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Empowering Communities through ICT Cooperative Enterprises
(Working Paper)

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What is empowerment in the sphere of information and communication? Empowerment means being able, in terms of affordability and capacities, to *access content that you choose, to create the content that you need, and to gain control of the means of communication* by which these are transmitted. Empowerment means communities being free to explore alternative ownership, management and service delivery models to secure sustainable access, where the *for-profit* calculus does not add up for them.

Given the challenge facing local communities, and the importance of access to vital public services and locally relevant content, a variety of models must be explored. In this context, community-driven networks¹ and cooperatives may offer an avenue to such empowerment in under-served rural grass-roots communities. Drawing on community resources and labour, they are potentially sustainable in contexts where market-driven options have difficulty. More important, unlike externally owned networks, they have a stake in the continued development of the community, a critical factor in an age where many rural communities are becoming increasingly economically and socially marginalized.

This paper outlines the background, ongoing work in the area, and a generic business plan. It is a preview of ongoing work supported by UNDP and IDRC, in which the author is participating, respectively, as Programme Coordinator and Chief Research Advisor.

1. Introduction: A Meeting of ICT and Development Policy

The community-owned network cooperative represents a confluence of trends, tracing its lineage, and the specific opportunity now offered to us, from at least two policy directions.

First is the ICT sector itself, which has come a long way over the past decade or two.

In the days when ICTs were called telecommunications and value-added-services, developing countries were persuaded to regard them not as sectors in their own right generating employment, income and taxes, but as *enablers* of the wider economic and social goals. In the long term a more efficient ICT sector offering cheaper services was good for economy and society, even if it meant an immediate loss of foreign revenue and government income. And so a process of liberalisation began designed to transform the sector into a dynamic driver, delivering innovative low-cost services across the sectoral spectrum.

¹ Three identified variations of a community driven approach are the user/community owned cooperative, the local authority owned network, and the hybrid entrepreneurial/community-driven model. See *Community-Based Networks and Innovative Technologies: New models to service and empower the poor*, Seán Ó Siochru and Bruce Girard, A Report for UNDP. 2005. p14. see <http://www.propoor-ict.net> Much of the following is drawn from this report.

Although initially creating a vibrant market was proposed as the core solution, it soon became obvious that some form of universal access policy was needed to bring services to those beyond a market-driven dynamic, and newly created regulators were charged with this function. A further refinement emerged in the late 1990s as ICT services (as distinct from the infrastructure) were recognised as a *horizontal* function demanding a distinct and participatory strategy and high level support. Such a direction was promoted for instance by UNDP's global DOI initiative, the eSee Agenda Initiative in Eastern Europe and APDIP's work in Asia.

Second, in a parallel universe seldom touching one another, twenty years ago the development community too - donors, policy makers, NGOs and others - were barely aware of the potential of ICTs. A process of experimentation and education began (including the SDNP programme), until ideas such as telecentres and cyber cafes, e-health, e-education, e-government began to be recognised as agents in the fight against poverty. Now, specific applications and services were seen as having the potential to become *enablers* of development and poverty reduction.

The two trends have yet to fully meet and acknowledge one another, at either local or policy levels. Telecommunication and ICT policy far too often remain distant from development policy and poverty reduction strategy. At local level, there is usually little connection between for instance universal access measures, initiatives aimed at delivering services, and poverty alleviation enabled by ICTs. There have been calls for the two to be connected, not least in the WSIS, but success so far has been limited.

Bringing telecoms/ICT policy and development policy together does face challenges.

One is that both the liberalisation process implemented, and the approach to universal access, were, and remain, flawed in many instances.

The liberalisation process rolled out in many countries did lead to dynamic expansion of services but mostly in urban areas and also to new generations of oligopolistic 'incumbents', the giant mobile phone companies that we see today in Africa and parts of Asia. The fixed line network, shackled with inappropriate regulation and policy and their own internal inertia, failed to build out significantly, resulting in woefully inadequate backbone networks, and leading to grossly inflated tariffs for international bandwidth. This left poor rural communities, in particular, grossly underserved with services and, where services were available, priced well beyond their means.

On the universal access side, the currently favoured approach of lowest-subsidy auctions extends services to the next most viable areas, not necessarily to the poorest ones; and, more seriously, tends to benefit mainly the wealthier sectors and individuals within these areas since only they can afford the tariffs.

