2. Empowering Communities through ICT Cooperative Enterprises: The Case of India*

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Information and Communication Technology (ICT) strategies and poverty reduction strategies have tended to develop in parallel, telecentres being one of few areas of overlap. As a result, poor communities cannot fully exploit the potential of ICTs, and indeed the growth in ICTs at the national level may result in further marginalisation. The Community-Driven Network is seen as one possible way forward – a community-owned enterprise offering telephony and ICT services focusing on the needs of the poor. Its goal is to capture as much as possible of the benefits of an ICT enterprise within the community itself. Using a wireless broadband local network and low cost technologies, this option is being explored in several countries, including Cambodia and Rwanda. A preliminary feasibility analysis of building such a network in rural India suggests financial sustainability, based on leveraging local resources and offering low-cost Voice over Internet Protocol (VoIP) and a suite of other ICT services. This approach merits further investigation.

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 local 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 challenges facing poor and marginalised 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 networks[1] and cooperatives may offer an avenue to such empowerment in underserved rural grassroots 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

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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 Ó Siochrú and Girard (2005, 14). The following draws from this report.

continued development of the community, a critical factor in an age where many rural communities are becoming increasingly economically and socially marginalised.

This paper outlines the background, ongoing work in the area, and a generic business plan. It is a preview of ongoing work supported by the United Nations Development Programme (UNDP) and International Development Research Centre (IDRC), in which the author is participating, respectively, as Programme Coordinator and Chief Research Advisor. It applies that work to a hypothetical case of a rural village in India.

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.

Although initially 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 Digital Opportunities Initiative (http://www.opt-init.org/framework.html), the eSee Agenda Initiative (http://www.eseeinitiative.org/) in South Eastern Europe, and the Asia-Pacific Development Information Programme's (APDIP) work in Asia (http://www.apdip.net/).

Second, in a parallel universe seldom touching the other, twenty years ago the development community, too – donors, policy makers, NGOs and others – was barely aware of the potential of ICTs. A process of experimentation and education began (including the Sustainable Development Networking Programme), until ideas such as telecentres and cybercafés, 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. Telecommunications and ICT policy too often remain distant from development

policy and poverty reduction strategy. At the local level, there is often little connection between, for instance, universal access measures, initiatives aimed at delivering services, and poverty alleviation enabled by ICTs (Mureithi et al. 2006; Nsengiyumva et al. 2007; Mutagahywa et al. 2006; and WOUGNET 2007).[2] There have been calls for the two to be connected, not least in the World Summit on Information Society (WSIS), but success so far has been limited.

Bringing telecommunications/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 (Esselaar et al. 2007). The fixed line networks, shackled with inappropriate regulation and policy and their own internal inertia, failed to build out significantly, resulting in woefully inadequate backbone networks and inflated tariffs for international data 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 their 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;

[2] This was the conclusion for instance in the recent policy studies undertaken in Rwanda, Uganda, Kenya, and Tanzania.

- In the absence of fixed lines and low-cost international connections, bandwidth charges remain extremely high for ICT services, usually relying 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 the use 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 enterprises 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.

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, cybercafés 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.

Enabling Conditions

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

1. 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 it 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.

2. 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 telecommunications 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 telecommunications 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 (Gillwald 2005). In East Africa, such licenses are possible in Kenya (Mureithi et al. 2006) and Tanzania (Mutagahywa et al. 2006), 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 developmental remit than previously. Overall, then, the experience of failure is bringing more flexibility and more imagination to policy and regulation.

3. 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 standard form for rural telecommunications provision in the USA is the cooperative, 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.

Financial Sustainability

This concept requires sustainability of several kinds. As an initiative focusing on poverty reduction, it must be capable of sustaining its social inclusion dynamic and ownership structures. Underpinning these is also an enduring development question of financial sustainability. And achieving financial sustainability can mean a lot more than staving off project closure when donor funding dries up since it opens the door to replication and upscaling and policy, regulatory, and financing support. A financially sustainable business model is thus much sought after.

The generic financial sustainability of the community-driven network 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 cost 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 provided on the same principles as the lowest-subsidy auction, i.e., a once-off investment is sufficient to launch a service that is sustainable thereafter.[3] A further policy measure, currently possible in Uganda, is to allow rural telephony networks to receive asymmetrical interconnection charges,[4] 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. 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.

