digital divides, both the global as well as the urban-rural digital divide.

Participation and involvement of all stakeholders required

This aspect was emphasized again and again. RCA Kibengwe shows that early and consistent involvement of the local community is essential. The involvement of the user community, who are also the beneficiaries of the project, from the planning phase to execution of the project, is considered a key success factor for any RCA project. The stakeholders should include local champions' groups and schools (pupils, teachers and school committees). This enhances local/community ownership and contributes to sustainability. Also youth groups and women groups can play an important role.

Clear need for increase of rural access

It was concluded that the need for establishing RCA facilities in remote rural areas in Tanzania is high. The interest is particularly clear during special occasions such as the time of publishing the national examination education results. This means that access points need to generate and offer useful information to its beneficiaries, regularly use the RCA services and thereby contribute to the sustainability.

Education and sensitization of communities is essential

While a latent need indeed exists, it is important to educate communities on the benefits of RCAs and make them aware of the possibilities ICTs offer. Awareness creation is needed through seminars, training sessions and demonstration of how the various available technologies work and how they can assist people to improve skills and enhance their livelihoods.

Cromabu through its community development activities generates substantial interest and use of the RCA. The provision of ICT training of youth groups in exchange for services appears to be a successful formula to raise awareness and increase use of services.

ICT training activities and secretarial services are important sources of income. But the time-to-market certain services is important. If the market size is of economic interest, the services are easily copied and returns become rather marginal. Therefore continuous improvement and renewal of services is necessary.

Political will is crucial

It was observed that political will within the locality is crucial for the success of a RCA. Involvement of the local authorities not only legitimizes the operations of the RCAs, but also adds value to the centres by availing relevant government information for dissemination. Local government agencies can also use the centre for enhancing access for their offices.

Management aspects

Need to anticipate sustainability at project start-up

Participants emphasized the need to explore and tap possible sources of income within the locality, including contributions from other stakeholders in the area. This would contribute to sustainability.

Strong leadership

Leadership that is sensitive to the needs of the community and sufficiently strong to keep the activities focussed and on track came up as a decisive factor. Committed leadership should pull the RCA through difficult periods. Centres established by 'outsiders' in a generally weak market and with many technical and institutional constraints are doomed to fail.

Need for accountability and good governance

It is important to observe accountability and good management practices in the running of RCAs. This enhances stakeholder and customer confidence. It includes proper and transparent accounting systems and sound investment policies.

Customer focus needed in telecentres

Participants emphasized the need to ensure that services are relevant and address needs of the local community. It is essential to ensure that there is effective and efficient Customer Care, including easy access to services. Projects have concluded that diversification of services could help to increase income and users are willing to pay if they get value for money.

Capacity and human resources

Importance of retaining young people

A number of centres depend largely on volunteers, often bright and intelligent youngsters. Since these young people are an important element of the RCAs, strategies have to be devised to make it attractive for them to continue their efforts. For example: they could receive training in return for loyalty and commitment shown over a certain determined period. Another incentive, which was successful for Cromabu, is to provide bicycle transport to youths. Youths managed to visit more markets and villages, from 9 to 16 times more in a period of 1 year.

Need for technical skills

Telecentres need to develop technical capacity to operate communication equipment to maintain a stable service. At least basic capacity for troubleshooting is required since telecentres are non-functional for long periods due to minor connectivity, software or hardware errors.

Staff continuity

The staff consistency is an additional challenge; it has been noted that staff working at the RCAs quickly become valuable in the market because of their skills and experience. As a result they will easily be recruited by other organisations. Projects need to develop proper retention strategies and basic human resource management skills.

Use volunteers

It was reported that the use of volunteers is feasible and it reduces the running costs.

Service orientation of RCAs

It is not easy to make ICT relevant to the farmers and local communities. RCAs need to be trained and taught on ways to involve the target group and make their services relevant. This can be achieved by hosting more activities at the centre to attract youths e.g. via theatre, talk shows, debates, competitions. Especially selecting and providing access to locally relevant content that enhances income or other aspects of livelihoods is key.