On the development side, the telecentre approach, intended precisely to bring affordable and shared access to the poorest, continues with a mixed record, and the issue of sustainability has by no means been resolved, the cost of bandwidth being a key factor. An appropriate 'business model', even incorporating initial donor aid or government subsidy, remains elusive although current moves to aggregate local demand look hopeful. Furthermore, many of the services that have been developed fail to meet the real needs of poor rural communities, and local communities lack the

skills and capacity to build there own.

Thus many problems remain, especially in rural areas of Africa and South East Asia:

- Poor people either lack telephony services altogether, or face tariffs that limit their use to emergencies;
- Such high tariffs result in a significant proportion of overall rural incomes being extracted from the area by mobile phone companies;
- In the absence of fixed lines and low-cost international connections, bandwidth charges remain extremely high for ICT services, usually relaying on satellite, limiting the spread of cybercafés and requiring large subsidies for telecentres that few can sustain;
- ICT services, where they are available, are seldom suited to local needs and relevant local content remains a key constraint.
- Even where services could be delivered effectively through ICT, communities remain underserved due to a lack of awareness of the role of ICT and limitations in the business model pursued.
- Securing access to services is not simply a question of delivering them but also of empowering the community to access, effectively use and secure broader development benefits from them.

However, drawing on wider development experience, and taking advantage of the latest low cost technologies, an innovative model is now on the horizon and is being tested in combination with new technologies in Africa and Asia as well as Latin America:

This is the *Community-Owned Network Cooperative*. If implemented successfully, it can *both* underpin development activities and dynamics using ICTs, *and* capture the value-added and profits of ICTs as a sector for the local community. The empowerment comes not just from using of ICTs to enable development, but from the capacity building and income generated by the cooperative enterprise. The goal is to empower poor communities through the benefits of ICTs *both* as an enabler of a range of development activities *and* as a *sector in itself*. Community driven enterprise maximise the potential of ICTs as enablers of development activities, and retain the profits and embed the skills and capacities within the communities themselves.

In this respect, ICTs have come a full circle. Governments, having earlier been persuaded to cede proprietorial claims to ICTs as a sector - mainly to foreign ownership - and open it up as a horizontal enabler now have an opportunity of reinventing at least the local network as an asset in itself, one that can potentially contribute to poverty alleviation.

2. Key Characteristics and Benefits

A Community-Owned Network Cooperative is an enterprise built by the community that fulfils local needs for voice telephony, data networking and internet, as well as services and development content. It can coexist with other ICTs, such as the mobile phone, cyber cafés and so forth; but its combination of activities is unique. The 'ideal type' would:

1. Provide a wireless high-speed network throughout the community, connecting all the major development actors to each other and to the internet, for data and video conferencing;

2. Offer very low cost local telephony, greatly undercutting mobile phone operators (if present), at multiple points throughout the community;
3. Provide low cost external telephony, nationally and internationally, to fixed line phones, and to mobiles at tariffs determined by minimum interconnection costs;
4. Develop content suited to the needs of the community, as determined by the community themselves;
5. Become a distributed and accessible node for e-government services, from local to national level;
6. Deploy other communications technologies, such as radio and video, that can add further value and strengthen the impact of various development activities.

In terms of impact, such an enterprise can:

1. Enhance the networking and knowledge sharing activities of local development actors, both economic and social;
2. Create employment locally through the provision of services, jobs that would normally be located elsewhere;
3. Build the capacity of the local community in enterprise development and institution building, both collectively and individually;
4. Enhance the provision and transparency of government services in the area;
5. Retain income in the area that would otherwise flow out;
6. Harness local private entrepreneurial skills through a joint community/private service provision;
7. Reinforce overall community development efforts, through reinvesting the surplus.

In other words, it can become a central component in a community's efforts at development enabling multiple avenues for empowerment and development.

3. Enabling Conditions

At a practical level, the current potential to create such enterprises is based on the convergence of several factors.

The first is the technologies:

- The rapid growth in wireless technologies and ever lower prices means that building local high-speed networks now costs a fraction of what is used to. Such networks can also be built horizontally.
- IP technologies for voice have come of age, including now low-cost VoIP stand alone handsets. Skype and similar companies are not the only evidence of the acceptability of VoIP in terms of quality. More compelling in this context is the fact that a consortium of Kenyan ICT investors and banks have recently announced that they intend to build VoIP telephony networks within a short radius around rural banking offices, promising to greatly undercut mobile phone companies in voice services.

- These new technologies can be built and maintained with relative ease, as compared to earlier infrastructure, obviating the need for major technical expertise and corporate resources.
- Wireless technologies are small scale and scaleable: they can begin small, and grow incrementally as the need arises without huge initial investment or growth redundancy.