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 and design in four pilot areas of East Africa. The particular regulatory and services provision circumstances of India have also been considered.

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.

1. Basic Characteristics of a Community Owned Network Enterprise

The individual components of the model are:

A Community-Owned Network Cooperative (Co-op): 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.

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[3] See the preliminary rethinking of universal funds evident in Regulatel et al. (2006). 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.

[4] Also see Dymond and Oestmann (2002) and the ITU (2003).

Institutional Partners: These are the originating partners of the Co-op, establishing it and holding it on behalf of the community, and they 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 overall Co-op 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 Co-op that specifies how much they charge customers and how much they pay the Co-op for these services. These may be private entrepreneurs, including shopkeepers or simply individuals, or may be non-profit entities and NGOs.

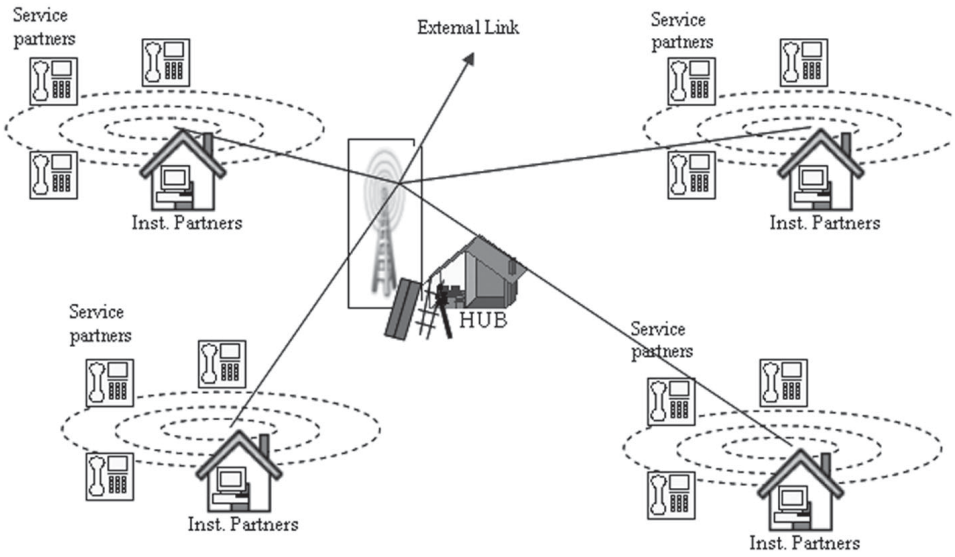
The Co-op is managed by a **Management Board** comprising representatives of the Institutional Partners, of the Service Partners, and of directly elected villagers.

Broadly speaking it exhibits the following characteristics:

1. Bandwidth is aggregated between the various Co-op stakeholders, institutional and entrepreneurial, thereby reducing costs to each;
2. Regular income is generated from core Co-op Institutional Partners;
3. Public services – e-government – are provided by the Co-op 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 Co-op 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 cooperative with the following physical characteristics, though of course these will in reality vary significantly in different geographic and terrain conditions:

- 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 10 kilometres from the Hub using for instance an Omni Wimax solution.
- 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 Mbps downlink and 512 Kbps 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.

2. 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 cooperative. These figures are based on actually sourced equipment at current international prices.

Table 1: Initial Network Capital Cost (US$)

Initial Network Capital Cost (US$)			
Description Local Infrastructure	**Number**	**Cost/Unit**	**Total**
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	5,500	5,500
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			0
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			**60,660**

Thus the total capital cost of equipment and installation comes to just over US$60,000.

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.

Table 2: Solar Power System for Hub (US$)

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: PCs have LCD screens, 3 mast lights @ 50 watts)

Total capital costs are thus in the region of US$70,000, for this configuration.