Making relevant information easily accessible

A barrier for using information is that users of the centres find it difficult to find information, despite having received training. More emphasis must be placed on rendering content services and create an inventory of easily accessible relevant information. This can be achieved by selecting key information sources, downloading and local hosting of digital documents in a virtual library combined with links to dedicated web-sites and key repositories with relevant information.

Technology aspects of RCAs

The below table captures the technical problems encountered by the RCA as well as solutions offered by workshop participants.

Problems encountered	Attempted solutions
Costs and profitability	
Software availability and costs	- Use Win 98 Office 2000 on most computers - Use Win XP Office 2000 on the central computer - Use Linux
High VSAT deployment costs	- Solicit support from donors
High dial-up costs (initially) and now, high bandwidth costs after VSAT installation. Originally: 256 K at USD 420	- When using dial-up system: work offline and connect to send/receive once a day - With VSAT, reduce bandwidth to 128K at USD 150
Low income from Internet services	- Introduce other services: computer training, web site designing, trouble-shooting - Investigate opportunities to share bandwidth via wireless broadband
Management and operation	
Hardware: - Second hand/recycled computers (P1 and P2) - Old LAN equipment and re-cycled LAN cables	- Use 1 Pentium 3 and convert this into a server - Carry out regular maintenance and routine checks - Carry out virus checks every week
Low quality of connectivity when using VSAT -Ku Band	- No solution provided
Power blackouts; dependency on the power grid	- No solution provided yet; rural energy options will be explored
Users not having enough computer skills to search web and read mails	- Designate an information assistant to help users - Conduct regular technical update seminars (participants pay for training) - Encourage users to enrol for trainings
Language barrier: Web is in English whilst most users use Swahili	- Plan English and local language websites
Users want to surf 'bogus' websites	- Put up a 'No Pornography allowed' notice. This however may refrain some customers from visiting

On the technology side two aspects stand out: 1) cost and reliability of Internet access and 2) the threat of non-functioning telecentres due to lack of power.

The Internet services that are offered by the various ISPs are not fully satisfactory. Although customers must pay for the offered services in terms of bandwidth provided, the services are often not adhered to by the ISPs due to downtime of Internet access and providing less than agreed bandwidth. It is advisable to revise contracts and base payments to the ISPs on the services actually delivered with the possibility to reduce payments in case of non-compliance.

Acquiring affordable and reliable Internet access can be achieved by strengthening RCAs nationwide and jointly negotiating contracts with ISPs. In Bolivia telecentres negotiated for several years and eventually got the adequate services at a very competitive rate and a practical service level agreement to cover cases of disruption.

Power & electricity failures are a risk factor as power cuts undermine the possibility to offer good and reliable connectivity and related services to clients. No electricity means no functioning computers, no VSAT and subsequently no Internet. The only way to temporarily solve this problem is by installing UPS (Uninterruptible Power Supply) systems that safeguard vital equipment for power fluctuations and ensure continuity of operation for a few hours. The recent long electricity cuts in Tanzanian are disastrous and alternative solutions are required.

Financial aspects

The FADECO telecentre is more or less sustainable and covers expenses. Cromabu was profitable for some time, but delays in implementation of the new infrastructure, electricity cuts and some other drawbacks, resulted in a difficult situation. RCA Kibengwe was subsidized for the purchase of an inverter. It operates only at a break-even point even with subsidised cost of Internet access. Sengerema was slightly costly in its initial set up and therefore sustainability is critical.

Conclusions

Overall sustainability of the projects

Under present conditions the financial sustainability of the projects is difficult. The problematic power situation is a crucial factor and deserves ample attention. The bandwidth costs in Tanzania are excessively high. If these could be reduced to acceptable levels – as compared to other countries - RCAs can become economically feasible.

The linkage of the telecentres with the community can have a strong impact on economic development. Farmers who work with the Cromabu project claim a rise in income of 30- 50%! Also nearly 50% of the youth group members felt empowered through ICT and could obtain a (better) job or improve their business. This offers ways to recover costs, therefor future benefits are to be explored.

Collaboration at local level between different actors on rural access is generally limited. However, by joining demands of different stakeholders it is possible to sustain a RCA. It would allow building up of local technical and managerial capacity and continued learning about ways to better serve needs for local communities. It enables the speed up of the exchange, use and generation of locally relevant content. Very important is also that it allows sharing costs of bandwidth or negotiating lower prices.