The question, it seems increasingly likely, is not whether these technologies will begin to take on established mobile operators, but when.

Shifting Regulation and Policy

A second factor is shifts and openings in regulation and policy.

The overall failure to provide poor rural communities with affordable access has led to a search for less simplistic and more effective regulatory regimes. In much of Africa and parts of Asia, the search is on for an indigenous model of policy and regulation suited to local needs and capable of taking advantage of the relatively 'green-field' development potential in backbone and in local connectivity. 'Open Access' is the current buzzword for telecoms backbone, in which bandwidth and data capacity are made available to all at cost-based prices through dedicated development-oriented companies. An emerging view is that the sector should be horizontally differentiated, so that competition and service provision will happen at each layer, all benefiting from low cost-basic bandwidth. The approach may also be used to extend low-cost backbone into rural areas.

This retreat from the telecoms behemoths opens the door to small local level licenses. Several countries have already experimented with them, and mistakes have been made, as in South Africa, and lessons learned. In East Africa, such licenses are possible in Kenya and Tanzania, and other countries are looking at the possibility, often strongly encouraged by NGOs and civil society. Furthermore, universal service funds are being brought into the picture with a stronger development goal than previously. Overall, then, the experience of failure is bringing more flexibility and more imagination to policy and regulation.

Relevant Experience

Local development experience is also pointing in this direction, suggesting that an institutional or enterprise model based around community ownership and control could indeed work in ICTs. This emanates from both within the ICT sector and outside.

In terms of rural enterprise, farmers' cooperatives that produce, process, market and sell goods to a high standard are common, from coffee to fishing to forestry. Infrastructure cooperatives include water and irrigation schemes and exist or have existed in all regions. They represent a natural, and very effective, way for communities to collectively address their needs.

Less known is that the cooperative is the standard form for rural telecommunications provision in the USA, of which about 1,000 are in existence today, all receiving a subvention from federal government but operating efficient enterprises and offering a wide range of services. The model has been directly copied with great success in Poland. And there are others: in Pinamar Argentina a local telephone cooperative has been operating since 1962; and in the Chancay-Huaral Valley, the irrigation Commission representing all farmers in the district also operates a community-

owned network which offers VoIP and others services.

India has also recently become a hotbed of experiments and upscaling of community ICT activities, among them the Akshaya experience in Kerala, which combines community oversight and development goals with individual enterprise, underwritten by low-cost high-speed bandwidth. And the telecentre concept has matured more recently, growing beyond single centres and moving towards supporting local networking and aggregating demand to reduce costs.

4. Sustainability Underpinnings

The enduring question in development is sustainability. Achieving sustainability means a lot more than staving off project closure when donor funding dries up. It opens the door to replication and upscaling, and policy, regulatory and financing support. A sustainable business model is thus the much sought after.

The generic sustainability of the community-driven sustainability is based on a number of factors, the key ones being the following:

1. The possibility of undercutting mobile-phone operators is very real and has huge potential for income generation. Research and experience have shown that demand for telephony is very strong in rural areas, even to a point of significant sacrifice of income. Demand is also elastic: a significant tariff drop leads to a larger growth in telephony. Providing local VoIP is relatively easy, and it might take a while longer to extend to all fixed lines and ultimately full international connectivity. There are no longer any technical obstacles to this.
2. Considerable capital and current costs savings can be made by utilising public and community resources for building the networks. Such resources range from the provision of premises for the hub, to transmission towers and public rights of way, to voluntary labour.
3. Aggregating bandwidth usage between a larger number of social and economic actors within the community, linked together into a network, reduces the cost to each and increases the utility of the network as networking content and exchanges multiply.
4. At policy level, initial subsidy from universal access funds can be provide on the same principles as the lowest-subsidy auction i.e. a once-off investment is sufficient to launch a services that is sustainable thereafter.² A further policy measure, currently possible in Uganda, is to allow rural telephony networks to receive asymmetrical interconnection charges³, whereby income to the rural network for each incoming call is larger than what it pays out to completed outgoing calls.

These suggest a sound basis for creating a sustainable and profitable enterprise.

² See the preliminary rethinking of universal funds evident in the draft report of the Forum of Latin American Telecommunications Regulators (Regulatel), the World Bank, and the UN Economic Commission for Latin America and the Caribbean titled "New Models for Universal Access in Latin America". <http://regulatel.org/miembros/ppiaf2.htm>. The report puts a strong emphasis on local and community level initiatives including community telecom cooperatives, micro telcos, etc. and on using technologies creatively to make voice and broadband available in rural areas.