3. Current Costs

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

Table 3: Estimated Current Costs Annually (US$)

Estimated Current Costs Annually (US$)			
Description	**Number**	**Cost per unit US$**	**Total**
External Bandwidth			
VSAT 256kbit/2mbit month * 2 (4,400 a month)	12	3,750	45,000
Depreciation			
25% depreciation on capital equipment			15,000
Hub Staff			
Manager, per month (4,000 rupees)	12	175	2,100
Trainer per month (6,000 rupees)	12	262	3,150
Technical Manager	12	200	2,400
Other			
Office needs, transport etc.	12	1,000	12,000
TOTAL			**79,650**

This model assumes just three staff: a manager, a trainer, and a technical manager to maintain the system. Depreciation at 25 percent suggests an average life of four years for the equipment. The bandwidth is based on current VSAT costs quoted by Hughes Satellite, one of the largest suppliers in India. The office costs are an initial estimate that might include for instance insurance, security, office needs, and a means of local transport.

By far the largest single component is the external bandwidth charges. Yet India has a very extensive optical fibre network which, if it can be tapped into more effectively, has huge potential to bring prices down and bandwidth availability up (see below).

4. 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 an area appropriate for public access.
2. A location for the transmission mast, including its footprint (which, depending on the type used and the height, can cover quite a large area).
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, which would require some initial training and support from the Technical Manager.

6. Billing and fee collection from the VoIP Service Partners, who would also provide appropriate access for the public to use the services.

7. A voluntary Board of Management.

8. The provision of electricity in all centres except the Hub.

5. Potential Income

The goal, in terms of income for the networks, is to combine a number of different potential sources, thereby spreading the sustainability base and avoiding too much dependence on a single source. The proposed configuration opens up a number of possible sources of income. However, the specific combination and the relative weight of each will vary hugely between different settings, both nationally and internationally.

Among the possibilities for income that have been identified as feasible are the following. Each is considered for its specific applicability and potential in a rural area of India.

1. The network of about 20 computers can be utilised for public use, to access the Internet, word processing, and so forth. The income generated is limited, and some competition might be present from cybercafés (if they exist) and so forth. An income is forecast here of about Indian Rupees (INR/Rs.) 35,000.[5]

2. The network of Institutional Partners would each pay a contribution for their Internet access and local networking and telephony and voice use. This is set at about Rs. 1000 a month.

3. The potential income from VoIP services is more speculative. India is almost unique among developing countries (or any country) in having succeeded in driving down the cost of mobile phone use, and also in having an extensive copper, fixed line network. The cost per minute of mobile phone use in much of Africa and many other countries can be as much as a multiple of five or even ten, as compared to India. Thus the potential to generate income from the VoIP local network is accordingly less.

   The assumption here is that the VoIP phones will have interconnection within the local network itself for free (once the above costs are covered), and that interconnection will be possible to fixed lines both locally and globally at a low cost (perhaps Rs. 0.20). (For this exercise we leave aside the possibility of interconnection with the mobile network.) These services are expected to be developed successively, not all at once, and the viability

[5] 1 US$ = INR 41

of each can be tested. The first services will be very low cost telephony within the network of VoIP handsets themselves, and then to fixed lines locally, nationally, and internationally.

Our set of much simplified, though plausible, additional assumptions, are as follows.[6] The current cost per minute, from fixed line, mobile, or public telephone averages Rs. 0.75 per minute; long-distance to fixed lines averages about Rs. 2.00 per minute, and international is about Rs. 8.00 per minute. If each of the 120 VoIP handsets is used for 100 minutes per day for 30 days of the month, the total usage comes to about 360,000 minutes per month. If local calls within the network or to fixed lines could be sold for Rs. 0.20 per minute, national calls to fixed lines for Rs. 1.00 per minute, and international calls at Rs. 2.00 per minutes, and each is sold in equal volume; a total return of over Rs. 385,000 could be achieved every month. Interconnection costs, at Rs. 0.20 per minute, would amount to about Rs. 90,000 per month, leaving net income of Rs. 295,000 for the micro-entrepreneurs.

Assuming micro-entrepreneurs can each earn Rs. 0.50 average for each minute sold (less for local calls, more for international), their total income would amount to Rs. 180,000 between 120 of them, or about Rs. 1500 each (about US$65) each per month. This would leave a net income to the cooperative of about Rs. 115,000 per month, about US$5000.