Comparison of experiences with RCAs in Bolivia and Tanzania

IICD has been supporting partners in 9 countries in their efforts to establish telecentres. In 2006 a study was published on the experiences in Bolivia[5].
When comparing the Bolivian and Tanzanian experiences a high similarity was noted in terms of the organisational, technical, financial and legal challenges that Rural Access Centres face.

However in 2 areas markedly differences appear between the two countries:

Cost of Connectivity

At present the cost of connectivity in Tanzania is very high. This is due to the fact that demand is relatively low and the number of providers is limited. In Bolivia we see an increasing number of new entrants into the market; as a result prices have come down significantly. It is to be expected that the same will happen in Tanzania in the coming years. Roughly, it looks like developments with regard to connectivity in Tanzania are about 1 to 2 years behind those in Bolivia.

Sustainable models

The telecentres that were presented in Tanzania can barely sustain themselves. They were and are heavily subsidized and don't generate sufficient income to cover costs. One important aspect is that telecentres are not yet partnering up and/or sharing running costs. In Bolivia it became apparent that revenue generating services alone are generally not sufficient to survive.

[5] *The study can be found online* *http://www.iicd.org/articles/iicdnews.2006-04-24.3282480478*

Recommendations and points of attention

The presentations and discussions at the workshop yielded a number of challenges for telecentres in Tanzania. These are presented below together with possible actions and suggestions.

Financial challenges

- Sustainability is a major concern. None of the centres is financially or economically self-sustainable and therefore potentially at risk
- Cost of connectivity via VSATs is high. Strategies to reduce costs of connectivity and bandwidth use must be pursued
- More efforts are required to ensure greater outreach
- Poor community participation is a point of concern. Hence there is need for more transparency, sensitization and awareness raising campaigns, which also requires resources.

Organisational challenges

- Technical support for telecentres is often inadequate. This should be addressed through more capacity building efforts
- Capacity development should include a mix of face-to-face training sessions, technical help through support lines and online resources for telecentre managers and operators
- Marketing of services has been limited. There is a need to train staff on marketing and staff motivation policies
- Peak hours and days for telecentres use were after-office hours, weekends and holidays. The telecentres should pay attention to these preferences with their services and opening times.

Technical challenges

- Telephone lines are often noisy and disturb connections
- Frequent thunder strikes can damage equipment
- Technical Support for troubleshooting is lacking
- Speed of the Internet access is often slow. There is a need for Internet speed monitoring tools
- Viruses are a major menace and can reduce telecentre operations. A strict anti-virus policy needs to be in place.

Cultural challenges

- Resistance to change is reported in some communities. Hence there is a need for sensitization campaigns. Advocacy and promotion of rural access should be conducted.
- Gender imbalance in services usage is noted. There is need for sensitization and formulation of gender sensitive policies and strategies.
- Language is often a barrier. There is a need for English language courses
- Content development and availability. There is a need to train volunteers and staff to produce local content
- Computer literacy is also often a barrier. There is need to conduct computer courses for prospective beneficiaries

National coordination challenge

- There is need of a network to support telecentres at the grassroots through an information 'ecosystem' connecting many sites and mailing lists at the national and sub-regional levels. This would enable knowledge sharing and more effective content generation. This requires that existing and emerging telecentres work together with national and other networks wherever feasible.

Recommendations

The workshop presentation and deliberations yielded the following conclusions and recommendations for enhancing rural access to information via Rural Communication Access Centres:

- **Focus on sustainability**. A business plan that fit the needs and possibilities of the community needs to be in place. It should focus on information services for generating income rather than only on computers and the Internet. The RCA has to become a local institution fully interweaved with the community.
  Recommended action:
  Telecentre Managers and operators to prepare realistic business plans.

- **Location-specific design of RCAs**. In replicating the RCAs studies should be done to tailor the services to the specific locality, investigate would-be stakeholders such as NGOs, government institutions, the interest and needs of the user community as well as the commitment of the local government in the area.
  Recommended action:
  RCA owners, before setting up a RCA, to carry out studies to assess needs and volume of services of potential users. This can be supported by Government e.g. Ministry of Infrastructure Development and Local Governments (District Councils) as well as development partners and donor agencies.