³ Also see Dymond, Andrew & Sonja Oestmann (2002) Rural Telecommunications Development in a Liberalising Environment: An Update on Universal Access Funds http://rru.worldbank.org/Documents/PapersLinks/Update_Universal_Access_Funds.pdf ITU (2003d) *Birth of Broadband* <http://www.itu.int/osg/spu/publications/sales/birthofbroadband/>

Other factors can also add to sustainability. Treating the enterprise as a business from the outset, rather than a development programme that must transform itself into a business, can orient it towards sustainability. Additional policy supports, such as tailored finance packages, could also assist; as could the creation of technical support resources around for instance University centres.

5. An Indicative Business Model

The following summarises an indicative business model for the Community-Owned Network Cooperative emerging from the above discussion. While hypothetical – a 'pure' example does not yet exist - it offers a credible scenario based on work in Cambodia, including equipment costs about to be deployed in two pilots there, as well as the ongoing needs assessment design in four pilot areas of East Africa.

No doubt actual implementation in different circumstances would yield considerable variations to this model. Nevertheless, the purpose here is to present a credible *prima facie* case for the sustainability for the Community-Owned Network Cooperative, as a core development strategy for grassroots rural communities.

Basic Characteristics of a Community Owned Network Enterprise

The individual components of the model are:

A Community-Owned Network Cooperative: This is a non-profit entity owned by the community (in various possible configurations) that delivers ICT and voice services to promote development, while creating employment, generating economic activity and building capacity in the community.

Institutional Partners: These are the originating partners of the Coop, establishing it and holding it on behalf of the community, and might include local health centres, schools, cooperatives, NGOs, local government and others. They include non-profit, social and public development actors in the area who can themselves benefit from the services on offer, and who can also deliver ICT based services to the community. Ownership may be opened out to all groups and even individuals in the community, over time.

The Hub: The Hub provides external and internal connectivity to all Institutional and Service Partners, technical assistance and the overall Coop management expertise. It may also provide ICT services to the community, as a dedicated telecentre.

Service Partners: Service Partners offer specific services to the community, such as low-cost VoIP telephony, on a contract with the Coop that specifies how much they charge customers and how much they pay the Coop for these services. These may be private entrepreneurs, including shopkeepers or simply individuals, or may be non-profit entities and NGOs.

The Coop is managed by a **Management Board** comprising representatives of the Institutional Partners, of the Service Partners, and of directly elected villagers.

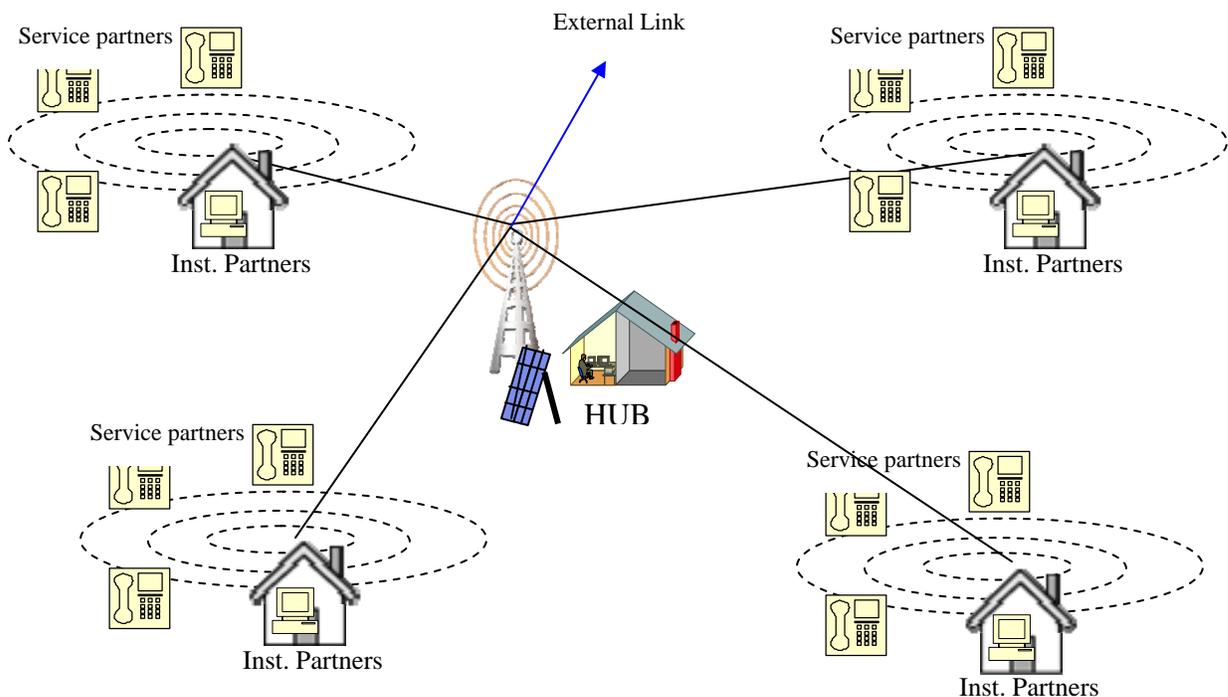
Broadly speaking it exhibits the following characteristics:

1. Bandwidth is aggregated between the various Coop stakeholders, institutional and entrepreneurial, thereby reducing costs to each;
2. Regular income is generated from core Coop Institutional Partners ;
3. Public services – e-government - are provided by the Coop, and funded by public authorities;

4. VoIP is provided as a low-cost voice service, initially within the area, and later interconnected outside, at affordable rates that greatly undercut the mobile phone operators.
5. VoIP services are sold by micro-entrepreneurs to local villagers, on the basis of a contract with the Coop which specifies tariffs and fees that enable *both* low-cost telephony *and* private income generation. A VoIP telephony service could in future be offered as a retail service to village families.

Very schematically, it may be represented as follows:

Figure 1: Illustration of Technical Network



In this exercise, we assume a Coop with the following physical characteristics

- A Hub, equipped with 5 computers as a Telecentre, as well as VoIP devices for telephony, and solar energy.
- A local wireless network (802.11g) capable of very high bandwidth for voice and video within the area. For fixed receivers/antennae, the network will extend to a radius of about 10Kms from the Hub.
- A further 15 Institutional Partners, such as health centres, schools, NGOs etc. each with a computer, printer/scanner and VoIP handsets.
- About 120 additional VoIP handsets, clustered within about 500 metres radius of the Institutional Partners, and operated by micro-entrepreneurs and local NGOs.
- A relatively high bandwidth access to the internal internet, of 2 megabits per second downlink and 512 kbits uplink.

Such a configuration would enable video conferencing from the PCs, local telephony of acceptable quality, access to the internet including the Web at relatively high

speeds (depending on demand), and voice and data interconnection to the outside.

Capital Costs.

The following tables estimate the income and expenditure, drawing attention also to the initial and ongoing contribution made by the community to the Coop. These figures are based on actually sourced equipment at current international prices.

Initial Network Capital Cost (\$US)			
Description	Number	Cost per unit	Total
Local Infrastructure			
Link to external bandwidth (512bits X 2mbits)	1	4,000	4,000
CISCO 1300 (AP) outdoor	1	1,800	1,800
10bDi Omni antenna	1	500	500
Ethernet switch, 5 ports	1	70	70
Wireless Lan Router	1	190	190
Mast: 30 metres	1	3,000	3,000
Installation & set up	1	1,500	1,500
Local 'Hot Spots'			
Wireless LAN CPE	15	200	3,000
Wireless LAN Router	15	190	2,850
Local Premises Equipment			
Computers with Webcams	20	1,000	20,000
Peripherals (printers, scanners etc.)	15	250	3,750
VoIP phones (with hand energy recharger)	150	100	15,000
TOTAL			55,660

Thus the total capital cost of equipment and installation comes to just over \$55,000.

Power might prove problematic in many areas as mains electricity is often not be available. Costs can vary a lot depending on what form is used, and renewable energy is to be preferred. Below an estimate is made for the electricity requirement of the Network Hub, using solar power.

Solar Power System for Hub	Number	Unit cost	Total
1200 watt high efficiency sine wave Inverter	1	1,250	1,250
150 watt Solar Panel	6	750	4,500
100 AH VRLA Batteries	8	200	1,600
Charge regulator	4	75	300
DC mixer	1	100	100
48/ 20A volts mains charger	2	450	900
Installation	1	550	550
Total			9,200

(Assumptions: PC have LCD screens, 3 mast lights @ 50 watts)

Total capital costs are thus in the region of US\$65,000, for this configuration.