4. If income from VoIP telephony is likely to be less than in other developing countries, there is now an opportunity in India to generate income from another source: the Common Services Centres (CSC) programme. Launched by the Department of Information Technology as part of the National E-Governance Plan, this programme is open to all States in India to develop a network of 100,000 rural centres – one for every six census villages – at which citizens can gain access to e-government services. CSCs are seen as the front-end delivery points for government, private and social sector services to rural citizens of India, in an integrated manner. The objective is to develop a platform that can enable government, private and social sector organisations to align their social and commercial goals for the benefit of the rural population in the remotest corners of the country through a combination of IT-based as well as non-IT-based services (Government of India 2006).

The operation of the Centres themselves is to be contracted out to entrepreneurs, who will be able to charge for the services an agreed amount. The local cooperative enterprises described here would be in an ideal position to implement such a programme, connecting in to local needs and offering a positive environment in which such services could be offered. The fact that the charges for government services would be invested back into the community enterprise, instead of channelled into private hands, is an added advantage.

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[6] This is based on the Table 3.12, 'Comparison of BSNL's Present Tariffs of Base Service and Cellular Mobile Service', in Singh (2006), and figures supplied to the author.

It is impossible at this point to estimate realistically the amount of income that could be generated. However, given that the CSCs are intended to create the basis for viable enterprises, as service delivery agents, an income of Rs. 5,000 is the assumption here.[7]

The CSC are intended also to develop private services, on the platform of their e-government offerings. The community-owned model has a staff of three and the capacity among institutional members to develop a wide range of additional services. A number of successful models of community organisations, providing a range of services to villagers, and achieving a degree of sustainability through charging for them, already exist in India (Ó Siochrú and Girard 2005, Annex). We suggest these additional services could raise a further Rs. 5000 per month.

These assumptions yield the following estimate of income for the cooperative enterprise.

Table 4: Estimated Monthly/Annual Income US$

Estimated Monthly/Annual Income US$			
Description	**Units Per month**	**Income US$ per unit**	**Total**
Computer and Internet use			
Service Hours 20 PCs * 6 hours * 25 days c. Rs. 35,000	3,000 hours	0.50	1,500
Institutional Partner fees (15 initially, Rs. 1,000 a month each for network services)	15	45.00	675
Available VoIP minutes			
VoIP 120 handsets*100mins*30 days	360,000	variable	5,000
Other Services			
E-government services (CSCs) Rs. 5,000/month			220
Other services Rs. 5,000 /month			220
TOTAL Monthly			
TOTAL Annual			**91,380**

6. The Business Conclusion

Within the context of the assumptions here, a community-driven network cooperative would not only be sustainable, but would generate a profit to expand and reinvest back into the area. With a capital cost of about US$70,000, annual current costs of about US$80,000, and an annual income of over US$91,000, a plausible case for the sustainability of the model is made if some initial subsidy is available to partly offset the set-up costs.

[7] See http://www.mit.gov.in/vol1rfpcsc.pdf for the template for the official Request for Bids for CSCs that individual Indian States will issue. An example to explain how revenue offsetting works (p.53) suggests a revenue figure of Rs. 3000 per CSC per month. As conceivers of this scheme, the authors have an interest in parties bidding low for expected support, to keep the subsidy low. The figure of Rs. 5000 per month we are using is therefore not unreasonable.

The model relies on a number of key factors: It assumes that significant cost savings can be generated through the provision of community assets. The key variable of costs is the price of bandwidth; and the key income generating variable is the potential of VoIP telephony to undercut existing models.

Of course, one could argue that the assumptions are set at a level that deliberately suggests sustainability. There is some truth in this – a few changes here and there to the model would change the final outcome significantly. However the question is ultimately whether or not these assumptions are plausible. If they are, then the model merits further investigation.

Regulatory and Policy Issues in India

A number of regulatory and policy issues arise in relation to community-owned ICT enterprise and the provision of services including VoIP.

1. Licenses for Local VoIP Networks

The cooperative conceptualised here would provide telephony services to a local area, both within the area and interconnecting outside. At present such a category of license does not exist in India (although private networks can be set up using WiFi). However, the regulator, Telecoms Regulatory Authority of India (TRAI), in 2005 recommended as part of a proposed Unified Licensing Regime that niche area operators, with minimum or no license fees and spectrum charges, be allowed to operate in areas with tele-density of less than 1 percent.