- **Need for capacity development.** In order to ensure that existing and future RCAs are managed properly, effectively and efficiently there is need for training of current and future managers of these facilities in administrative and financial management.
  Recommended action:
  Training activities for RCAs to be provided by Government through the Ministries of Infrastructure Development, Higher Education Science and Technology, Education and Vocational Training, Local Governments (District Councils) as well as a Capacity Development NGOs and Development Partners

- **Reduce cost of connectivity.** There is need to address the issue of high cost of connectivity and the bandwidth charges. One possible area of immediate impact is the exemption of ICT equipment for RCAs from taxes and duties, which is already done in Tanzania. Moreover, options to share the cost of bandwidth provided by expensive satellite connection are to be explored and used.
  Recommended action:
  Government through the Ministry of Finance to see that taxes on ICT equipment are low. The ICT4D network and IICD partners to explore and share experiences for optimising use of bandwidth and reducing costs.

- **Government support for connectivity infrastructure.** Since RCAs are an important instrument to facilitate rural development, adequate investments should be made through budgetary allocations and as part of infrastructure development.
  Recommended action:
  Government through Ministries of Infrastructure Development, Finance and Planning, Economy and Empowerment, to include investment in the planning and budget process.

- **Raising awareness on ICTs.** Especially among the rural population it is necessary to raise awareness about the benefits of ICTs in order to ensure interest and participation. It will stimulate demand for ICTs and a market for ISPs, thus enhancing private sector participation. Resources should be made available for sensitization, advocacy and mobilization campaigns, including through media (TV, Radio).
  Recommended action:
  The Government through Ministries of Infrastructure Development, Finance and Planning, Economy and Empowerment, Local Governments (District Councils), Private Sector and Development Partners to raise awareness about potential use if ICT for rural population.

- **Enhance networking.** The challenges identified in the workshop as well as future challenges could be well addressed through collaborative action, partnering arrangements, better coordination and networking. Existing telecentres need to network more closely and effectively in order to promote exchange of information and experiences and sharing of resources where feasible.
  Recommended action:
  The multi-stakeholder network on ICT4D SWOPnet can bring stakeholders together and ensure knowledge sharing and concerted action. Regular dialogues should be in place with the appropriate government bodies dealing with ICT. In Tanzania this is the Ministry of Infrastructure Development whereas in other countries it may be the Ministry of Communication or Information.
  RCA or telecentres owners and operators to explore the possibility of setting-up an association of telecentres and access points. The national ICT4D network can be instrumental.

- **Setting up a technical support mechanism.** In order to enhance technical support and facilitation, there is a need for lead organisations to ensure or enter into collaborative technical support for telecentres. The various kinds of support required should be identified and ensured.
  Recommended action:
  Plans for providing technical support to be prepared by UDSM/UCC, COSTECH, SWOPnet, DIT, Development Partners (IICD, SIDA) and the Private Sector.

- **English language and computer training for communities**. This is a generic requirement for effective use of RCAs in many ways as well as for documenting and sharing information.
  Recommended action:
  All stakeholders to build-in appropriate end-user training.

- **Locally relevant content and services.** In order to attract customers and ensure that they are willing to pay, relevant services are to be provided and locally relevant content made accessible.
  Recommended action:
  Information producers such as extension services and agencies to share relevant content for local users. The national networks to support aggregating sources and promoting access to the sources. Telecentres operators to scout for relevant content and ensure easy access for end-users.