Current Costs

Current or recurring costs are also a major issue, especially for bandwidth:

Estimated Current Costs Annually

Description	Number	Cost per unit US\$	Total
External Bandwidth			
VSAT 256kbit/2mbit month * 2 (4,400 a month)	12	4,400	52,800
Depreciation			
20% depreciation on capital equipment		500	11,132
Hub Staff			
Manager	12	650	7,800
Trainer	12	500	6,000
Technical Manager	12	500	6,000
Other			
Office needs, transport etc.	12	1,000	12,000
TOTAL			95,732

This model assumes just three staff: a manager, a trainer and a technical manager to maintain the system. Depreciation at 20% suggests an average life of five years for the equipment. The bandwidth is based on current VSAT costs is East Africa, though it can vary considerably, and is by far the largest component. The office costs are an initial estimate that might include for instance some means of local transport.

Community Contributions

One of the advantages of the community-owned model is that it can take advantage of assets of the community itself, in terms for instance of rights of way, premises, voluntary labour and so forth. The key assumptions concerning community contributions are as follows:

1. A Hub premises, possibly an existing Telecentre, IT training centre or underutilised public building, that will include public access.

2. A location for the transmission mast
3. Locations at each of the Institutional Partners for computers etc. including the possibility in some of public access.
4. Staffing of the Institutional Partners to the extent that the services generate public access and computer use.
5. Basic maintenance and care of the equipment
6. Billing and fee collection from the VoIP Service Partners
7. A voluntary Board of Management
8. The provision of electricity in all centres except the hub.

Potential Income

The following is an estimate of income for the Hub and the other centres and services.

Estimated Monthly/Annual Income

Description	Per month	Income \$	Total
Computer and Internet use			
Service Hours 20 Computers * 6 hours * 25 days	3,000	1.00	3,000
Institutional Partner fees (15 initially, \$50 a month each)	15	50.00	750
Available VoIP minutes			
VoIP 120 handsets*100mins*30 days	360,000	0.025	9,000
Other			0
TOTAL Monthly			12,750
TOTAL Annual			153,000

The assumptions here are as follows:

- Each of 20 computers is used by paying clients, at US\$1.00 per hour, for about 6 hours a day. This may be an overestimate, and it would also limit the use for which the computers could be utilised by the Institutional Partners themselves. However, the amount of income generated is relatively small.
- It is assumed that the Institutional Partners will pay US\$50 a month, for access to the services and as a contribution to the costs.
- By far the largest part of income comes from the use of VoIP handsets. The assumption here is that 120 handsets are used for 100 minutes every day (e.g. ten minutes each hour for ten hours), and that the net Coop income for their use is US\$0.025 (2.5 cent) per minute. In fact the Service Partner might charge local people US\$0.04 (about a third to a quarter of the per-minute charge for a mobile phone), yielding a surplus of US\$0.015 per minute, or generating a daily income of \$1.50, a useful supplement to other economic activities. In this scenario, such an income could be generated by up to 120 people, sharing an annual income of almost \$65,000.

This scenario is somewhat simplified, and does not consider differential charging and additional costs for VoIP telephony outside the local area. However these aspects can be built in later, in a more sophisticated model.

The Business Conclusion:

Within the context of the assumptions here, a community-driven network cooperative would not alone be sustainable, but would generate a healthy profit to expand and reinvest back into the area. With a capital cost of about US\$65,000, annual Current Costs of about US\$95,000, and income of over US\$150,000, it would pay for itself in just over a year, and reap profits of about 50% thereafter.

Significant costs savings can be made through the provision of community assets. But the key cost outgoing is clearly bandwidth; and the key income generator is VoIP telephony. In the long term, bandwidth costs are likely to fall.

But the big unknown is whether such a volume of VoIP telephony use could be generated, even at such low cost, especially as it will be confined initially to within the local area. Furthermore the hand units are not individually held so that contacting the desired person may be time consuming, reducing the utility.

6. Conclusion

The race is on.

Someone is going to take advantage of the potential of low cost IP based networks, carrying voice and data. The question is: Where will most of the benefits go?

Private-sector led development, already taking off in Kenya and on the brink elsewhere, will bring lower costs and will undoubtedly challenge the dominance of the mobile operators. Lower costs will bring benefits to rural communities.

But going down the route of *community-owned network cooperatives* promises much greater gains for communities and for development. Community enterprises retain all the profits and much of the local expenditure within the area; they build capacities at the technical level but also in terms of enterprise development at micro and macro levels; they generate worthwhile employment within the area; they maximise the ICT benefits through developing services that they really need; and they contribute to wider development by building a focus for broader empowerment and development actions.

This is what ICT empowerment is about.