To increase penetration of telecom services in rural, remote, backward areas from telecom point of view, niche operators to be allowed in short distance charging areas (SDCA) with fixed rural tele-density below 1 percent, providing fixed telecom services including multimedia Internet telephony and other IP enabled services only in these SDCAs. These operators shall however, be permitted to use only wireline/fixed wireless networks. Definition of niche operators will be reviewed later (TRAI 2005).

Such areas may be particularly relevant to the low-cost cooperatives model since the competition for services would be relatively weak – though of course the available income is probably also low. Although no specific mention is made of community or cooperative ownership, this recommendation, suitably amended, could form an initial basis for appropriate policy and regulatory change.

Regulation regarding the sale of VoIP services is also relevant. At present, VoIP between computers and from computers to numbers outside India is permitted, but VoIP calls cannot be initiated or terminated on landline and cellular system within India. However, VoIP is widely used in practice and the rules are unenforceable: the policy will undoubtedly change. Furthermore under the proposed Unified Licenses Regime, those receiving a license would have all restrictions on VoIP telephony lifted (InfoDev and ITU).

2. Availability and Access to Optical Fibre

Optical fibre is surprisingly widespread in India, owned by a variety of companies and entities. According to one Ministry of IT official, every village in India is within 25 kilometres of an optical fibre cable (Govind 2004). Thus in principle, the backbone infrastructure already exists to provide high bandwidth at low cost (relative to satellite) to every village. This would greatly enhance the viability of enterprises offering IP-based services in rural villages.

Connecting into them seems to be relatively unproblematic. At the technical level, installing the appropriate termination hardware is routine, and operators are eager to sell. The public operator, Bharat Sanchar Nigam Ltd. (BSNL), charges Rs. 17,000 annually for each 5 kilometres it lays to link to the customer premises, and usage charges for 2 Mbits from BSNL are reported to be Rs. 1200. BSNL and other suppliers, such as the public railway company Railtel, are more than willing to sell and are seeking sources of demand since much of the fibre is underutilised. At least one development-oriented project already purchases BSNL bandwidth to supply a mesh Wifi network serving 32 points.[8]

One obstacle to opening up the fibre to a village cooperative might be around resale, which is currently in a regulatory vacuum. The position of the fibre suppliers is not known here but there is reason to hope they would welcome it. However, currently most public sector owned fibre is lying idle due to lack of demand and the absence of a business model to sell. Only a handful of funded projects are currently exploring the potential of broadband.

There is thus almost unlimited broadband bandwidth, owned by the public sector, running very close to most villages. Its use depends on (1) a large number of communities/projects seeking connectivity, which would reduce the cost towards urban levels, and (2) government policy to encourage the public sector to take a proactive role in stimulating demand through, for instance, very low or zero cost provision.

Clearly, the sustainability of the business model proposed here would be considerably boosted with such a significant fall in the cost of bandwidth. Assuming a distance of 25 kilometres from the nearest fibre, the annual cost of the last mile connection is Rs. 85,000 (about US$3750), and the annual charge for 2 Mbits in either direction of Rs. 144,000 (about US$635), a total of just US$4385. This is less than one tenth of the satellite costs used in the model of US$45,000 for 256 Kbps up and 2 Mbps down. Thus, a cooperative could afford to purchase vastly more external bandwidth, and still make huge savings.

3. The CSC as a Cooperative Model

As noted, the community-owned enterprise could in principle take on the role of Common Service Centres, delivering e-government services to the community. An argument can be made that such an enterprise would be a more effective vehicle than a private commercial

[8] Email message to the author from Parminder Jeet Singh, IT for Change. 27 February 2007.

one to develop and deliver these services. Some of the CSC rhetoric lends support such an approach:

> the CSCs cannot be seen as mere service delivery points in rural India. The CSC is positioned as a Change Agent – that would promote rural entrepreneurship, build rural capacities and livelihoods, enable community participation and collective action for social change (Government of India 2006).