Annex 1. Current connectivity services provided in Tanzania

The following schemes are derived for the report Rural connectivity in Tanzania: options and challenges in 2006 written by Suhail Sheriff and commissioned by IICD (www.iicd.org/files/RuralConnectivityTz_TR_FINAL_online.pdf)

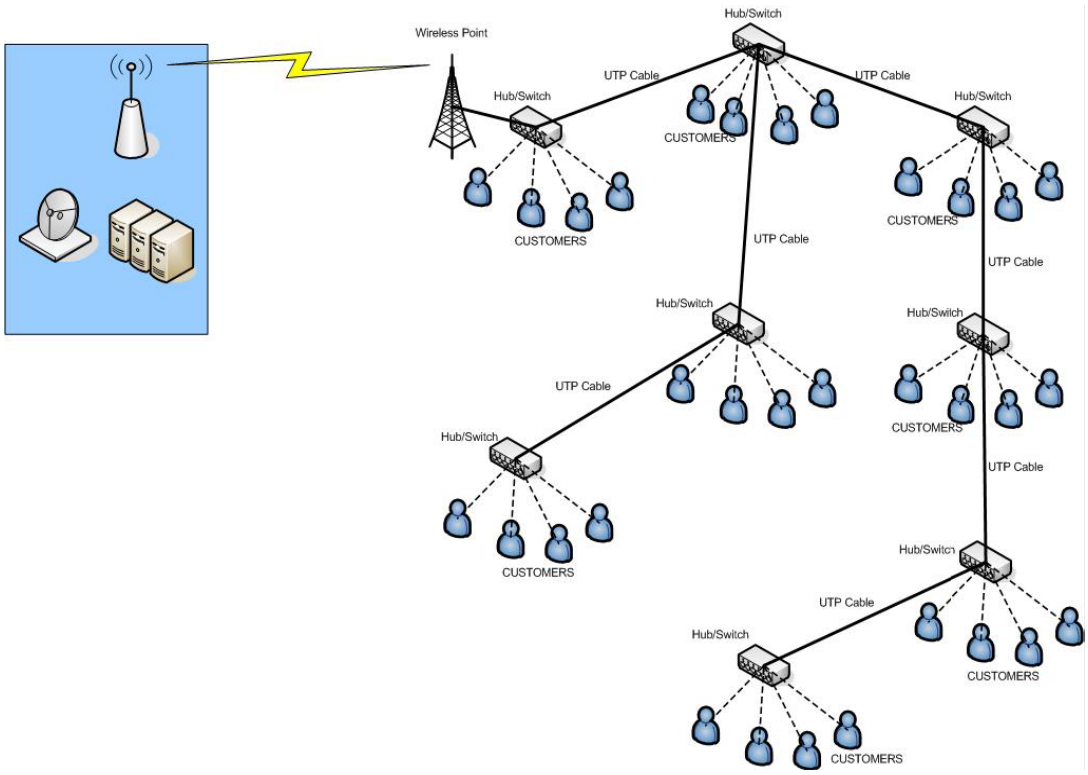

Figure 1: Typical Network Topology of an ISP using UTP & Wireless

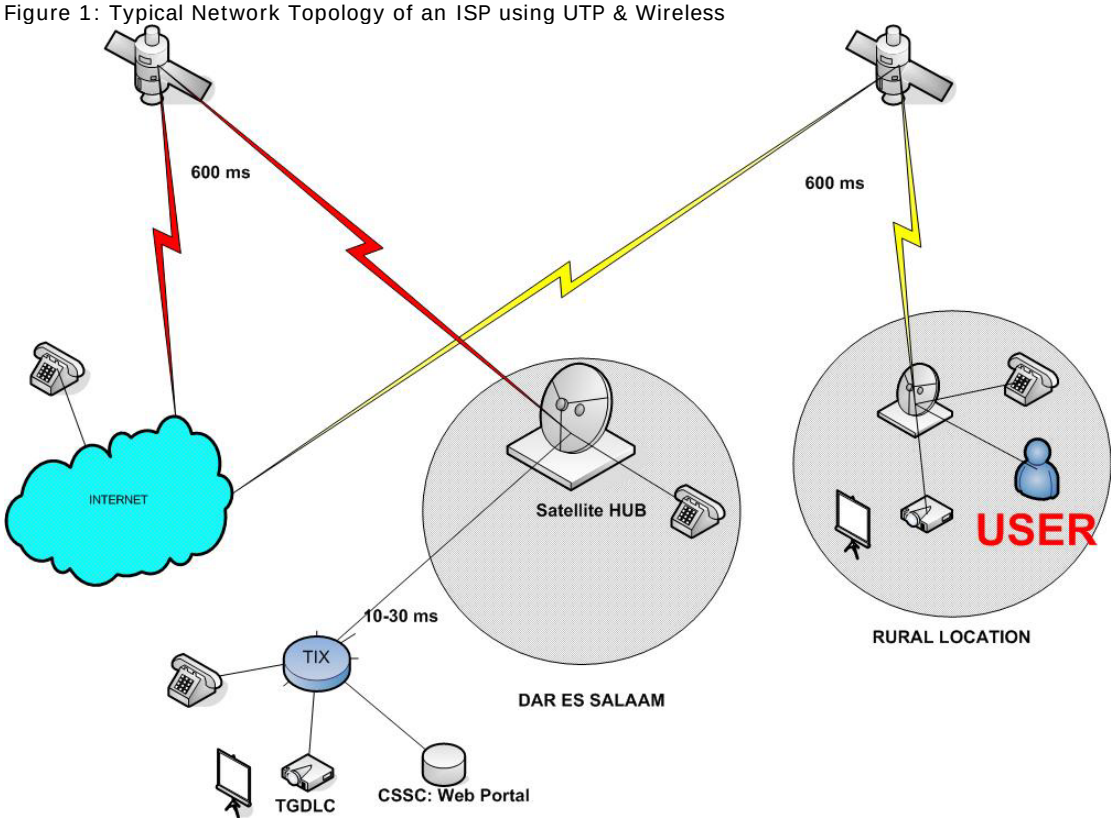

Figure 2: Standard Topology of a Satellite provider having an International Satellite Hub

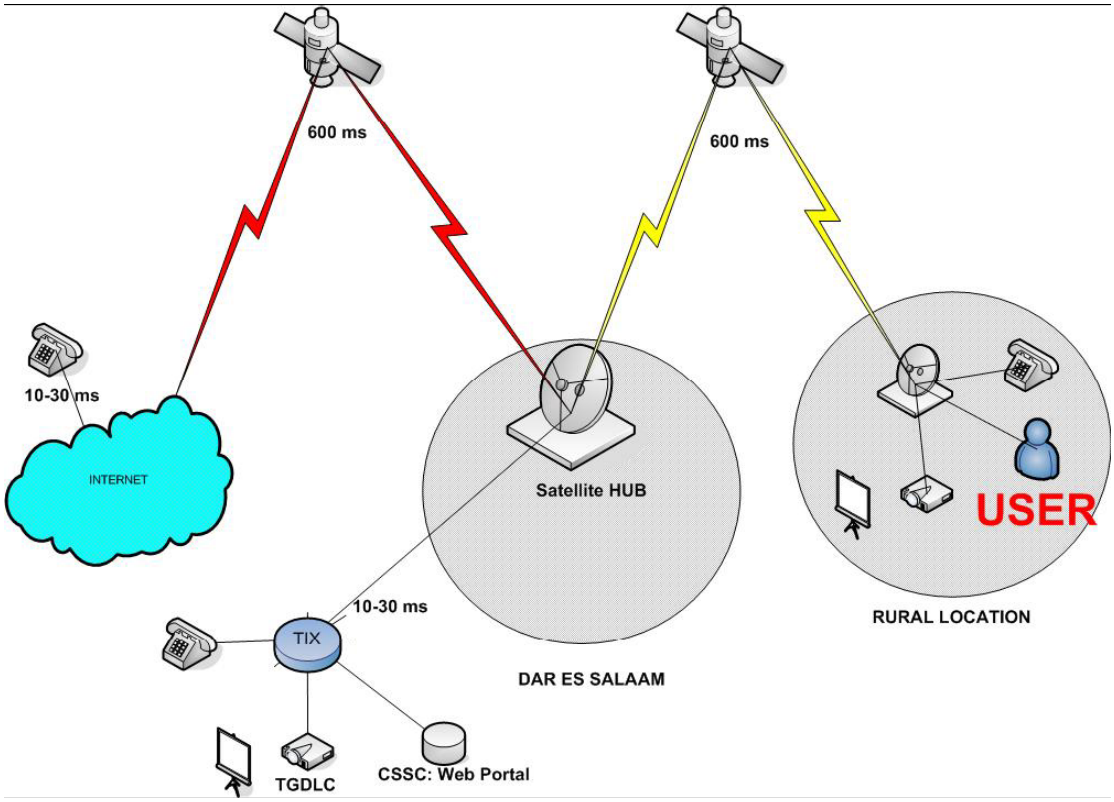

Figure 3: Standard Topology of a Satellite provider having a Local Satellite Hub

Annex 2. Abbreviations and options for Internet connectivity

- RCA = Rural Communication Access Centres
- COSTECH = Tanzania Commission for Science and Technology
- ICT4D = Information and Communication Technology for Development
- RCADC = Rural Communication Access and Development Centre
- IICD = International Institute for Communication and Development
- VoIP = Voice over Internet Protocol

1.	DSL	An acronym for Digital Subscriber Line. Digital telephone line capable of carrying both data and voice at the same time. Therefore you can have your landline acting as a route for Internet Connectivity as well. Telephone companies can do this under your request for service.
2.	ISDN	Integrated Services Digital Network; a digital telephone line that can be used for voice, fax, and data communication like a regular telephone line but can transfer data five times faster and allow you to talk on the phone with one person while sending data to another. This is a special service that you can order from your phone company.
3.	VSAT	VSAT stands for Very Small Aperture Terminal. The word Terminal in this case refers to the small Satellite dish that is installed on your location. This is a satellite communication system that can serve your home and business. Business and home users also get higher speed reception than when using ordinary telephone service, ISDN or dial-up.
4.	Dial-up	This is connecting to the Internet using a telephone line. Your computer connects via a modem to the Internet Service Provider, which in turn is connected to the Internet with a high-speed link. Many computers come with built in dial-up modems. Dial-up service is not always connected to the Internet thus you need to use your ISP software to dial each time you want to connect. The types of modems that can be used to connect under dial-up include: • Fixed Line, the standard copper wire telephone line. • A Fixed Cellular Terminal/PC card. This enables you to connect to the Internet through GPRS (General Packet Radio Service) and enables connectivity wherever there is mobile phone network coverage. • Fixed Wireless Terminal (Tele-saver phone). Enables you to connect to the Internet through CDMA (Code Division Multiple Access) available in selected areas through a telecom company.
5	Wireless IP	Radio-based systems that allow transmission of information without a physical connection, as opposed to transmission systems that require a physical connection, such as copper wire or optical fibre.