However, the Scheme as it stands clearly has in mind an individual private entrepreneur rather than a collectively-owned entity. At the village level it introduces the concept of a Village Level Entrepreneur (VLE) (loosely analogous to a franchisee), 'to service the rural consumer in a cluster of 5-6 villages.'

The VLE is the key to the success of the CSC operations. While content and services are important, it is the VLE's entrepreneurial ability that would ensure CSC sustainability. A good VLE is expected to have some financial strength, entrepreneurial ability, strong social commitment as well as respect within the community. The quality of service at the CSCs would depend a great deal on the quality of VLEs. Selection and proper training of the VLE, therefore would play a vital role in making the CSC Scheme a success (Government of India 2006).

Thus a case can be made to supplement the programme with features that would positively encourage community-owned entities to take the CSC role.

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 tariffs costs and may even challenge the dominance of the mobile operators. Lower tariffs 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.

References

Dymond, Andrew, and Sonja Oestmann. 2002. *Rural telecommunications development in a Liberalising Environment: An Update on Universal Access Funds*. Intelecon Research and Consultancy Ltd., http://rru.worldbank.org/Documents/PapersLinks Update_Universal_Access_Funds.pdf.

Esselaar, Steve, Alison Gillwald, and Christoph Stork. 2007. *Towards an African e-Index: Telecommunications Sector Performance in 16 African countries.* Johannesburg: Research ICT Africa.

Forum of Latin American Telecommunications Regulators (Regulatel), World Bank, and UN Economic Commission for Latin America and the Caribbean (UNECLAC). 2006. *New models for universal access in Latin America: Draft Report*. http://www.regulateonline.org/content/view/873/32/.

Gillwald, Alison. 2005. Stimulating investment in network extension: The case of South Africa. In *Stimulating Investment in Network Development: Roles for Regulators,* eds. Amy Mahan and William Melody. World Dialogue on Information and InfoDev. http://www.infodev.org/en/Publication.12.html.

Government of India, Department of Information. 2006. *Guidelines for implementation of the CSC scheme in states.* http://www.mit.gov.in/download/cscguidelines.pdf.

Govind. 2004. *Internet and IPv6 road map for India.* Conference Presentation by the Director, Ministry of Communication & Information Technologies. January 21, http://www.cu.ipv6tf.org/casos/mcit-ipv6-2004.pdf.

InfoDev and ITU. n.d. *Practice note: Types of converged licenses in India*. http://icttoolkit.infodev.org/en/PracticeNote.aspx?id=2390.

ITU. 2003. *Birth of Broadband. ITU Internet Reports.* Geneva: ITU. http://www.itu.int/osg/spu/publications/sales/birthofbroadband.

Mureithi, Muriuki and Alice Wanjira Munyua. 2006. *Making ICT work for the poor in Kenya: In search of an entry strategy framework*. New York: UNDP (PPICT Project report). http://www.propoor-ict.net/content/blogcategory/24/53/.

Mutagahywa, Beda, Respickius Casmir and Theophilus E. Mlaki. 2006. *Pro-Poor ICT Project Report – Tanzania: A community-owned network.* New York: UNDP (PPICT Project report). http://www.propoor-ict.net/content/blogcategory/24/53/.

Nsengiyumva, Albert, Emmanuel Habumuremyi and. Sharon Haba. 2007. *A Community-driven network makes it happen*. New York: UNDP (PPICT Project report). http://www.propoor-ict.net/content/blogcategory/24/53/.

Ó Siochrú, Seán, and Bruce Girard. 2005. *Community-based networks and innovative technologies: New models to service and empower the poor.* New York: UNDP. http://www.propoor-ict.net.

Singh, Harsha Vardana. 2006. *Asian backbone study: A general model applied to India,* World Dialogue on Regulation. http://www.regulateonline.org/content/view/769/70/.

TRAI (Telecoms Regulatory Authority of India). 2005. *Press release no. 8/2005: Issues recommendations on unified licensing regime*. January 13th, http://www.trai.gov.in/trai/upload/PressReleases/116/pr13jan05.pdf.

Women of Uganda Network (WOUGNET). 2007. *Uganda country-based research, policy support and advocacy partnerships for pro-poor ICT.* New York: UNDP (PPICT Project report). http://www.propoor-ict.net/content/blogcategory/24/53/.