6	Leased Line	Refers to a phone line that is rented exclusively for an Internet connection 24 hours a day, seven days a week. High-speed connections tend to require a leased line.
7	Fibre	This is a technology that uses glass to transmit data. A fibre optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages in the form of light. Fibre optic has a much greater capacity than metal cables, which means they can carry more data.
8	WIMAX	An acronym that stands for Worldwide Interoperability for Microwave Access. WIMAX refers to wireless networks that can cover a wide area.

Source: Easy guide to the Internet in Uganda, I-Network, 2006 (www.iicd.org/articles/InternetGuideUganda)

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IICD Profile

The International Institute for Communication and Development (IICD) assists developing countries to realise sustainable development by harnessing the potential of information and communication technologies (ICTs). The driving force behind IICD activities is that local 'change agents' themselves identify and develop proposals for realistic ICT applications - local ownership forms the essential basis for sustainable socio-economic development.

Acting as a catalyst, IICD's three-pronged strategy is mainly delivered through a series of integrated Country Programmes.

First, IICD facilitates ICT Roundtable Processes in selected developing countries, where local stakeholders identify and formulate ICT-supported policies and projects based on local needs.

Second, working with training partners in each country, Capacity Development activities are organised to develop the skills and other capacities identified by the local partners.

Third, IICD draws on its global network to provide information and advice to its local partners, also fostering local information exchange networks on the use of ICTs for development. The best practices and lessons learned are documented and disseminated internationally through a Knowledge Sharing programme.

In support of these activities, IICD invests in the development of concrete partnerships with public, private and non profit organisations, thus mobilising knowledge and resources needed by IICD and its local partners.

Country Programmes are currently being implemented in Bolivia, Burkina Faso, Ghana, Jamaica, Mali, Tanzania, Uganda and Zambia.

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